

# THE UPPER ZONAL BIRD-LIFE OF MTS. RORAIMA AND DUIDA

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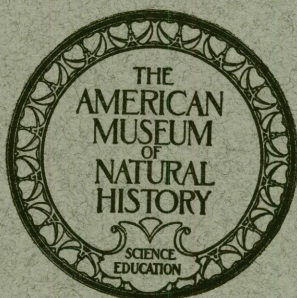
BY FRANK M. CHAPMAN

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## BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY

VOLUME LXIII, 1931

ARTICLE I



NEW YORK

1931



THE UPPER ZONAL BIRD-LIFE OF  
MTS. RORAIMA AND DUIDA

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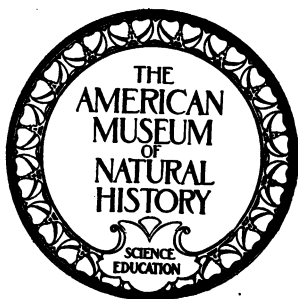
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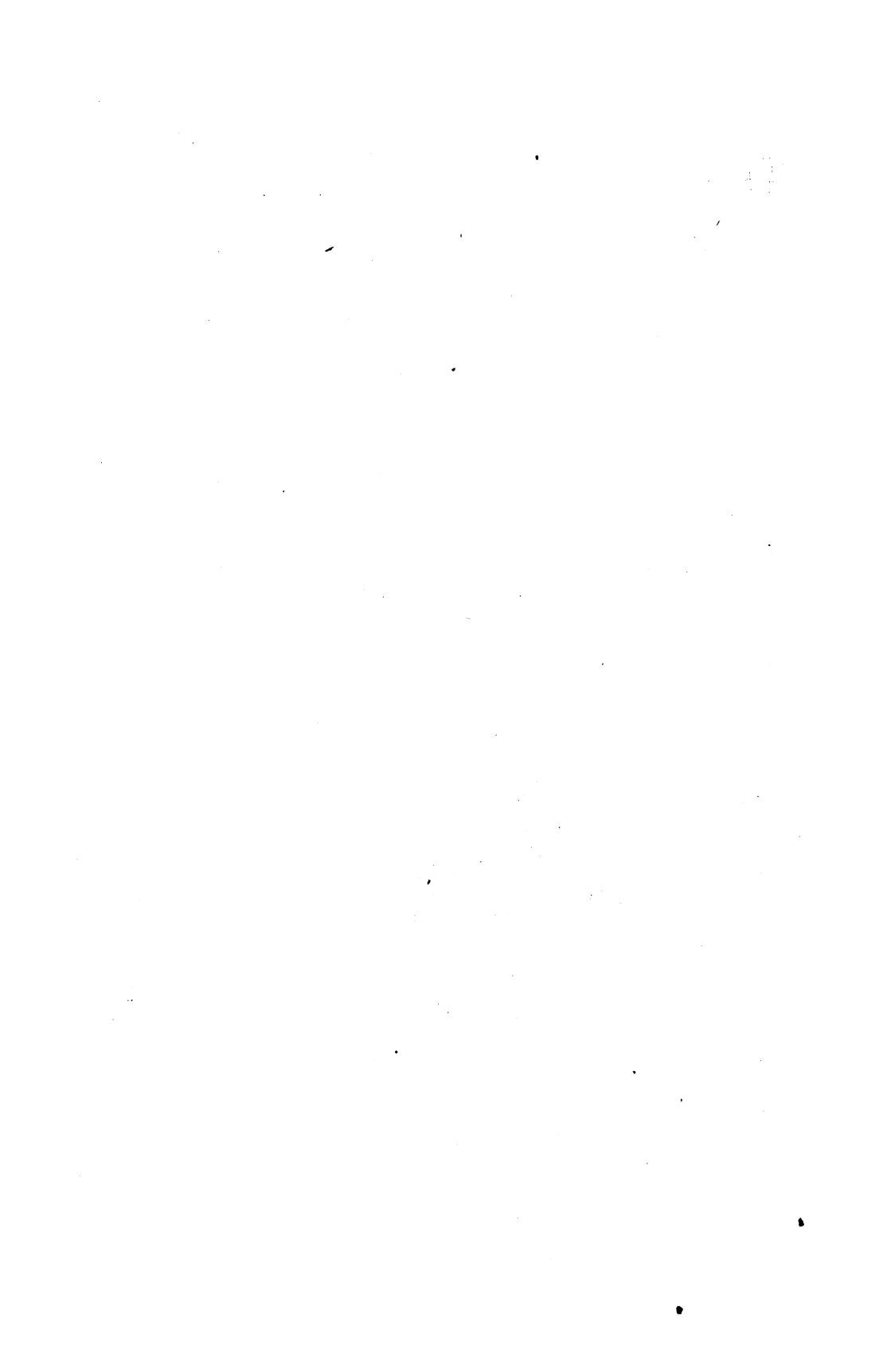
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Article I.—THE UPPER ZONAL BIRD-LIFE OF MTS.  
RORAIMA AND DUIDA

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## PART I INTRODUCTION

In 1927, the American Museum despatched the Lee Garnett Day Expedition to Mt. Roraima at the junction of British Guiana, Brazil, and Venezuela. The following year, in continuation of the same biological project, the Tyler Duida Expedition was sent to Mt. Duida, Venezuela, about 400 miles south-southwest of Mt. Roraima.

In a preliminary paper<sup>1</sup> on the birds of the Day Expedition it was said that a fuller report was deferred in the hope that collections then being made by the Tyler Expedition on Mt. Duida would throw some light on the problems presented by the bird-life of Mt. Roraima. This hope, it is believed, has been fulfilled. The fauna hitherto supposed to be largely restricted to the upper life-zone of Mt. Roraima has been found in the corresponding life-zone of Mt. Duida, thereby widely extending the area it occupies and confirming many phenomena in distribution which previously had rested solely on our knowledge of the Roraiman fauna. Furthermore, the boundaries between life-zones are so much better defined on Duida than they are on Roraima that the problems of the origin of its zonal forms are correspondingly simplified.

In view, therefore, of the similarity of the bird-life of these two mountains and of the questions arising from its study, it is obvious that a report on our Roraiman and Duidan collections should be contained in a single paper. This report was completed June 1, 1931.

Our interest centers in the upper zonal life, and I have included here only such tropical species as occur above the lower limits assigned to the Subtropical Zone.

### ORNITHOLOGICAL HISTORY

#### MT. RORAIMA

Mt. Roraima was discovered by Robert Schomburgk in 1838, but it was not until 1842, on his second expedition, when he was accompanied by his brother Richard as naturalist, that birds were collected there. Then, according to Cabanis' report,<sup>2</sup> eight Roraiman forms were secured.<sup>3</sup>

It remained for Henry Whitely, forty-one years later, to reveal the richness of the indigenous avifauna of Mt. Roraima. Whitely's work was supplemented by that of Frederick V. McConnell and John J. Quelch who visited Roraima in 1894 and in 1898, in the latter year securing the first specimens from the summit of the mountain.

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<sup>1</sup>Amer. Mus. Novit., No. 341, 1929, p. 1.

<sup>2</sup>See Bibliography.

<sup>3</sup>Now known as *Campylopterus hyperythrus* Cabanis; *Systellura ruficervix roraimæ* Chapman; *Troglodytes rufulus* Cabanis; *Myioborus castaneicapillus* (Cabanis); *Atlapetes personatus* (Cabanis); *Zonotrichia capensis roraimæ* (Chapman); *Diglossa major* Cabanis; *Tangara guttata guttata* (Cabanis).

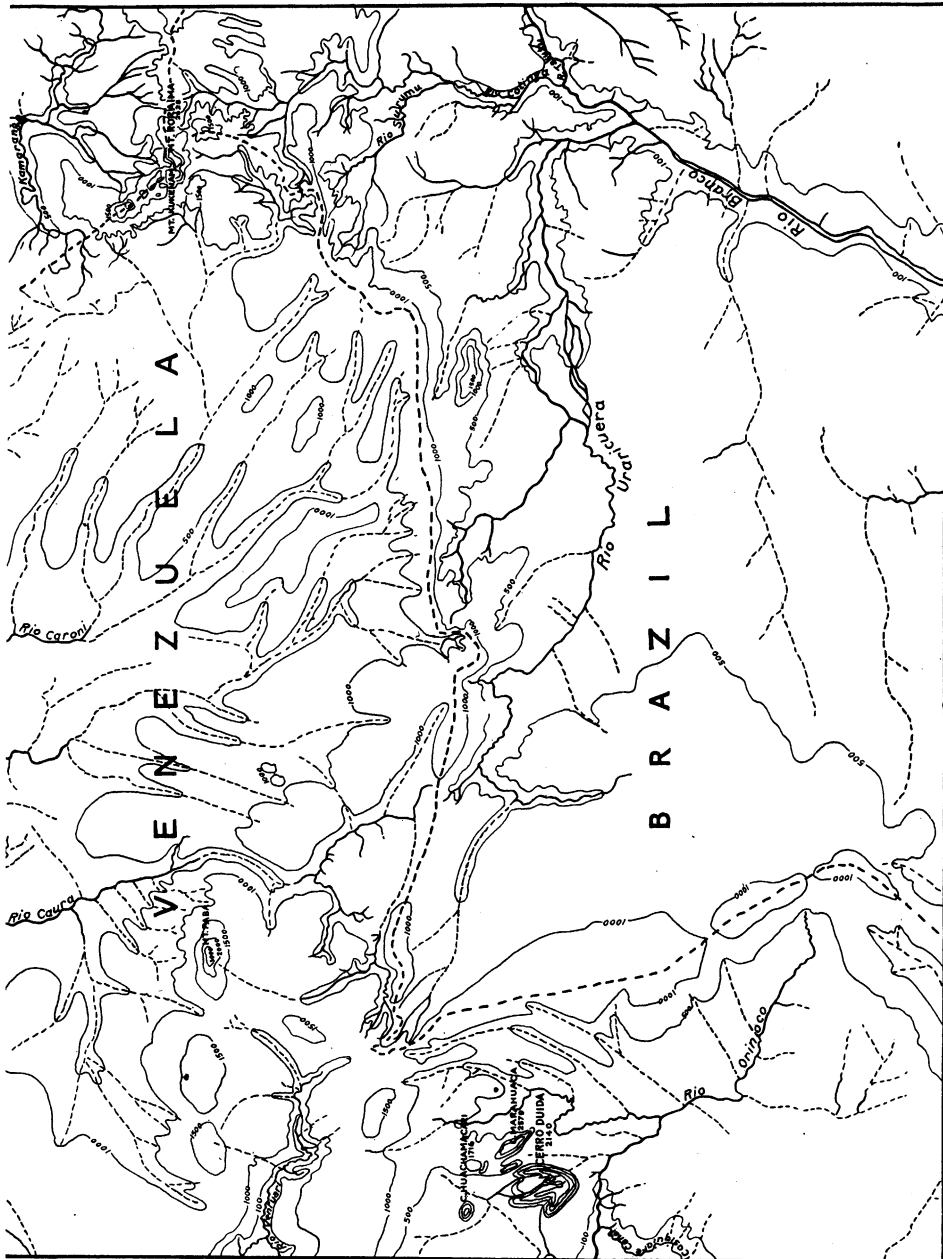


Fig. 1. Map showing relative positions of Mts. Roraima and Duida. Sketched by permission of the American Geographical Society from its millionth map of Hispanic America. Elevations in meters.

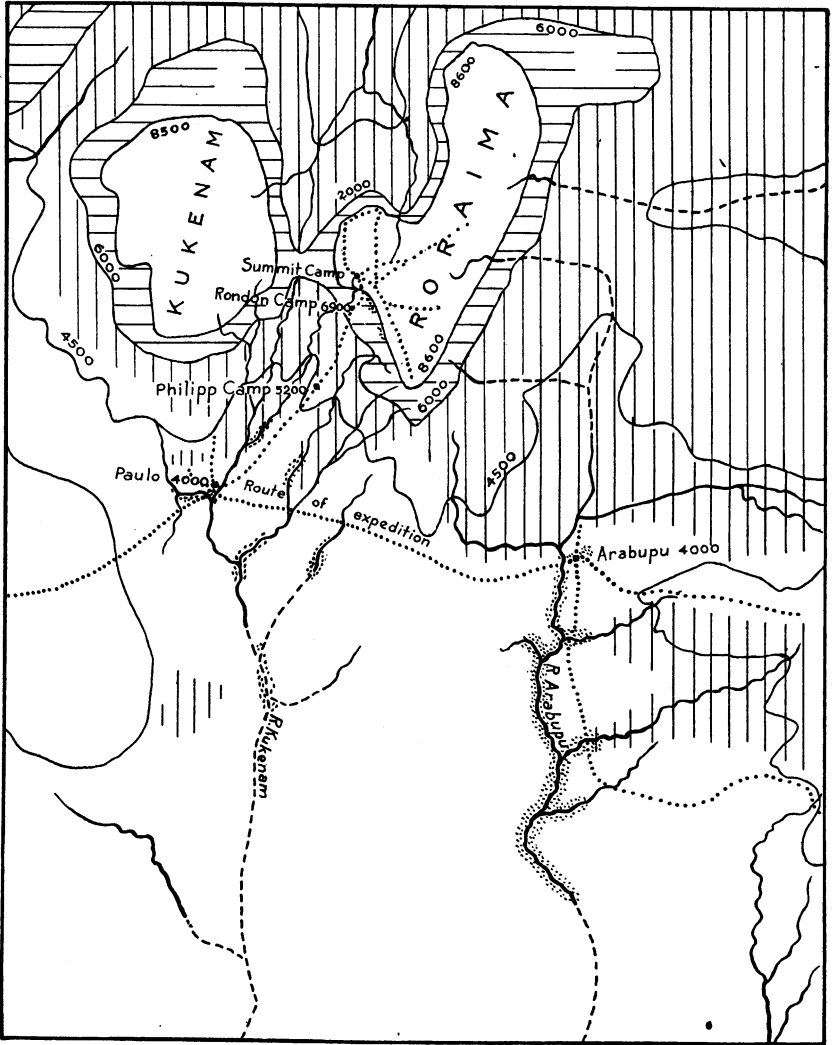


Fig. 2. The Mt. Roraima District.

Showing route (dotted line) and camps of the Lee Garnett Day Expedition and extent of savannas (open areas) and forests (lined areas).

From the MS. of G H. H. Tate



## THE LEE GARNETT DAY EXPEDITION

No further collections of Roraiman birds were made until 1927 when, in furtherance of a study of zonal faunas, and as a preliminary to a long-planned assault on Mt. Duida, the American Museum despatched an expedition to Mt. Roraima to secure specimens and, especially, more detailed information regarding the altitudinal distribution of the region's distinctive life than had previously been available.

This expedition was financed by Mr. Lee Garnett Day, of New York City. It was led by Mr. G. H. Tate, who was accompanied by Mr. T. D. Carter, both of the American Museum's Department of Mammals, and by Mr. Tate's brother, Mr. G. M. Tate, who served as a volunteer. It sailed from New York for the Amazon, July 9, 1927, and approached Roraima from the south by way of the Rio Branco. Collections were begun in the Roraiman district at Paulo on October 27, 1927 and continued until January 9, 1928. During this period Mr. Carter, with the aid of native hunters, secured 831 specimens and much important information concerning their distribution.

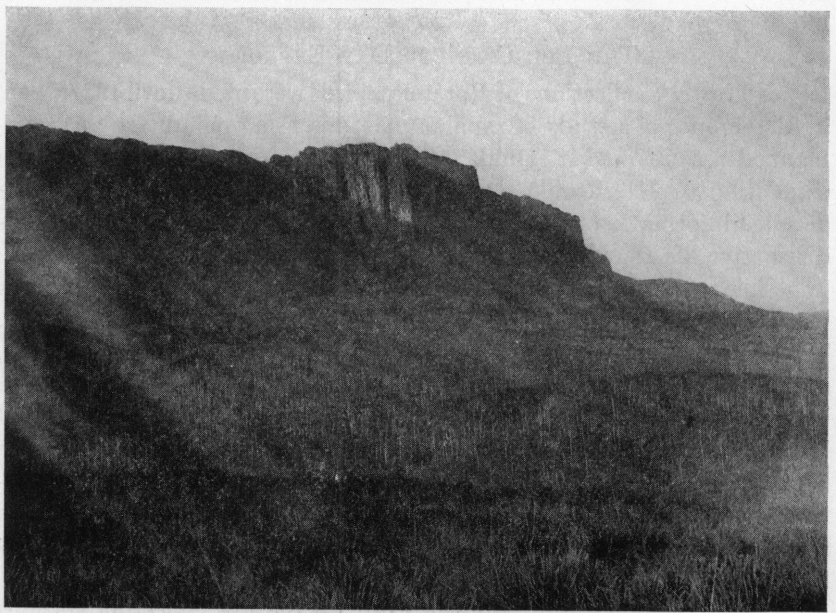
The appended information in regard to the five collecting stations established in the Roraiman district is taken from Mr. Tate's MS. notes and paper on the general characteristics of the region.<sup>1</sup> Tate writes that two years before his arrival, during a period of extreme drought, the greater part of the forests of the diabase slopes of Roraima had been destroyed by fire. "On the slopes sufficient surviving pockets of forests of various altitudes were discovered for the assemblage of collections representative of the rich fauna and flora that existed before the fire."

While this catastrophe handicapped the work of the expedition, the area of the Roraiman fauna proves to be so much wider than has hitherto been supposed, that its distinctive forms have probably suffered only locally.

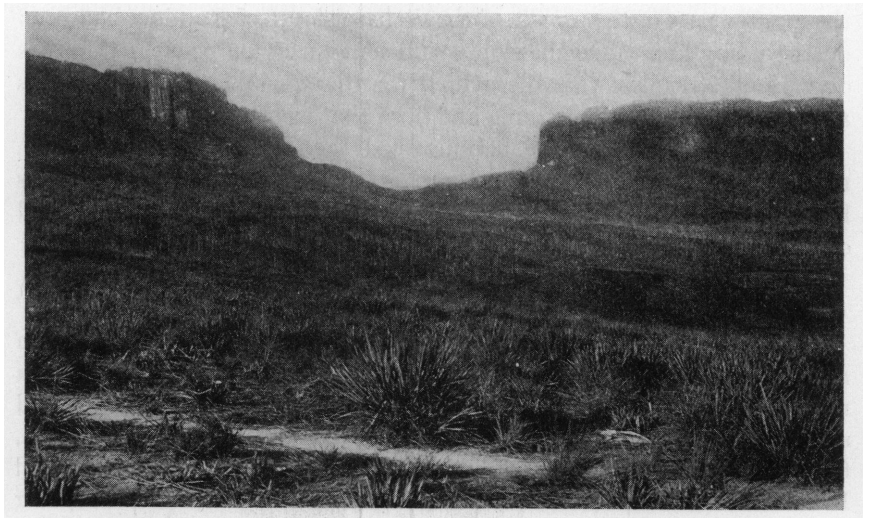
## Roraima Collecting Stations

Paulo (Alt. 4000 ft.).—"Paulo, an Arecuna village, some seven miles to the southwest of the cliffs of Roraima, stands at the tip of a ridge springing from the Kukenam foothills. The Kukenam River and another stream to the west, which unite a quarter of a mile to the south, flank the ridge. Before the conflagration the forest on the Kukenam and Roraima slopes extended to within a half a mile of Paulo; now, excepting a few small portions, damaged but not wholly destroyed, its place is taken by a deep mat of bracken, with innumerable bare whitening tree-

<sup>1</sup>Geogr. Rev., 1930, Jan., pp. 53-68; map and illus.



**Fig. 3. Roraima from Paulo, 4000 ft., distant 7 miles.  
Showing burned forests.**



**Fig. 4. Mts. Kukenam and Roraima from Paulo, distant 7 miles.  
Note burned forests on the intervening slope.  
(Photographs by Tate and Carter.)**

trunks thrusting through. Pokeweed, usually mixed with the all-pervading bracken, has grown in as a replacement plant very abundantly at altitudes of 4000 to 6000 feet.

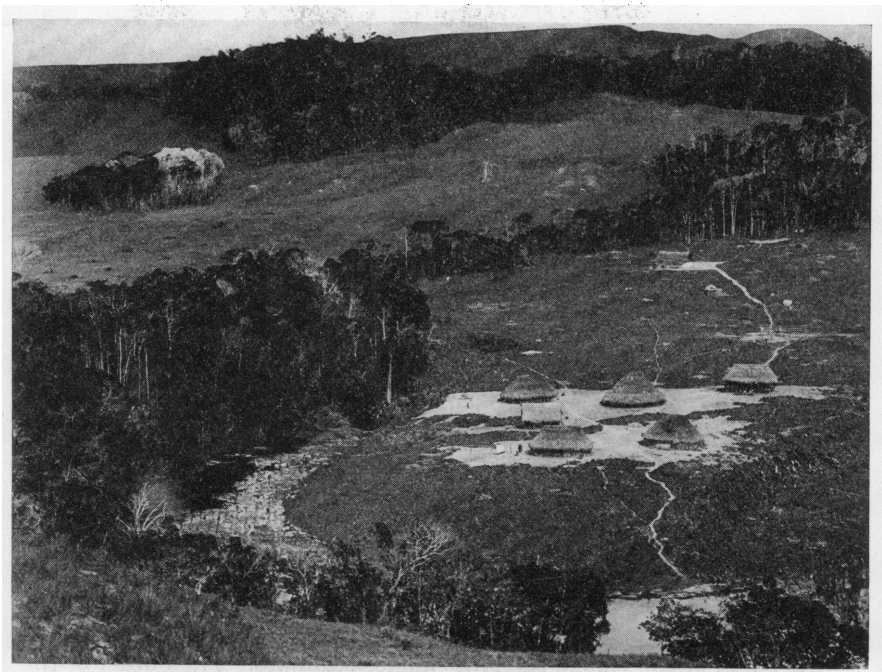
"The steeply sloping, dissected country south and east of Paulo is for the most part devoid of forest. Indeed, over much of its extent the land appears never to have been forested; and only in sheltered ravines and re-entrants small pockets of forest exist, invariably much damaged by fire. The character of these small tracts is similar to that of the extensive woods at Arabupu."

Arabupu (Alt. 4000 ft.).—"The village of Arabupu, about eight miles southeast of the base of Roraima, with a population of about fifty people, is named after the river on whose bank it stands. The river (Arapape on Brazilian maps) begins as a thin, silvery cascade, falling from the cliffs of Roraima near the middle of the southeast wall, and joins the Kukenam River some twenty-five miles to the south. Its valley is broad, chiefly savanna-covered, bordered on either hand by rolling hills from which issue numerous tributary streams. A mile or so to the north of the village the grass-lands terminate. The border of the great forest of Weitipu, stretching unbroken for some ten miles to the northern slopes of the mountain of the same name, lies half an hour's walk to the southeast.

"As will be seen from the sketch-map, the extensive forests of Arabupu, starting from the southeastern foothills of Roraima, curve around the northern end of the valley and over the ridge reaching southeast to Weitipu, and connect with the forest of Weitipu at its northern edge. In addition, small patches border the tributary streams of the Arabupu. Forest grows chiefly on the hillsides; the ridge-tops and river-valleys, except for strips of gallery-woods in the latter, are mainly savanna-covered."

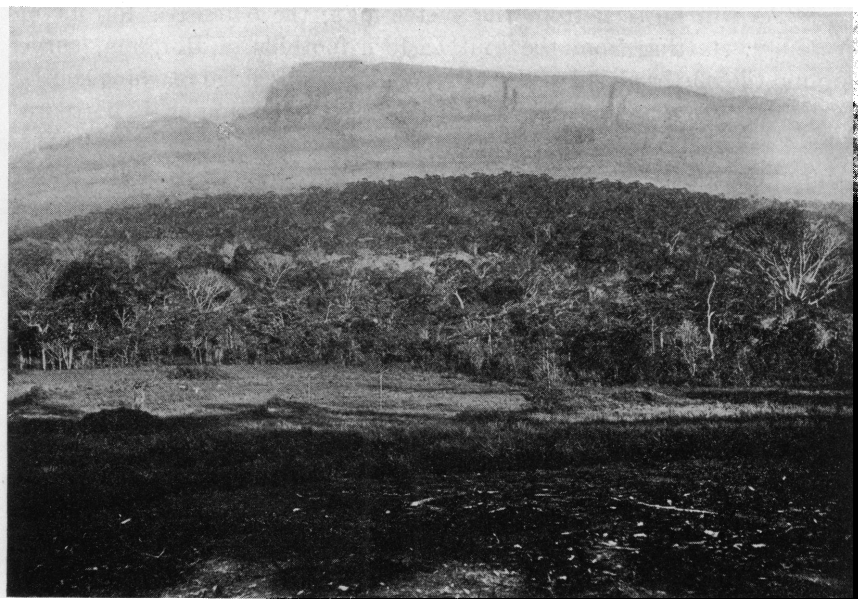
Philipp Camp (Alt. 5200 ft.).—"Directly up the southwest slope of Roraima and some five or six miles from Paulo, Philipp Camp, 5200 feet, is located in a little sandy plain cupped in a hollow of the hills. A stream of clear water flows not fifty feet away from the camp site and joins the Kukenam River. Numerous great sandstone boulders whose tops support certain rock-loving plants are strewn about.

"In Philipp Camp zone four distinct types of habitat, depending upon their relation to water and the water-table, are present. These, while they grade into each other at their edges, are at their highest development widely different. They are arranged below in order of the water-table level:

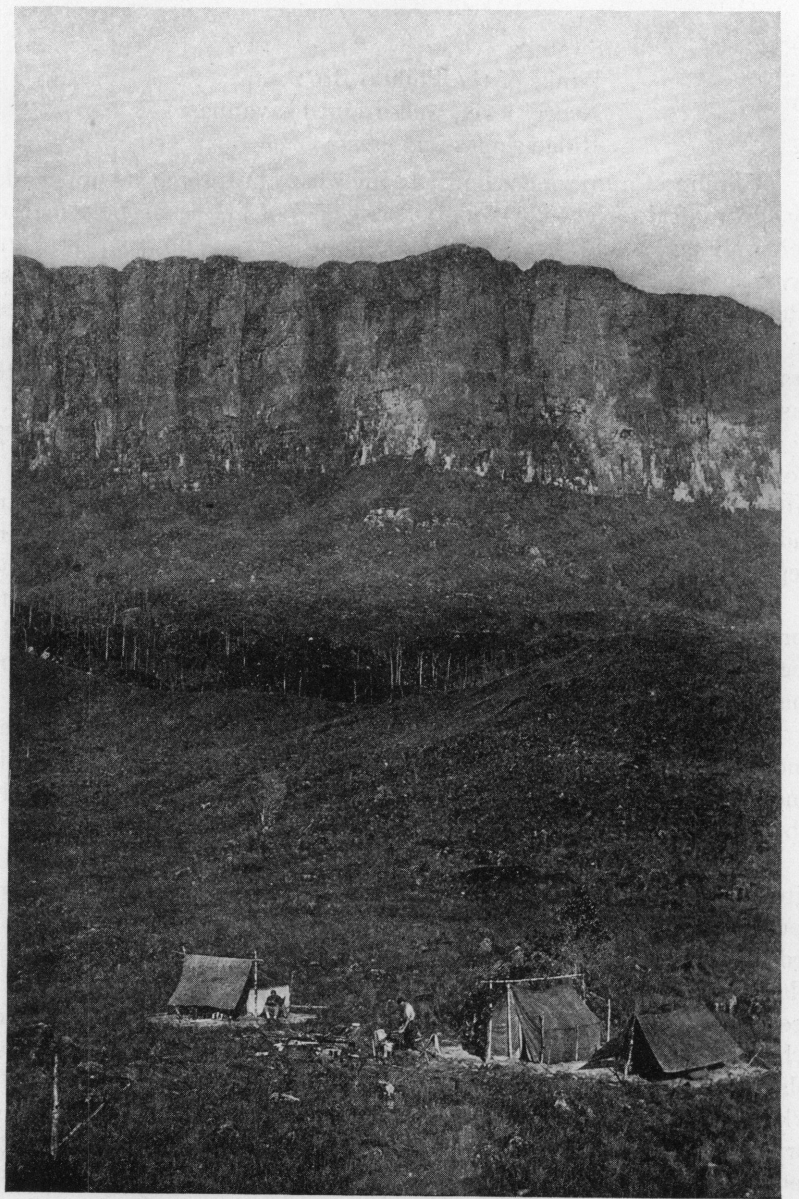


**Fig. 5. Arabupu, 4000 ft.**

The gallery forest marks the lower limit of the Subtropical Zone; the savannas are in the Tropical Zone.



**Fig. 6. Roraima from Arabupu, 4000 ft., distant about 8 miles.**  
(Photographs by Tate and Carter.)



**Fig. 7. Philipp Camp, 5200 ft.; Roraima and talus forest in the background.**  
(Photographed by Tate and Carter.)

## Swamps

Banks of the Philipp Brook

Nearly level, well-drained savanna

Ridge-slopes and crests

“Philipp Camp zone is limited somewhat abruptly at its upper edge by subtropical forest, 6000 feet. The 6000-foot line is strongly marked here only because of the strip of savanna which runs up from the Paulo savanna zone; this is the only tongue of grass-land of its kind, for elsewhere the slope is entirely covered with forest or the remains of forest. In the woods no sharp transition can be discovered, the lowland plants gradually giving place to vegetation of the higher zone. Such is also the case on the Arabupu side of the mountain.

“Between Philipp Camp and Paulo there is no sharp line. The slope is grassy, and its soil is sandy in places, in others composed of laterite. Transition from one zone to the next is barely noticeable, and indicated mainly by gradual changes of temperature, rainfall, and vegetation.”

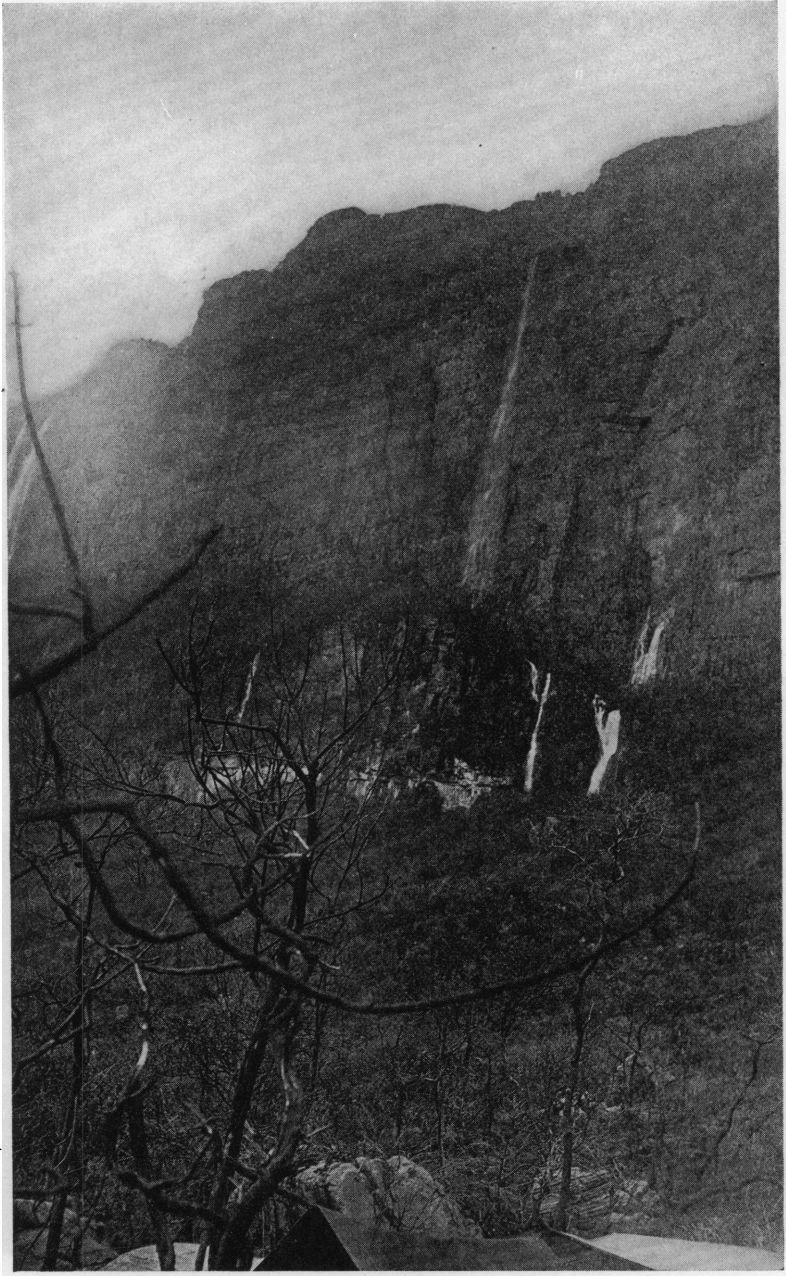
Rondon Camp (Alt. 7000 ft.).—“A large patch of uninjured cloud-forest at 7000 feet furnished the greater part of the collection from this region. Moreover, from Rondon Camp it was possible to work the remaining 500 feet up to the base of the cliffs.

“Before the fire this rain-forest formed an unbroken belt completely encircling the mountain. Now, only small patches of woods remain, and they are mainly in the deep valleys where a maximum of humidity obtains.”

Summit Camp (Alt. 8600 ft.).—“The camp, which occupied the site used by all previous visitors to the summit, was located in a shallow, rocky basin only a few hundred yards in extent close to the summit of the ledge. This basin, somewhat separated from the main part of the plateau by a line of “morros” or low mesas of sandstone a few scores of feet in height, is etched out of the pervading quartzite, and its floor, which is scarred with plant-filled seams and ruts, shows scarcely a level place. In the lowest portion humus has gathered to form small bogs in which *Sphagnum* and *Bonnetia* grow, the latter forming rather dense brushy areas which afford concealment for the scanty bird-life of the mountain top<sup>1</sup>; while along the bordering hillocks accumulated débris gives root-hold for plants which require a better drained habitat.”

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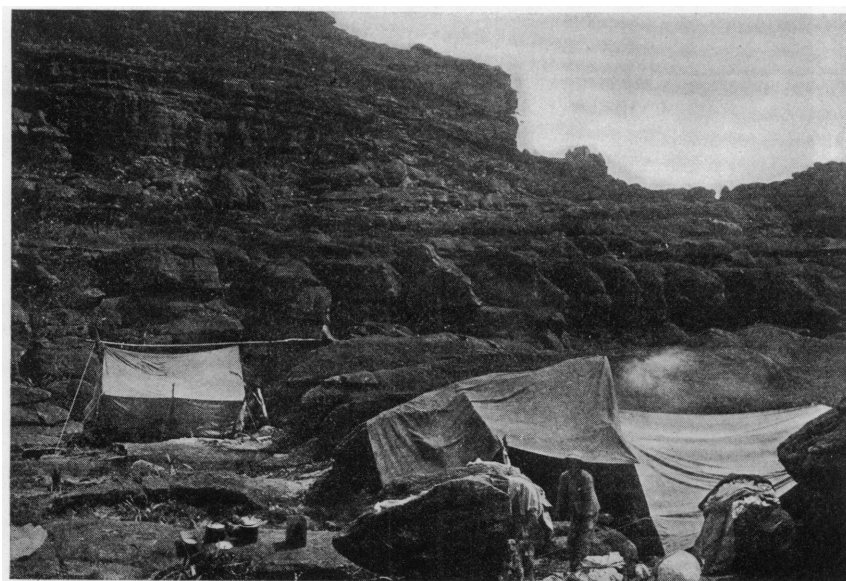
<sup>1</sup>*Zonotrichia capensis macconnelli* was the only species found to live on the mountain top.



**Fig. 8. Rondon Camp, 7000 ft., in the talus forest at the foot of Roraima.**  
(Photographed by Tate and Carter.)



**Fig. 9. On the Summit of Roraima, 8600 ft.**



**Fig. 10. Camp on the Summit of Roraima, 8600 ft.**  
(Photographs by Tate and Carter.)



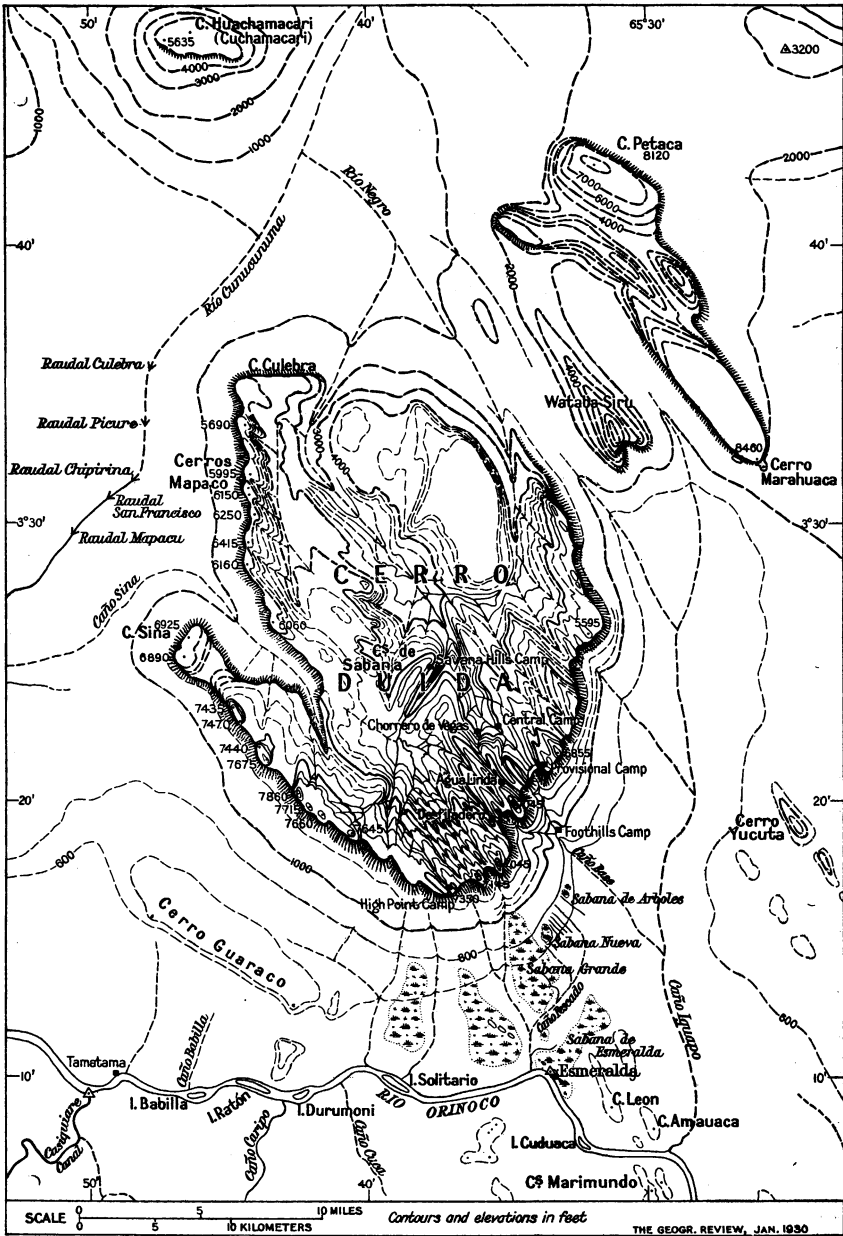


Fig. 11. Mt. Duida, scale 1:500,000.  
 (From the Geographical Review for January, 1930, p. 33.)  
 Courtesy of the American Geographical Society.

## MT. DUIDA

Although Mt. Duida was discovered by a Spanish boundary commission<sup>1</sup> in the middle of the eighteenth century, it is to Humboldt,<sup>1</sup> Robert Schomburgk,<sup>1</sup> and Richard Spruce<sup>2</sup> that we owe the limited information we have had concerning this mountain mass. This was acquired chiefly from a distance and no attempt was made to ascend the mountain. It was, however, stated by Humboldt that the mountain attained an elevation of nearly 8000 feet. This fact indicated the existence of a subtropical fauna the relations of which, in view of the isolation of the mountain, could not be surmised. In the belief that a knowledge of the life of this unknown area would be of assistance in the study of the origin of Andean zonal faunas which the American Museum had then lately undertaken, Mr. Leo. E. Miller, with one assistant, was despatched to Mt. Duida in 1912. Shortly after he reached the Rio Cunucunuma and was making plans for the ascent of the mountain, the serious illness of his assistant forced his return to Fernando de Atabapo, where further circumstances compelled him to abandon the project.

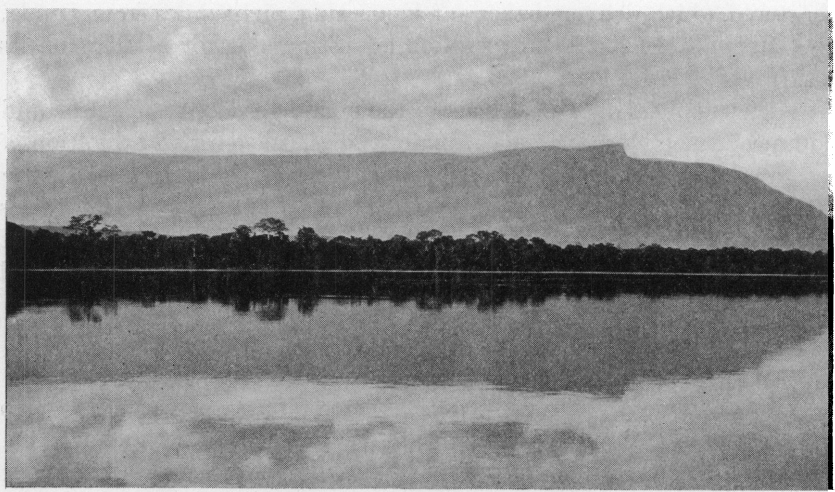
## THE TYLER DUIDA EXPEDITION

Although the exploration of Mt. Duida continued to be a cherished aim it was not until 1928 that our plans for its conquest materialized. Then, thanks to the generous coöperation of Mr. Sidney F. Tyler, Jr., of Philadelphia, funds were provided which enabled us to put a well-equipped expedition in the field. It was under the direction of Mr. G. H. H. Tate, whose success as the leader of our Roraiman expedition of the preceding year especially qualified him to attempt this more difficult undertaking. Mr. Tate was accompanied by Mr. Sidney F. Tyler, Jr., as historian and photographer, Mr. C. B. Hitchcock, as topographer and geologist, and Mr. R. S. Deck as ornithologist. Mr. Tyler and Mr. Deck were unfortunately invalidated home by illness contracted in the field, but not before the former, with Tate, had succeeded in ascending Duida.

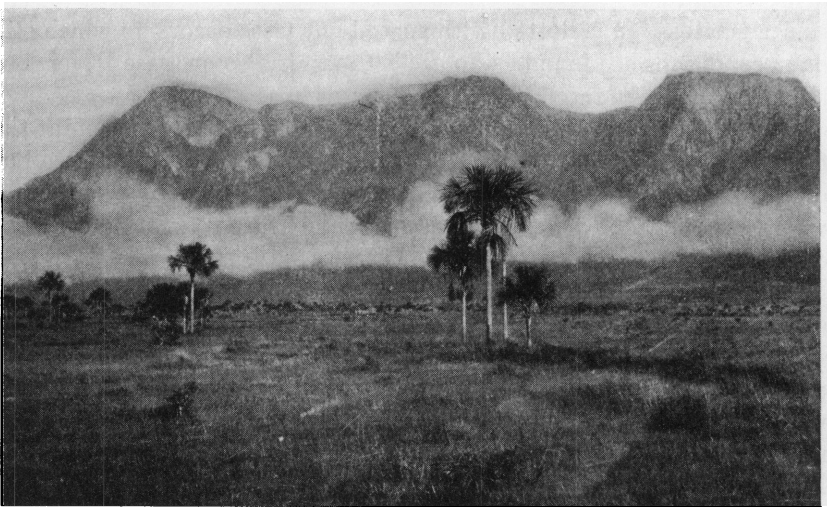
The expedition sailed from New York for the Amazon on July 21, 1928. At Manáos it was joined by Alfonso and Ramon Olalla, the Museum's Ecuadorean collectors, with their four native assistants. Chiefly to their labors we owe a collection of 6748 specimens, of which 1165 came from above an altitude of 3000 feet on Mt. Duida. The party

<sup>1</sup>For references see the paper by G. H. H. Tate and C. B. Hitchcock in the *Geogr. Rev.*, Jan., 1930, pp. 31-52; maps and ill., on the general physiographic results of the American Museum's Expedition of 1928 to Mt. Duida.

<sup>2</sup>Spruce, Richard, 'Notes of a Botanist on the Amazon and Andes,' two volumes, I, 1908, pp. 403-408, ill.



**Fig. 12.** Duida from the Orinoco below Esmeralda.



**Fig. 13.** Duida from the Grand Savanna, distant four miles.  
(Photographs by Tate.)

left Manáos September 3 for Santa Isabel where a special launch was chartered which delivered them at Esmeralda, eight miles from Duida, on October 1, 1928. The expedition left Esmeralda for Manáos on its return voyage March 18, 1929.

The conquest of Mt. Duida and the making of large zoölogical and botanical collections, and topographic studies, called for an exhibition of resourcefulness which should give this expedition a high place in the annals of natural history exploration. Some conception of the difficulties surmounted may be gained from Tate and Hitchcock's brief account quoted beyond. Eventually eleven collecting stations were established on the mountain. They are described by Tate as follows:

#### Duida Collecting Stations

Foothills Camp (Alt. 850 ft.).—"This was the base station at which supplies were accumulated for carrying to the summit of the mountain. It is well up on the talus slope but, owing to the fact that a spur runs out for a considerable distance from the cliffs, it has not the extremely humid climate of the Valle de los Monos Camp below. However, it is very densely forested. About 200 feet up the slope and on the crest of the spur a small savanna dotted with spaced-out trees occurs, in which still drier conditions are found. Foothills Camp is also on Base River, but the river instead of forming flood plains runs in a ravine."

Caño Seco (Alt. 2700 ft.).—"This station is high up the spur at the foot of which Foothills Camp is located. It is within the cloud area but due to the considerable run-off flowing water is quite scarce. Again a very heavily forested region with some admixture of subtropical trees commencing to appear."

Agüita Camp (Alt. 3250 ft.).—"A camp half-way up a slope which averages 40 degrees. The forest is transitional from tropical to subtropical but contains a high percentage of subtropical trees. This percentage increases as the slope is ascended. The station is placed within one of the re-entrant valleys of Duida and for this reason its rainfall is markedly heavier than that of nearby Caño Seco Camp. Agüita is well within the cloud belt.

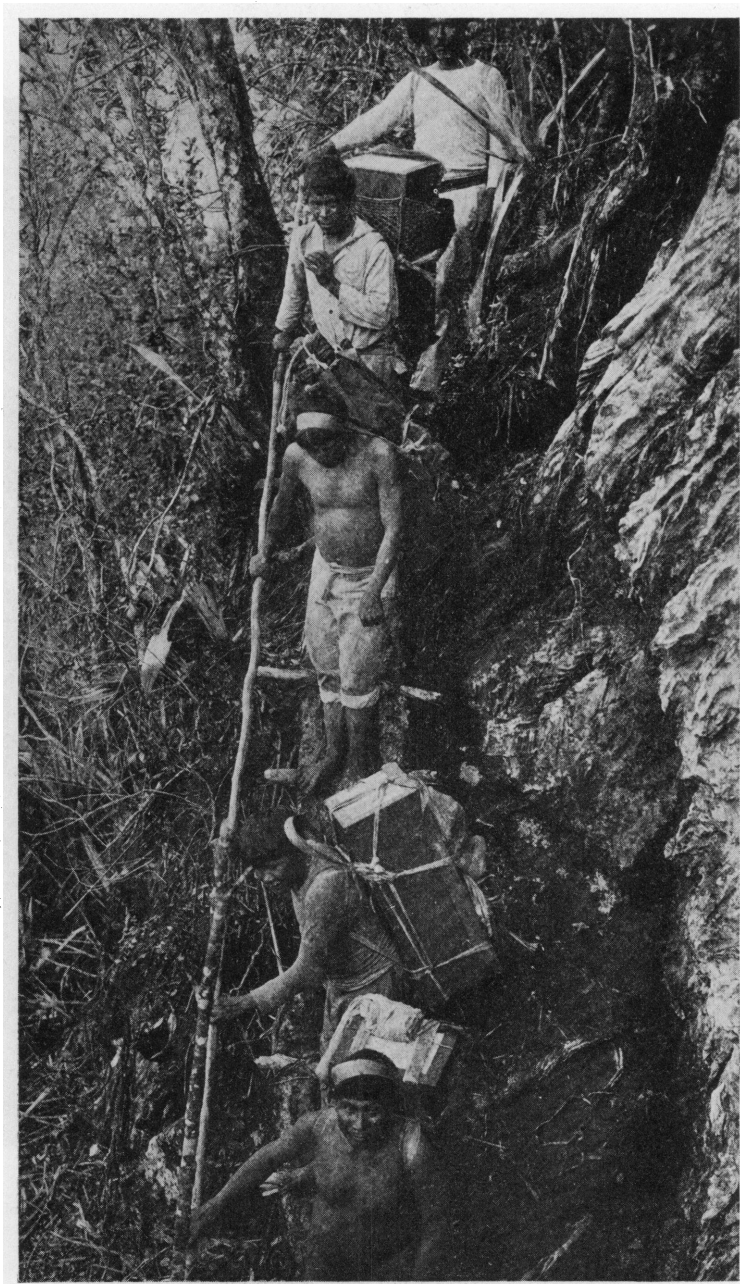
"From Agüita considerable collecting was done as high as First Ridge which has an altitude of 4000 feet; no station could be established here because of the absence of water. On First Ridge, numerous birds and plants belonging to the summit of the mountain are first met with. Agüita was occupied by Olalla in December and January and by Tate in February."



**Fig. 14. Camp at Agüita, 3250 ft., on Duida.**

The Tropical and Subtropical Zones meet at or near this altitude. The definiteness of their boundaries is explained by the high angle of the slope on which they meet.

(Photographed by Tate.)



**Fig. 15. Ladder Trail on Duida, at 5000 ft.**  
(Photographed by Tate.)

Provisional Camp (Alt. 5600 ft.).—"This station, located on the summit of Duida close to the edge of the eastern scarp, was found to be one of the most humid of all those occupied. The surface of Duida is undulating, conforming with the folded structure of its sandstone matrix. The crests of the folds are usually from 500 to 1000 feet above the intervening valleys. The vegetation on the crests is generally densely brushy and some six feet in depth. This gradually increases as one descends into the valley until a forest growth is found composed of more or less

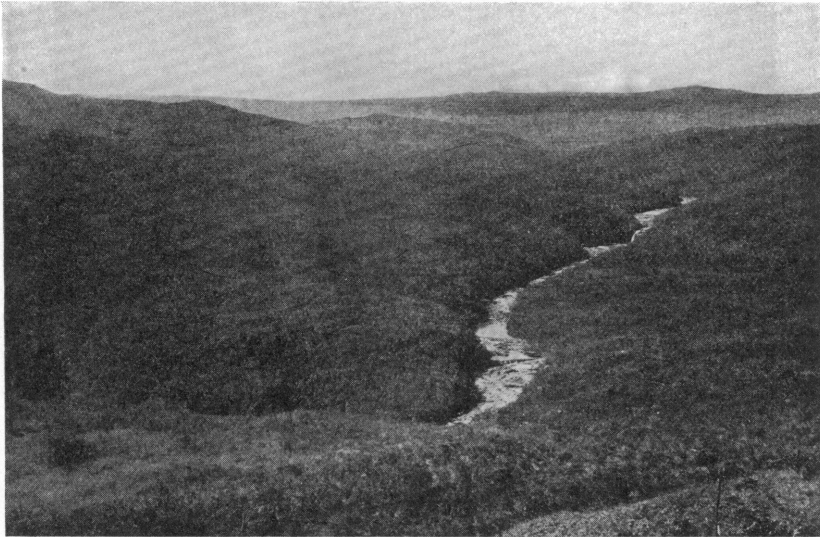


Fig. 16. Caño Negro on the plateau of Mt. Duida.  
(Photographed by Tate.)

recumbent trees which are strongly interlaced and very difficult to penetrate. This forest usually grows to a height of 20 feet above the ground.

"Provisional Camp is about half-way down one of the slopes described above. From it the neighboring ridge-crest was worked. The ground at Provisional Camp is much crevassed and broken and usually the interstices of the rocks are filled with a soil which is almost pure humus. The brush and semi-forest of Provisional Camp is so densely matted that collecting can be done only from trails cut through it."

Valley Head Camp (Alt. 5000 ft.).—"Another summit station in the valley below Provisional Camp and also near the cliffs. It was used only by Olalla and was occupied by him in January. The forest is of the

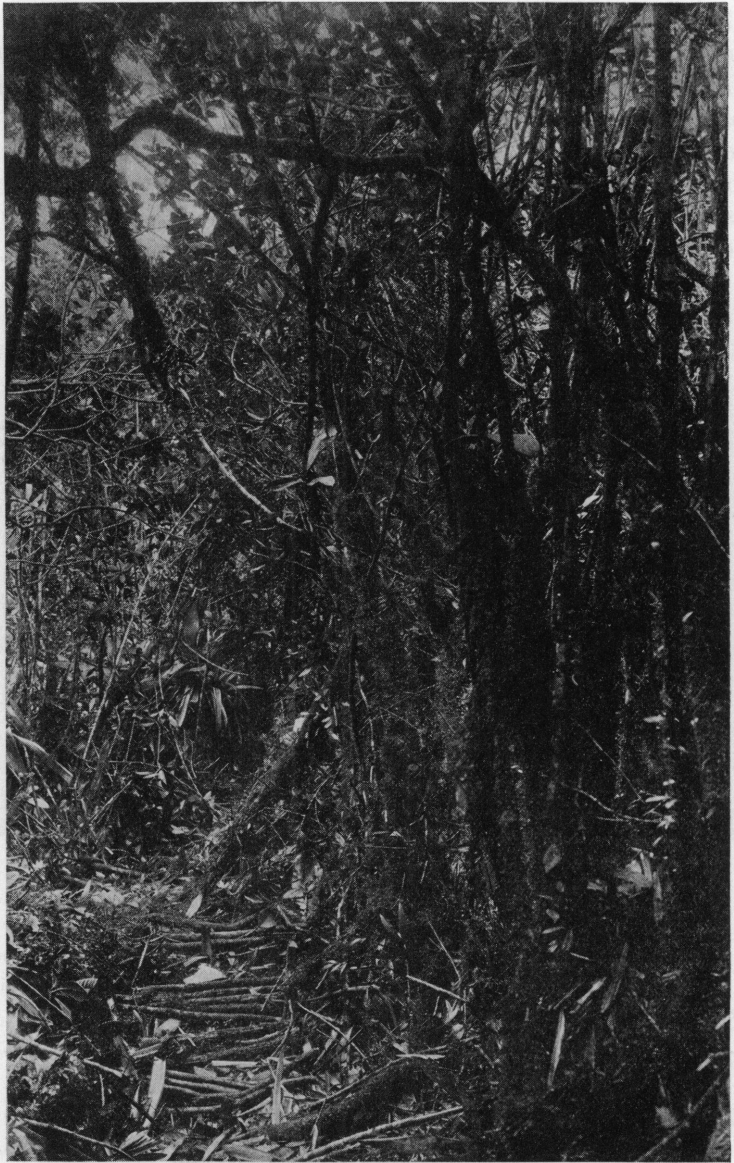


Fig. 17. Trail through forest on the summit of Duida, near Provisional Camp, 5600 ft.

(Photographed by Tate.)

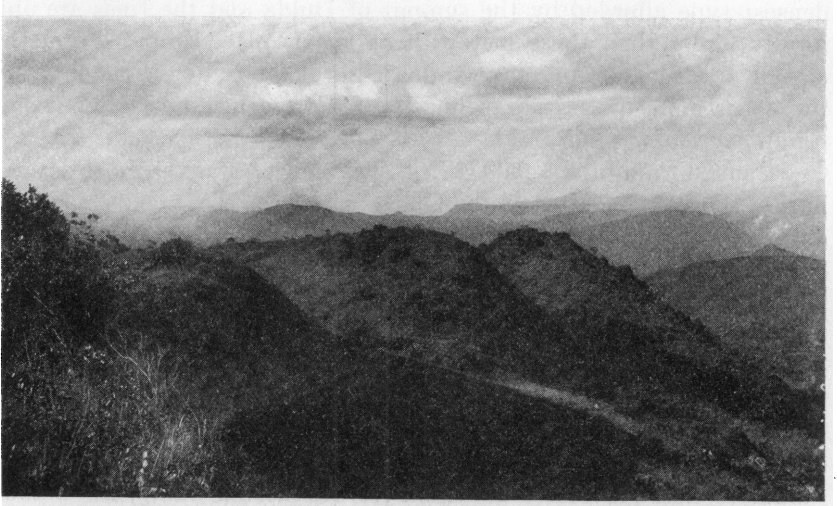


densest type afforded by the summit of Duida and the trees are uniformly larger than those met with at Provisional Camp. From the station trails led off, one to Savanna Hills at the center of the plateau, the other more or less paralleling the cliffs southwest to High Point Camp overlooking Esmeralda."

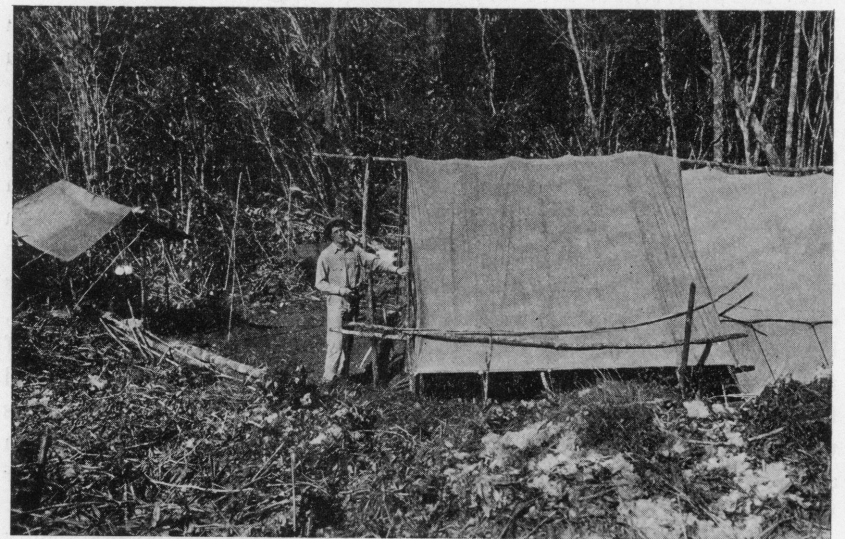
Central Camp (Alt. 4500 ft.).—"This station was the most permanent of the camps formed on the Duida plateau. It lies about four miles inward and downward from Valley Head Camp at the cliff edge. A considerable area of the brush was cleaned off at this place in order to afford suitable conditions for drying specimens. In addition, its distance from the edge of the cliffs was sufficient to bring about a very much drier climate, since most of the precipitation caused by clouds rising up the face of the scarp takes place within the first half mile of the precipice. Sunshine at Central Camp frequently reached eight hours per day. The camp lies in the same valley as Valley Head Camp. The soil there is similar to that previously described for Provisional Camp, the humus content being so high that the cooking fires gradually burn their way into the ground. Vegetation is perhaps slightly less dense than higher up, but trails must still be cut everywhere before collecting becomes feasible. The stream which originated near Valley Head is now some 25 feet in width and passes along by a succession of small cascades alternating with deep pools."

Vegas Falls (Chorrera de Vegas).—"A station some two miles to the west of Central Camp on the trail to Savanna Hills whose chief feature is a water-fall some 50 feet in height and perhaps 50 feet in breadth. Olalla was stationed here for about a week in February with the hope that he might find material peculiar to the place. Due to the width of the stream and the fact that at this time of year the water is extremely low, considerable open space occurs in its bed. Its banks, however, are fringed with the customary brush-forest of the interior of the plateau. A few hundred yards to the northwest much firmer ground than the usual yielding humic soil is reached, and accompanying this there is some change in the vegetation—the forest becoming more open and more easily penetrated. Also, certain sedges and bromeliads occur which are not found in the higher parts."

Savanna Hills (Alt. 4500 ft.).—"This camp is situated practically at the center of the plateau, and due to the fact that a marked change in soil condition is found, with consequent change in vegetation and animal life, Savanna Hills affords a most interesting contrast with the rest of highland Duida. At this station, which is very irregular and hilly,



**Fig. 18.** Savanna Hills, 4500 ft., on the plateau of Duida.



**Fig. 19.** Tate and camp at Savanna Hills, 4500 ft., in the center of the Duida plateau.  
(Photographed by Tate.)

there occurs a soil formed of iron laterites and laterite clays, the iron occurring both as hematite and limonite. The area included in this change is approximately one mile in length and one-half mile in width and consists primarily of a single ridge of hills. It is bounded on one side by an extremely deep ravine, at the bottom of which is a small river, the Caño Negro. The crests of the hills are usually bare and very dry and support only low-growing drought-resisting herbs and a few bushes. The slopes, where eroded into valleys, are sometimes heavily forested but usually present only a slight modification of the dry crest flora. A

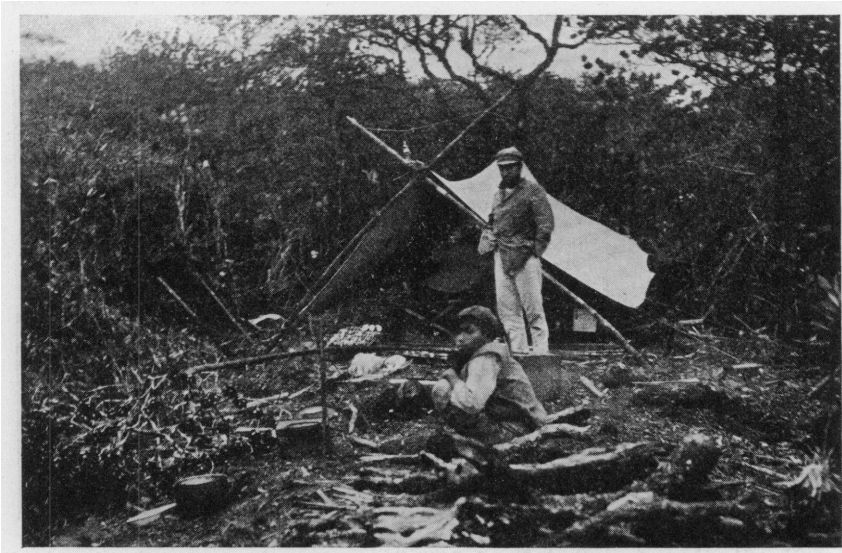


Fig. 20. Alfonso Olalla at Camp 15, 6500 ft., on the summit of Duida.  
(Photographed by Tate.)

few spots are swampy and these contain rather tall herbaceous plants, such as bromeliads, pitcher plants, sedges, etc.”

Desfiladero Camp (Alt. 6000 ft.).—“This camp, occupied only by Olalla, somewhat parallels Valley Head Camp, from the fact that it is at the head of a similar valley close to the cliffs, and has similarly an extremely heavy rainfall. It differs in its greater altitude, and in the fact that there is an abundance of a certain undetermined palm found there. Its position is about one-third of the way from Valley Head Camp to High Point Camp.”

Camp 15 (Alt. 6500 ft.).—“This station is intermediate between the last-mentioned and High Point Camp. At this spot, where Olalla was

stationed for a week, there is a total absence of the low valley type of forest of the Duida summit. The vegetation is formed only of brushy plants which grow to a height of some ten feet. It was occupied about the middle of February and, since this is the driest part of the year, it was found to be a comparatively dry camp, but undoubtedly at any other time it would rank among the humid camps of the cliff edge. It is perhaps 500 yards from the precipices.

High Point Camp (Alt. 6800 ft.).—"This was placed at the highest part of the slope on the southernmost peak (Peak 7) of Duida at which water could be found. Peak 7 itself reaches an altitude of about 7400



Fig. 21. View from Peak No. 7, 7400 ft., north-northwest over the plateau of Mt. Duida.

(Photographed by Tate.)

feet and overlooks the entire Orinoco basin. Vegetation is primarily of the crest type; i.e., extremely low, tussocky growth formed of wiry interlacing heath-like plants, and mats of bromeliads and pitcher plants. A few small valleys which approach it from the interior of the plateau are clothed in their deepest part with reduced summit forest, their width seldom exceeding 15 or 20 feet. Outcrops of sandstone here are rather numerous as compared with elsewhere, but except on the crests of Peak 7, the prevailing humus soil is everywhere found.

"Peak 7 was the highest portion of Duida reached by the expedition and except for a slightly larger eminence about two miles to the northwest, which exceeds it by about 150 feet, is the highest point. The

numbers applied to these localities, as Peak 7, Camp 15, etc., are taken from Rice's work and are the same as those given by him when he triangulated the various promontories of Duida."

#### GENERAL CHARACTERISTICS OF MTS. RORAIMA AND DUIDA

Tate's paper on Mt. Roraima, to which reference has already been made, is prefaced by the following comparison of the general physiography and geologic history of Roraima and Duida:

Both are table mountains, steep-sided and formed of sandstone. . . . On the other hand the strata of Duida are intensely folded; those of Roraima being level-bedded. Duida rises over 6000 feet from a peneplain 325 feet above sea-level and has a surface area of some 250 square miles. Roraima attains 8600 feet but rises from dissected, rolling savanna land 4000 feet above the sea and probably does not exceed 25 square miles in area. Duida appears to be a newly up-faulted mass, perhaps still rising, while the Roraima Mountains seem to represent only the remnants of a once vast tableland. Duida has a deep covering of humus and bears a complex and highly modified fauna and flora; while Roraima is almost devoid of soil and is the home of a relatively small and apparently diminishing plant and animal population.

#### MT. RORAIMA

I quote now from that portion of Tate's paper relating more specifically to Mt. Roraima:

Roraima is approached from south-southwest across some forty miles of broken, hilly savanna land. Woods are confined to deep valleys whose meanders cut the rolling savanna in every direction. Country of this type is representative for the entire region of the Arabupu, Kukenam, and part of the Caroni and Cotinga drainage basins. A series of high ridges running from Roraima and Weiassipu first east and later southeast marks the northern extent of the savanna country. They separate the headwaters of the Cotinga (Kwating) and Ireng of the Mazaruni and Potaro rivers.

About the land to the north of Roraima there is less information. Only some thirty miles away, the Kako and Mazaruni and their affluents capture the entire northern run-off of the Roraima Mountains. Accounts agree that no savannas exist to the north. Observation from the summit of Mt. Roraima bears out this statement; no trace of savanna interrupts the sea of forest stretching northward from the foot of the cliffs.

It may here be interpolated that, so far as I am aware, no birds have been collected in these forests at the northern base of Roraima. If they have the same elevation as that of the ground at the southern base of the mountain we may assume that their fauna is subtropical and hence, in addition to the common species, contains others rare or unknown in the comparatively scanty and now largely destroyed forests of the southern side of the mountain. Of the famous ledge which offers

the only means of access to the summit of the mountain and which im Thurn was the first to ascend, Tate writes:

Seen from a distance of five miles, the ledge leading to the summit appears an irregular, blackish line slanting upward from right to left across the red wall of rock. Nearer, it appears covered with steeply sloping débris, where a slip of the foot may mean death. The reality is quite different. In many places, so large is the scale on which the feature is built, one would never guess he were part way up the walls of Roraima, for, although there is a steep outward slope, the effect is merely that of hillside forest. Mist intensifies the impression by allowing only near views of the surroundings. The walk from the foot of the ledge, 7400 feet, to the summit 1200 feet higher, over a well prepared trail, takes about an hour.

The plateau of Roraima is composed of red stone showing in places literally acres of ripple-marked rock "and carved by erosion that is still proceeding quite rapidly" into an infinitude of forms.

In general the interior plateau looks flat and monotonous. Appearance is deceptive, for there are actually very few places where walking is not difficult, and these follow the joint system of the sandstone. For the most part, tumbled masses of rocks, rifts, and gorges and whole acres of ten-foot mushrooms and loaves of bread formed in stone offer a maze in which one may wander long before finding better ground; while gullies many yards in depth and breadth, meandering undecidedly, force detours of sometimes half a mile.

In a few fairly level places the sandstone disintegrates, and water-soaked, level stretches of sand are formed. The largest of the swamps is a little south of the center of the mountain. It is about 150 yards long and 50 broad. Concentrations of humus in the shallower cracks and rifts form a second kind of swamp. These humus bogs are treacherous and, when deep, dangerous. Sedges, sundews, pipeworts, and bladderworts grow on their surface.

There are no forests on the summit of Roraima and the scanty growth of stunted trees is restricted to sheltered places. Roraima is normally surrounded by a cloud belt which wells up shortly after dawn on all sides and from time to time rolls across the plateau. The central part of the table land averages more hours of sunshine than the edges, and often when the mountain appears completely obscured from the lowlands the center is bathed in sunlight. However, the rainfall is very great, there being little fixed rule for the time of precipitation. It may rain at any hour of day or night or all day and all night.

#### MT. DUIDA

From the paper by Tate and Hitchcock previously referred to, I quote the following statements concerning the more salient features of Mt. Duida:

Cerro Duida is the dominant feature in the mountainous country lying at the western end of the Parima Mountains in the west of Venezuelan Guiana. It is an elevated sandstone plateau, roughly four-square, with sides some ten to fifteen miles in length. . . . From the edge of the Orinoco, Cerro Duida is seen ten miles away behind the Esmeralda Ridge. Even in the dry season it is usually partly hidden by

mist and clouds, but frequently in the early mornings and late afternoons the precipitous scarps stand out sharply. Beyond it to the northeast the slightly higher Marahuaca can be seen. . . . As one proceeds directly toward the nearest part of Duida from Esmeralda, a broad strip of forest enclosing one small savanna is passed. Beyond this is another large savanna, which we named Sabana Grande. . . . From the lowland forests our trail leads up forested talus to the foot of one of the headlands, for the ascent of which more than a hundred ladders were constructed of poles lashed with vines. Nearly three tons of cargo had to be carried to the summit, and the trail as first cut was barely passable for men without any load whatever. Vegetation on the promontories is quite sharply differentiated into two types. The lower parts and the sides leading up to the knife-edge are covered with forest; the crests of the ridges from 4000 feet up to the highest part are clothed with wiry plants of similar species to those growing on the summit. The low limit of the giant *Bromelia* emphasizes the intergrading of the two zones. One or two moist, sheltered pockets exist well up towards the top, and these contain tangled forest growth similar to that of the summit valleys.

From the top of the ridge by which the ascent is made the tableland is seen to be not horizontal but depressed in the center, with slopes leading inward from all sides. To the north, where the border of the mountains becomes lower, the principal drainage appears to find its outlet. . . . Considerable time must have elapsed to allow the upper surfaces of the mountain, which are of unmistakable penneplain origin, to form. They slope back toward the interior of the mountain and terminate suddenly on the southeast face in an abrupt cliff which cuts irregularly across the intense folding of the resistant quartzites. Furthermore, it has been pointed out that the bases of the headlands lie in a comparatively straight line. It is difficult to conceive that the hard quartzites of the lowlands have textural differences sufficient to explain this discordance of the scarp with the initial structure.

#### On the summit of Duida.

November is still in the rainy period; December is drier, los Nortes coming at the end of it; January and February mark the height of the dry season; the end of February introduces the new wet season. The prevailing winds at Duida blow from the northeast. . . . The center of Duida is comparatively dry but becomes clouded over from time to time, and in the latter part of February wet afternoons and evenings are the rule. The number of hours of sunshine at the cliff edge in November and early December were no more than one or two a day, while rain fell with great frequency, becoming a downpour almost every afternoon and evening. Three miles nearer the center, in the neighborhood of Central Camp, the sunshine increased to six or eight hours a day in mid-December and to ten or even twelve hours in January and early February. . . . The conditions of intense rain-fall, subtropical temperatures, and pure humus soil overlying sandstone have combined to produce a remarkable vegetation complex. The valleys are filled with tangled, moss-hunting trees and bushes whose semi-recumbent trunks and branches interlace. The ridge-slopes are similarly forest-clad but on a rather reduced scale. Crests of ridges are crowned either with interwoven wiry bushes or with close-packed mats or cushions of herbaceous plants. Many trees of the slopes and valleys conform to a type with thick, blunt branches, terminal whorled rosettes of leaves, and large, apical flowers, usually pink. The family *Ochnaceæ* is well represented. Exposed

rocky places produce a low heathy growth; and the few small marshy spots carry vegetation appearing not greatly different in its ensemble from normal heath-marsh growth elsewhere; except that genera and species are one and all new. Streams are lined with wiry, flood-resisting plants, and their beds support tough linear-leaved, rushlike mats of water weed. The Savanna Hills laterites produce a number of plant forms not found elsewhere on the plateau—chiefly rocky, barren-ground and drought-resisting plants. Among dominant families are: Orchidaceæ, Bromeliaceæ, Xyridaceæ, Rubiaceæ, and Guttiferæ.

#### EXTENT OF THE RORAIMA-DUIDA REGION

The collections of Whitely and others in the Merumé Mountains and of Whitely on Mt. Twek-quey, about 50 miles to the northward of Roraima, have shown that the Roraiman fauna is by no means confined to Roraima; while the discovery that it extends westward 400 miles to Mt. Duida greatly increases the area it is known to occupy.

Duida doubtless marks its western, and the mountains of Guiana its eastern limit, but lying between and also to the southward of these extremes, as well as in Guiana itself, there are other mountains with sufficient altitude to support a subtropical fauna. It is highly probable that the exploration of this still zoologically unknown area will result in the discovery that it is inhabited by many Roraima-Duida species as well as by others as yet unknown to science.

Nor should we continue to think of the Roraiman district itself as restricted to the mountain and its immediate slopes. The forest-inhabiting species of Paulo, distant seven miles, and of Arabupu, distant about eight miles, from the base of Roraima have been shown by our expedition to be largely Roraiman and it is probable that the Roraiman fauna extends over adjoining forested areas with an altitude of not less than 3500 to 4000 feet. Mt. Roraima, therefore, is merely a central, more elevated point in a large subtropical area.

In this connection, Tate's remarks on the "members of the Roraima Mountain group,"<sup>1</sup> and Tate and Hitchcock's description of the view from the summit of Duida<sup>2</sup> should be read.

#### THE UPPER ZONAL LIFE

Aside from the tropical life at their base and on their lower altitudes, the birds of Roraima and Duida, whose affinities can still be traced, are almost wholly characteristic of the Subtropical Zone. There is, however, a trace of the bird-life of the Temperate Zone on each mountain.

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<sup>1</sup>Geogr. Rev., 1930, p. 61.

<sup>2</sup>Idem, p. 49.



## RELATIONS OF THE TROPICAL AND SUBTROPICAL ZONES

Notwithstanding the striking agreement in the upper zonal life of Mts. Roraima and Duida, the dissimilarity in their basal topography is responsible for the marked differences in the contacts of their Tropical and Subtropical Zones. On Roraima the boundaries between the zones are indefinite and they inosculate over a wide area; on Duida, they are more sharply defined and occupy a comparatively narrow belt.

As we have seen, Roraima rises from a slope which, at least at the southern base of the mountain, has an altitude of 7400 feet and thence

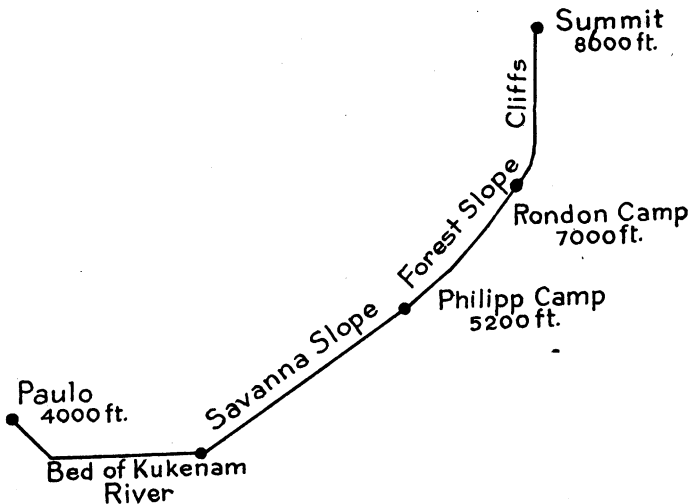


Fig. 22. Diagrammatic section on S. W. Slope of Roraima.  
Adapted from im Thurn.

falls away so gently that when eight miles distant it is 4000 feet above sea-level, and is still in the Subtropical Zone.

In strong contrast, Duida arises from a nearly level plain, only 750 feet in height, and the Tropical Zone extends up its steep slopes to an altitude of about 3000 feet, our station at 2250 feet being in the Tropical, that at 3250 feet, our next station, in or near the lower limit of the Subtropical Zone.

The broad interzonal boundaries of Roraima, as compared with those of Duida, are occasioned chiefly by the angle of the slope on which the zones merge. The zonal boundaries as well as their altitudes are no doubt much affected by local conditions on the two mountains. At our stations on the approaches to Roraima the forests at the junction of

the tropics and subtropics are restricted to narrow strips occupying the borders of the streams which, in worn barrancas, meander downward through the wide intervening, grassy savannas. On Duida, tropics and subtropics meet in an unbroken forest.

There are no data to show how the climate, particularly temperature, of these two areas, is influenced by the marked differences in their topography and vegetation, but it seems obvious that the Roraiman savannas, with their exposure to sunlight and broad, radiating surfaces, are favorable to the existence of higher temperatures than are found at similar altitudes in the dense forests on the slopes of Duida.

The influence of these facts appears to be strongly reflected in our collections of birds from the two mountains. Thus, at and above Arabupu (4000 ft.), eight miles from the base of Roraima, we took 66 species of tropical birds, while on Duida only 14 tropical species were taken at and above 3250 feet. It is true, as will be seen from the appended lists, that many of the Roraiman species are inhabitants of savannas or open, slightly wooded country. The Duidan birds, on the contrary, are all forest-inhabiting.

Tropical Zone Species, Unchanged, Collected on Roraiman Slopes At and Above 4000 Feet<sup>1</sup>

<i>Crypturus soui soui</i>	<i>Ceophleus lineatus lineatus</i>
<i>Penelope granti</i>	<i>Thamnophilus punctatus punctatus</i>
<i>Ortalis motmot</i>	<i>Synallaxis albescens josephinæ</i>
<i>Columba rufina andersoni</i>	<i>Sittasomus griseicapillus amazonus</i>
<i>Gallinago brasiliensis</i>	<i>Platyrhynchus mystaceus insularis</i>
<i>Gallinago undulata</i>	<i>Platyrhynchus coronatus gumia</i>
<i>Rupornis magnirostris magnirostris</i>	<i>Habrura pectoralis brevipennis</i>
<i>Falco fusco-cærulescens</i>	<i>Ornithion inermis</i>
<i>Ara hahni</i>	<i>Elænia flavogaster flavogaster</i>
<i>Pyrrhura egregia</i>	<i>Megarhynchus pitangua pitangua</i>
<i>Pionus menstruus</i>	<i>Myiobius barbatus barbatus</i>
<i>Thermochalcis cayennensis cayennensis</i>	<i>Myiobius fasciatus fasciatus</i>
<i>Phæthornis angusti incanescens</i>	<i>Hirundinea ferruginea ferruginea</i>
<i>Chlorostilbon prasinus subfurcatus</i>	<i>Tyrannus melancholicus desportes</i>
<i>Thalurania furcata fissilis</i>	<i>Pipra suavissima</i>
<i>Anthracothorax nigricollis nigricollis</i>	<i>Schiffornis turdinus olivaceus</i>
<i>Piaya cayana cayana</i>	<i>Ceratopipra cornuta</i>
<i>Tapera nævia nævia</i>	<i>Pachyrhamphus polychropterus tristis</i>
<i>Brachygalba lugubris lugubris</i>	<i>Procnias averano carnabarba</i>
<i>Chelidoptera tenebrosa tenebrosa</i>	<i>Alopchelidon fucata</i>
<i>Chloronerpes rubiginosus guianæ</i>	<i>Stelgidopteryx ruficollis ruficollis</i>
<i>Phlæceastes rubricollis</i>	<i>Troglodytes musculus albicans</i>

<sup>1</sup>Total 66 species.

<i>Pheugopedius coraya ridgwayi</i>	<i>Arremon taciturnus taciturnus</i>
<i>Mimus gilvus gilvus</i>	<i>Tanagra finschi</i>
<i>Turdus leucomelas ephippialis</i>	<i>Tanagra gyrola gyrola</i>
<i>Cyclarhis gujanensis gujanensis</i>	<i>Tangara paradisea caelicolor</i>
<i>Anthus lutescens lutescens</i>	<i>Tangara punctata punctata</i>
<i>Basileuterus auricapillus olivascens</i>	<i>Tangara cayana</i>
<i>Oryzoborus angolensis</i>	<i>Thraupis episcopus episcopus</i>
<i>Volatinia jacarini jacarini</i>	<i>Ramphocelus carbo carbo</i>
<i>Sicalis citrina citrina</i>	<i>Piranga leucoptera ardens</i>
<i>Myospiza humeralis meridana</i>	<i>Schistochlamys atra atra</i>
<i>Emberizoides herbicola sphenurus</i>	<i>Sturnella magna monticola</i>

Tropical Zone Species, Unchanged, Collected on Mt. Duida At and  
Above 3250 Feet<sup>1</sup>

- Colibri delphinæ*, 4200, 4700 ft.  
*Chlorostilbon prasinus subfurcatus*, 4400, 4700 ft.  
*Thalurania furcata orenocensis*, 3250, 4200, 5000 ft.  
*Calliphlox amethystina*, 4700 ft.  
*Pharomachrus pavoninus*, 3250 ft.  
*Trogonurus collaris collaris*, 5000 ft.  
*Piaya cayana cayana*, 5000 ft.  
*Chloronerpes rubiginosus guianæ*, 3250, 4700, 5500 ft.  
*Picumnus buffoni undulatus*, 4000 ft.  
*Hirundinea ferruginea ferruginea*, 4700, 6100 ft.  
*Pipra suavissima*, 3250, 4200 ft.  
*Tanagra xanthogaster brevirostris*, 3250, 4700 ft.  
*Tangara punctata punctata*, 3250 ft.  
*Tachyphonus phæniceus*, 4700 ft.

In order to show the extent of the subtropical element at Arabupu (4000 ft.) near Roraima, and at and near our 3250-foot station on Duida, I add lists of the subtropical birds taken at each.

LIST OF SUBTROPICAL SPECIES AND RACES FOUND AT OR NEAR  
ARABUPU, 4000 FEET, NEAR MT. RORAIMA<sup>2</sup>

<i>Nyctipolus whitelyi</i> (3500 ft.)	<i>Myiophobus roraimæ</i>
<i>Doryfera johannæ guianensis</i>	<i>Pipromorpha macconnelli roraimæ</i>
<i>Saucerottea cupreicauda cupreicauda</i>	<i>Myiarchus phænotus</i>
<i>Heliodoxa xanthogonyx</i>	<i>Oxyruncus cristatus hypoglaucus</i>
<i>Lophornis pavoninus pavoninus</i> (3000 ft.)	<i>Chloropipo uniformis uniformis</i>
<i>Aulacorhynchus derbianus whitelyanus</i>	<i>Cistothorus platensis alticola</i>
<i>Veniliornis kirkii monticola</i>	<i>Turdus ignobilis murinus</i>
<i>Dysithamnus mentalis spodionotus</i>	<i>Cichlopsis gularis</i> (3500 ft.)
<i>Herpsilochmus roraimæ</i>	<i>Pachysylvia sclateri</i>
<i>Schistocichla schistacea saturata</i>	<i>Pygochelidon cyanoleuca</i>
<i>Elzenia olivina</i>	<i>Compsothlypis pitiaiyumi roraimæ</i>

<sup>1</sup>Total, 14 species.

<sup>2</sup>Total 29.

*Compothlypis pitayumi roraimæ*  
*Myioborus verticalis pallidiventris*  
*Myioborus castaneicapillus*  
*Basileuterus bivittatus roraimæ*  
*Zonotrichia capensis roraimæ*

*Coereba guianensis roraimæ*  
*Chlorophonia chlorocapilla roraimæ*  
 (3500 ft.)  
*Tangara guttata guttata*  
*Macroagelaius imthurni*

LIST OF SUBTROPICAL SPECIES AND RACES FOUND AT FROM 3250 TO  
 4000 FEET ON MT. DUIDA<sup>1</sup>

*Otus guatemalæ roraimæ*  
*Glaucidium brasilianum duidæ*  
*Doryfera johannæ guianensis*  
*Campylopterus duidæ*  
*Colibri germanus*  
*Trogonurus personatus duidæ*  
*Aulacorhynchus derbianus duidæ*  
*Dysithamnus mentalis spodionotus*  
*Herpilochmus roraimæ*  
*Pipromorpha macconnelli roraimæ*  
*Myiarchus phænotus*  
*Chloropipo uniformis duidæ*

*Troglodytes duidæ*  
*Mecocerculus duidæ*  
*Turdus roraimæ duidæ*  
*Turdus ignobilis murinus*  
*Compothlypis pitayumi roraimæ*  
*Myioborus verticalis pallidiventris*  
*Myioborus duidæ*  
*Basileuterus bivittatus roraimæ*  
*Diglossa duidæ*  
*Chlorophonia chlorocapilla roraimæ*  
*Piranga testacea hæmalea*

EVIDENCES OF A FORMER TEMPERATE ZONE

Neither Roraima nor Duida reaches the altitude at which, in the Andes, we look for the lower level of the Temperate Zone, but on each mountain there are found species so characteristic of this zone that it is perhaps permissible to regard them as evidences of its former existence. On Roraima, at least, this theory is supported by the fact that the mountain had a greater altitude than that to which it now attains.

The most pronounced case of the occurrence of an Andean Temperate Zone species in Roraima and Duida is supplied by *Idiospiza homochroa* which inhabits the Andes from western Venezuela to Peru and, indeed, is commoner in the Paramo than it is in the Temperate Zone. It is also apparently represented in the Temperate and Paramo Zones of the Santa Marta group. The Roraiman-Duidan form, *duncani*, is so near the Andean race that the two are doubtfully even racially distinct.

*Stellura ruficervix roraimæ*, found on both Roraima and Duida, is represented in the Andean Temperate Zone by slightly differentiated races, which, like *Idiospiza homochroa*, range from western Venezuela to Peru and Santa Marta.

*Mecocerculus leucophrys* is one of the most characteristic species of the Andean Temperate Zone, ranging in this zone from northern Argentin-

<sup>1</sup>Total, 24.

tina to Colombia (including Santa Marta) and western Venezuela, whence, eastward to northeastern Venezuela, it is found in the Subtropical Zone.

*Cistothorus platensis alticola*, found on Roraima, but not as yet on Duida, is represented in the Andes chiefly in the Paramo Zone; in the Bogotá and Mérida regions in the Temperate Zone, and near Caracas in the Subtropical Zone. *Diglossa* is typical of the Andean Temperate Zone.

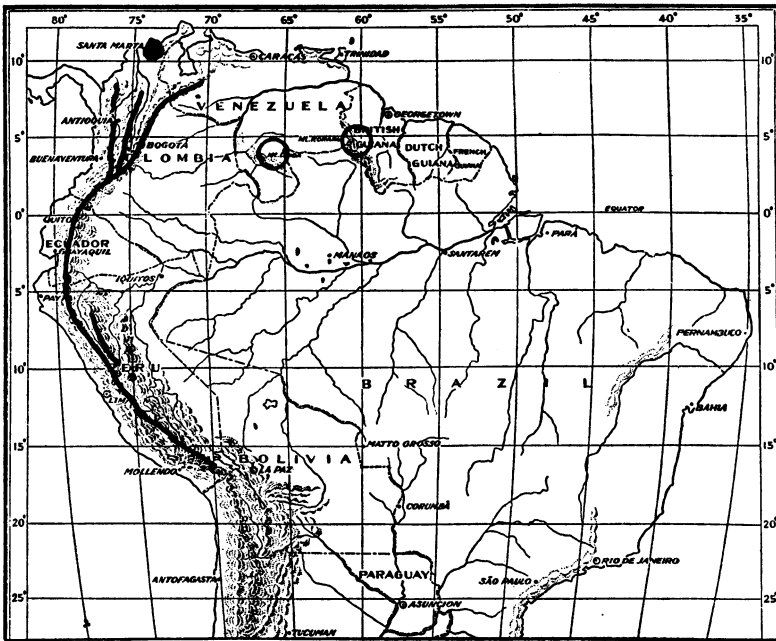


Fig. 23. *Idiospiza homochroa duncani* and races.<sup>1</sup>  
The Andean races inhabit the Temperate and Paramo Zones.

In the absence of Temperate Zone altitudes these species of necessity are found associated with subtropical species, but it is notable, though to be expected, that they are found chiefly in the higher parts of the Subtropical Zone. It is also worthy of remark, but in this case the reason is not obvious, that the Andean forms all have a wide range, extending from Venezuela to Peru or Argentina and that all are found on Santa Marta.

#### AVIFAUNAL RELATIONS OF MTS. RORAIMA AND DUIDA

Before discussing the general relationships of the Roraima-Duida avifauna in an attempt to discover its geographic origin, it is desirable

<sup>1</sup>It should be understood that this and the following distribution maps are semi-diagrammatic.

to learn the interrelationships of the distinctive bird-life of these two mountains. Their close faunal affinity has already been referred to. It remains therefore to present the data on which this statement of their relationships is based, and, so far as possible, determine their significance. The facts are as follows:

DISTRIBUTIONAL SUMMARY TO SHOW THE INTERRELATIONSHIPS OF THE DISTINCTIVE  
BIRD-LIFE OF MTS. RORAIMA AND DUIDA

Common to both mountains, as identical forms.....	34
“ “ “ “ “ “ representative forms.....	28
Found on Roraima only.....	17
Found on Duida only.....	7
Total.....	86 <sup>1</sup>

We must not here let the fine distinctions of the systematist give undue importance to minor geographic variations. For the purposes of distributional analysis we look for resemblances rather than differences. No one, therefore, who examined specimens of the 28 forms I have classified as representative could doubt their close relationship or the propriety of including them, in this comparison, with the 34 forms common to both mountains, making the total in this group 62<sup>2</sup> or nearly three-fourths of the entire avifauna.

Remembering that Roraima and Duida are nearly 400 miles apart, and that although the intervening area may have subtropical altitudes, both mountains are isolated, at least from their immediate surroundings; this surprisingly close relation has a definite significance of the first importance. It means that the mountains should be considered as parts of a faunal unit and that in its major details, at least, the faunal history of one is essentially that of the other.

Too great weight should not be given to the differences shown by our analysis. The Roraiman area is not only easier to penetrate but far more work has been done in it than on Duida. It is not to be expected that our pioneer efforts on that mountain have secured more than a fair proportion of its life. Further exploration will no doubt add numbers of species to those already secured, including some of the missing Roraiman species.

Local conditions are probably also responsible for some of the differences in the bird-life of the two mountains. There seems to be, for example, no suitable habitat on Duida for the reception of *Cistothorus*, nor do its forests offer favorable haunts for *Zonotrichia*.

<sup>1</sup>*Emberizoides herbicola sphenurus*, a Tropical Zone species, is here included from Roraima as representing *E. duidæ*, thus raising, in this connection, the total of distinctive forms from 85 to 86.

<sup>2</sup>Counting each two representatives as making but one species, this number would be 48.

Here, then, is the proof that we are not dealing with the fauna of a single mountain island and its nearby dependencies but with that of an area which, as previously stated, extends, or extended at favorable altitudes, over 40,000 square miles.

The further significance of these facts will be discussed in the general consideration of the origin of the fauna as a whole. The details of the summary presented above are appended.

NATURE OF THE VARIATIONS DISTINGUISHING REPRESENTATIVE FORMS OF MTS. RORAIMA AND DUIDA.—There is no constant type of difference separating the mutually representative forms of Mts. Roraima and Duida from each other.

### Distributional Relations of Upper Zonal Avifaunas of Mts. Roraima and Duida

#### COMMON TO BOTH MOUNTAINS<sup>1</sup>

<i>Columba albilinea roraimæ</i>	<i>Pipromorpha macconnelli roraimæ</i>
<i>Otus guatemalæ roraimæ</i>	<i>Cnemotriccus poecilurus salvini</i>
<i>Nannopsittaca panychlorus</i>	<i>Myiochanes funigatus duidæ</i>
<i>Systellura ruficervix roraimæ</i>	<i>Myiarchus phænotus</i>
<i>Doryfera johannæ guianensis</i>	<i>Turdus ignobilis murinus</i>
<i>Colibri germanus</i>	<i>Pachysylvia sclateri</i>
<i>Heliodoxa xanthogonyx</i>	<i>Pygochelidon cyanoleuca</i>
<i>Thamnophilus insignis</i>	<i>Compsothlypis pitiayumi roraimæ</i>
<i>Dysithamnus mentalis spodionotus</i>	<i>Myioborus verticalis pallidiventris</i>
<i>Herpsilochmus roraimæ</i>	<i>Basileuterus bivittatus roraimæ</i>
<i>Cranioleuca demissa</i>	<i>Idiospiza homochroa duncani</i>
<i>Automolus roraimæ</i>	<i>Coereba guianensis roraimæ</i>
<i>Roraimia adusta</i>	<i>Chlorophonia cyanea roraimæ</i>
<i>Mecocerculus leucophrys roraimæ</i>	<i>Tangara guttata guttata</i>
<i>Mecocerculus nigrifrons</i>	<i>Tangara whiteyi</i>
<i>Elænia olivina</i>	<i>Piranga testacea hæmalea</i>
<i>Myiophobus roraimæ</i>	<i>Macroagelaius imthurni</i>

#### MUTUALLY REPRESENTATIVE FORMS<sup>2</sup>

Mt. Roraima	Mt. Duida
<i>Campylopterus hyperythrus</i>	<i>Campylopterus duidæ</i>
<i>Saucerottea cupreicauda cupreicauda</i>	<i>Saucerottea cupreicauda duidæ</i>
<i>Lophornis pavoninus pavoninus</i>	<i>Lophornis pavoninus duidæ</i>
<i>Trogonurus personatus roraimæ</i>	<i>Trogonurus personatus duidæ</i>
<i>Aulacorhynchus derbianus whitelyanus</i>	<i>Aulacorhynchus derbianus duidæ</i>
<i>Myrmothera simplex simplex</i>	<i>Myrmothera simplex duidæ</i>
<i>Elænia dayi</i>	<i>Elænia tyleri</i>

<sup>1</sup>Species, 16; subspecies, 18. Total, 34.

<sup>2</sup>Total, 14.

## Mt. Roraima

*Chloropipo uniformis uniformis*  
*Troglodytes rufulus*  
*Microcerculus ustulatus*  
*Turdus roraimæ roraimæ*  
*Myioborus castaneicapillus*  
*Emberizoides herbicola sphenurus*  
*Atlapetes personatus*

## Mt. Duida

*Chloropipo uniformis duidæ*  
*Troglodytes duidæ*  
*Microcerculus duidæ*  
*Turdus roraimæ duidæ*  
*Myioborus duidæ*  
*Emberizoides duidæ*  
*Atlapetes duidæ*

FOUND ON RORAIMA BUT NOT FOUND OR REPRESENTED ON DUIDA<sup>1</sup>

*Nyctipolus whitelyi*  
*Veniliornis kirkii monticola*  
*Schistocichla schistacea saturata*  
*Chamæza brevicauda fulvescens*  
*Grallaria guatemalensis roraimæ*  
*Grallaria nana kukenamensis*  
*Synallaxis moesta macconnelli*  
*Euscarthmornis russatus*  
*Oxyruncus cristatus hypoglaucus*

*Lathria streptophora*  
*Euchlornis whitelyi*  
*Cistothorus platensis alticola*  
*Cichlopsis gularis*  
*Zonotrichia capensis roraimæ*  
*Zonotrichia capensis macconnelli*  
*Diglossa major*  
*Mitrospingus oleagineus*

FOUND ON DUIDA BUT NOT FOUND OR REPRESENTED ON RORAIMA<sup>2</sup>

*Otus choliba duidæ*  
*Glaucidium brasilianum duidæ*  
*Aëronautes montivagus tatei*  
*Waldronia milleri*  
*Taraba major duidæ*  
*Euscarthamus duidæ*  
*Diglossa duidæ*

## THE ORIGIN OF THE RORAIMA-DUIDA AVIFAUNA

We may now venture to approach the question of the general relationships of the Roraima-Duida avifauna in an attempt to ascertain its geographic origin. The appended distributional analysis, based chiefly on the study of our collections presented beyond, gives the fundamental aspects of our problem.

## DISTRIBUTIONAL ANALYSIS OF THE DISTINCTIVE BIRD-LIFE OF MTS. RORAIMA AND DUIDA

Of Tropical Origin.....	22
With Andean Relationships.....	39
With Southeastern Brazil Relationships.....	2
With Guatemalan Relationships.....	2
Of Unknown Origin.....	20
	—
Total.....	85

<sup>1</sup>Total, 17.<sup>2</sup>Total, 7.



It seems obvious from the most casual examination of this analysis that the age of the Roraima-Duida fauna extends from that of the forms derived from ancestors still existing in the basal or Tropical Zone, through a period where they are geographically distant but recognizable, to those of a past so remote that their ancestry cannot be determined. Let us consider these groups in the order in which they are given.

#### INDIGENOUS FORMS OF TROPICAL ORIGIN

Illustrations of the first stage in the evolution of a subtropical form from a tropical ancestor are doubtless supplied by those tropical species which have ascended to subtropical altitudes but because of their stability, recent entrance into the Subtropical Zone, or for other reasons, show no racial variation. They supply the material on which a changed environment, assisted by isolation, may or may not in time express itself. Lists of these birds are presented on the preceding pages.

The differentiated forms, tabulated above, are, in most instances evidently derived from ancestors still existing at the base of the mountain on which they occur. The Duidan forms of *Otus choliba*, *Glaucidium brasilianum*, *Taraba major*, and *Emberizoides sphenurus* are as convincing illustrations of zonal evolution as any with which I am familiar. The last-named, while evidently descended from the form common on the savannas of Esmeraldas, is so strongly characterized by size and color that I have given it specific rank. The basal form, *Emberizoides sphenurus herbicola*, occurs also on Roraima where it reaches an altitude of 5200 feet, but for some reason, possibly lack of isolation, shows no change.

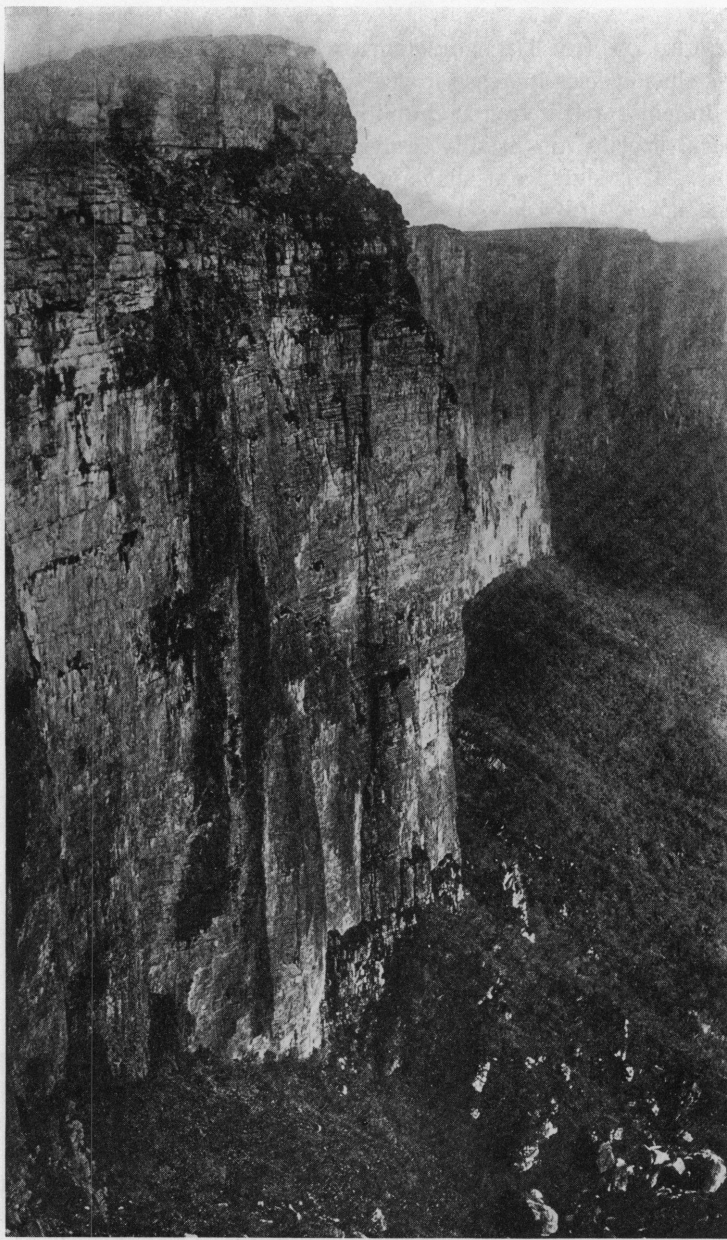
*Zonotrichia capensis* is included among the birds of tropical origin for the reason that it occurs in this zone in French Guiana and on Curaçoa and Aruba; I shall return to this question later. Here especial attention should be called to the occurrence of two forms of this species on Mt. Roraima, one on the savannas and slopes, the other on the summit of the mountain, their ranges being separated only by an escarpment of 1400 feet. This is an even more conclusive demonstration of zonal evolution than Mt. Duida affords.

*Mitrospingus oleagineus* affords the only instance in this group in which the range of the assumed basal representative is far removed from the mountains; *M. cassini*, the remaining species of the genus, being unknown from nearer than western Colombia. These birds are less nearly related than any others in the group and possibly may not be representative species.

The tropical species which have yielded to these influences are tabulated below:

Subtropical Form	Roraima	Duida	Range of Species in tropics, <sup>2</sup>
<i>Otus vermiculatus roraimæ</i> <sup>1</sup>		1	Ecuador, N. E. Venezuela and north to Panama
<i>Otus choliba duidæ</i>		1	Uruguay to Costa Rica
<i>Glaucidium brasilianum duidæ</i>		1	Argentina to Arizona
<i>Nyctipolus whitelyi</i> <sup>1</sup>	1		?Guiana and southward
<i>Veniliornis kirkii monticola</i>	1		Tobago to Panama and western Ecuador
<i>Taraba major duidæ</i>		1	Argentina to Guianas and Guatemala
<i>Dysithamnus mentalis spodiionotus</i>	1	1	Tropical and Subtropical Zone, Argentina to Guianas and Guatemala
<i>Herpsilochmus roraimæ</i>	1	1	Guianas and East Venezuela
<i>Schistocichla schistacea saturata</i>	1		Guianas to Peru
<i>Chamæza brevicauda fulvescens</i> <sup>1</sup>	1		Paraguay to Venezuela
<i>Grallaria guatemalensis roraimæ</i> <sup>1</sup>	1		Tropical and Subtropical Zones, Peru to Mexico, northern Venezuela to Trinidad
<i>Myrmothera simplex simplex</i> }	1		Northern South America east of the Andes
<i>Myrmothera simplex duidæ</i> }		1	
<i>Pipromorpha macconnelli roraimæ</i>	1	1	Guianas to Para and Bolivia
<i>Myiarchus phænotus</i> <sup>1</sup>	1	1	Base of Duida
<i>Turdus ignobilis murinus</i>	1	1	Guiana to Rio Madeira and Peru
<i>Pachysylvia sclateri</i> <sup>1</sup>	1	1	Guianas to southern Brazil
<i>Zonotrichia capensis roraimæ</i> <sup>1</sup>	1		Tropical Zone, Curaçoa and Arubu Islands, French Guiana, eastern Brazil. Subtropical Zone, Guatemala to Patagonia
<i>Zonotrichia capensis macconnelli</i> <sup>1</sup>	1		
<i>Emberizoides duidæ</i>		1	Costa Rica to Guiana and Argentina
<i>Cæreba guianensis roraimæ</i>	1	1	Guiana to Rio Negro
<i>Mitrospingus oleagineus</i> <sup>1</sup>	1		Costa Rica to West Ecuador

<sup>1</sup>Compare main text.<sup>2</sup>Total 21. Common to both mountains, 9; found only on one, 12.



**Fig. 24.** Summit and talus of Roraima with 1400 foot vertical cliff between them.

It is this cliff that separates the ranges of McConnell's sparrow (*Zonotrichia capensis macconnelli*) of the summit, and the Roraima sparrow (*Zonotrichia capensis roraimæ*) of the talus and below.

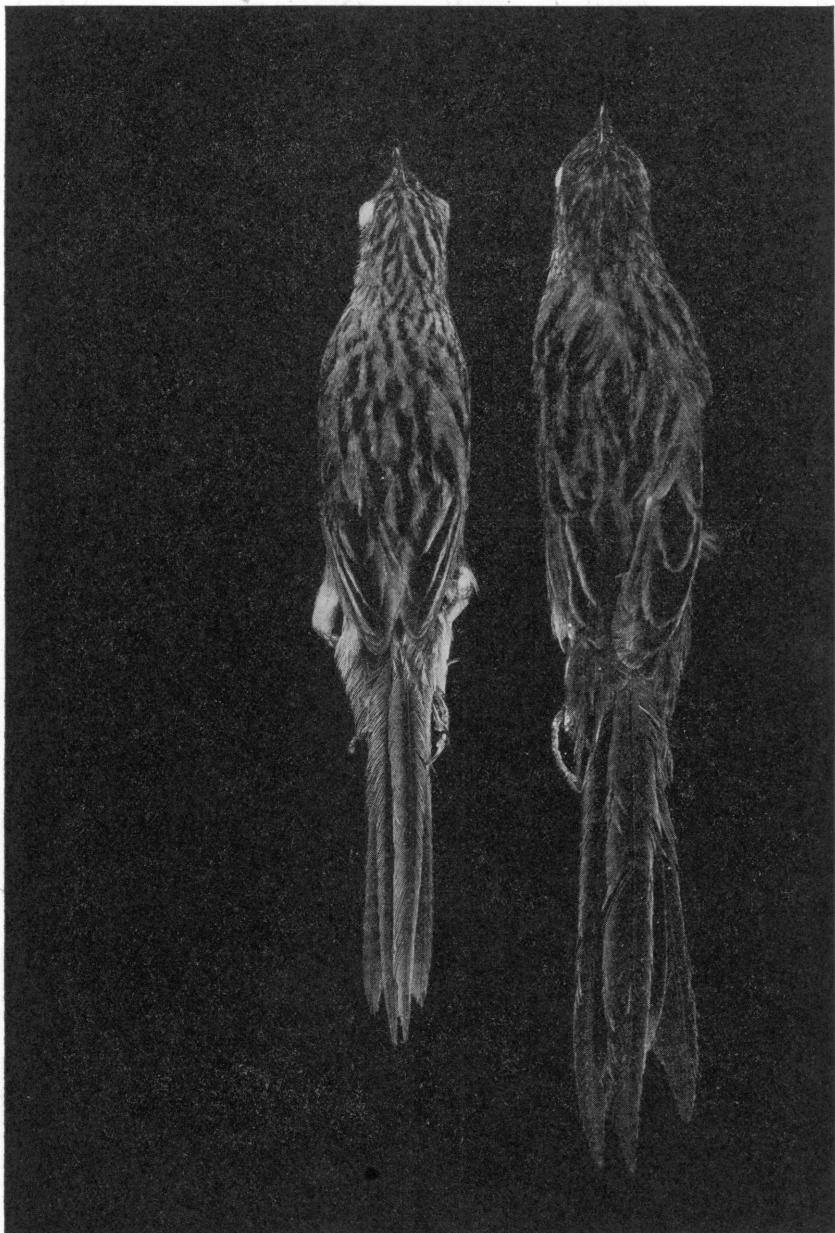
NATURE OF THE DIFFERENTIATION SHOWN.—In conformance to the laws that species increase in size with higher altitude and become darker in color with greater humidity, these cloud-belt derivatives of tropical species are usually larger and darker than their assumed ancestors. It is significant that among these presumably newer forms only one species (*Myrmotherula simplex*) is represented by different races on both mountains, a fact which may be accepted as further



Fig. 25. *Mitrospingus oleagineus* of Roraima and *M. cassini*.

evidence of their comparatively recent evolution. On the whole, therefore, it appears that, with some exceptions, the subtropical forms of tropical origin on Roraima and Duida have been evolved under existing conditions.

To explain how the environmental factors mentioned affect the organism lies within the province of the experimental evolutionist. I merely state the case as it is revealed by our field work and study of the specimens secured. Fundamentally, we have a species subjected to the influences of a new environment of which doubtless the most important



**Fig. 26. Zonal differentiation in *Emberizoides*.**

- a. *Emberizoides sphenurus herbicola*, the smaller and paler form of the Tropical Zone.
- b. *Emberizoides duidae*, the larger darker form of the Subtropical Zone.

single factor is isolation. Where the differentiating characters exhibited by the new form are mutational in character, isolation alone seems to afford conditions favorable for their development as racial characteristics. Examples of this nature are presented in my studies of *Buarremon*<sup>1</sup> and *Saltator aurantiivrostris*,<sup>2</sup> in which, regardless of locality, individual variation in the extent of certain markings (e.g., pectoral band or superciliary stripe) affords evidence of potential tendencies to vary. To give racial expression to these potentialities has apparently called only for an environment which supplied isolation. The characters exhibited by the large, dark races of Roraima and Duida,<sup>3</sup> are not, however, in my opinion mutational. The association of greater size with either increased latitude or altitude, and of darker colors with increased humidity is so frequent among animals it is difficult to avoid believing that this relation is one of cause and effect. In other words, whatever be the mechanism by which variations of this nature are given form, it is apparently set in motion by the influences of environment.

#### INDIGENOUS FORMS WITH ANDEAN RELATIONSHIPS

Nearly one-half the birds peculiar to the Roraiman-Duidan fauna have their nearest relatives in the Subtropical and Temperate Zones of the Andes. A list of these forms with the range of their apparent Andean representatives follows is given on the succeeding pages.

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<sup>1</sup>Bull. Amer. Mus. Nat. Hist., XLVIII, 1923, pp. 243-278.

<sup>2</sup>Amer. Mus. Novit., No. 261, 1927, pp. 1-19.

<sup>3</sup>For example, *Zonotrichia capensis macconnelli*, *Emberizoides duidæ*, *Otus choliba duidæ* and others.

Name	Roraima	Duida	Range of Apparent Andean Representative <sup>1</sup>
<i>Columba albilinea roraimæ</i>	1	1	Subtropical to Temperate Zones, Valencia, Venezuela to Bolivia and Costa Rica; Sta. Marta
<i>Stellura ruficervix roraimæ</i>	1	1	Temperate Zone, Mérida, Venezuela to Peru; Sta. Marta
<i>Aëronautes montivagus tatei</i>		1	Subtropical to Temperate Zone, Caracas, Venezuela, and southern Peru and Bolivia
<i>Doryfera johannæ guianensis</i>	1	1	Subtropical Zone, Colombia to Peru
<i>Saucerottea cupreicauda cupreicauda</i>	1	1	Subtropical Zone, Mérida, Venezuela to Colombia
<i>Saucerottea cupreicauda duidæ</i>		1	
<i>Colibri germanus</i>	1	1	By same form. Caracas, Venezuela, to Bolivia; Sta. Marta
<i>Heliodoxa xanthogonys</i>	1	1	Subtropical Zone, Colombia, West Ecuador, Panama and Costa Rica
<i>Trogonurus personatus roraimæ</i>	1		Subtropical Zone, Mérida, Venezuela to Peru; Sta. Marta
<i>Trogonurus personatus duidæ</i>		1	
<i>Aulacorhynchus derbianus whitelyanus</i>	1	1	Subtropical Zone, Ecuador and Peru
<i>Aulacorhynchus derbianus duidæ</i>		1	
<i>Grallaricula nana kukenamensis</i>	1		Subtropical to Temperate Zones, northeastern Venezuela to Ecuador
<i>Cranioleuca demissa</i>	1	1	Colombia to Bolivia
<i>Synallaxis moesta macconnelli</i>	1		Subtropical Zone, Colombia to Peru
<i>Mecocerculus leucophrys roraimæ</i>	1	1	Subtropical Zone, northwestern and northeastern Venezuela; Temperate Zone, Mérida, Venezuela to Argentina; Sta. Marta.
<i>Elænia olivina</i>	1	1	Subtropical Zone, Colombia to Peru
<i>Cnemotriccus pæcilurus salvini</i>	1	1	Subtropical Zone, Mérida, Venezuela to Bolivia
<i>Myiochanes fumigatus duidæ</i>	1	1	Subtropical Zone, Caracas, Venezuela to Argentina
<i>Cistothorus platensis alticola</i>	1		By same form and races. Subtropical and Temperate Zones, Caracas, Venezuela to Patagonia and North America; Sta. Marta
<i>Troglodytes rufulus</i>	1		Temperate Zone, Mérida, Venezuela to Argentina
<i>Troglodytes duidæ</i>		1	

<sup>1</sup>Total, 38.

Name	Roraima	Duida	Range of Apparent Andean Representative <sup>1</sup>
<i>Turdus roraimæ roraimæ</i> } <i>Turdus roraimæ duidæ</i> }	1	1	Subtropical Zone, Colombia; Sta. Marta
<i>Pygochelidon cyanoleuca</i>	1	1	By same form. Subtropical Zone, Costa Rica to Paraguay, southeastern Brazil, northeastern Venezuela
<i>Compsothlypis pitayumi roraimæ</i>	1	1	Chiefly Subtropical Zone, Texas to Uruguay, southeastern Brazil, northern Venezuela to Trinidad; Sta. Marta
<i>Myioborus verticalis pallidiventris</i>	1	1	By same form and races. Subtropical Zone, Costa Rica to Bolivia northeastern Venezuela; Sta. Marta
<i>Myioborus castaneicapillus</i> } <i>Myioborus duidæ</i> }	1	1	Subtropical Zone. Bolivia to Argentina
<i>Basileuterus bivittatus roraimæ</i>	1	1	Tropical Zone, southeastern Peru to Subtropical Zone, Bolivia, and Argentina
<i>Idiospiza homochroa duncani</i>	1	1	Temperate Zone, Mérida, Venezuela to Peru
<i>Atlapetes personatus</i> } <i>Atlapetes duidæ</i> }	1	1	Subtropical Zone, Bolivia
<i>Chlorophonia cyanea roraimæ</i>	1	1	Subtropical Zone, northeastern Venezuela to Peru; southeastern Brazil to northeastern Argentina
<i>Tangara guttata guttata</i>	1	1	Subtropical Zone, Trinidad to northern Colombia (except Sta. Marta) and Costa Rica
<i>Tangara whiteyi</i>	1	1	Northeastern Venezuela to western Venezuela and Sta. Marta
<i>Piranga testacea hæmalea</i>	1	1	Subtropical Zone, Trinidad to Sta. Marta, Guatemala and Bolivia
<i>Macroagelaius imthurni</i>	1	1	Eastern Andes of Colombia

## SUMMARY

Common to both Roraima and Duida as the same form.....	19
Common to both Roraima and Duida as representative forms....	14
Known on Roraima but not on Duida.....	3
Known on Duida but not on Roraima.....	2
Represented in the Andes by the same form.....	4
Represented in the Andes by another subspecies.....	19
Represented in the Andes by another species.....	15

<sup>1</sup>Total, 38.



In this group of birds related to Andean species we have the largest and most characteristic element of the Roraiman-Duidan avifauna. These birds find their nearest allies at a distance of usually more than a thousand miles, nevertheless they outnumber those members of the Roraiman-Duidan fauna derived from nearby tropical ancestors by more than fifty per cent. This fact indicates the greater age of the



Fig. 27. *Mecocerculus leucophrys roraimæ* and Andean races.

Illustrating the relationship between the Subtropical Zone of Roraima-Duida and the Andes.

Andean element and also that when it was acquired the Roraiman-Duidan and Andean forms, or their antecedents, were more nearly in contact than they are today.

In this group also we find the closest affinity in the bird-life of Roraima and Duida, only five of the thirty-eight forms listed not being common to both. So close an agreement implies a common origin for their indigenous avifauna as a whole. The faunal history of one mountain should therefore be that of the other.

There are three ways in which we may account for the presence of these forms in the Andes and Roraiman-Duidan region. First, they may have flown from one to the other. Secondly, their presence may indicate that the Andes were formerly connected with the Roraiman-Duidan area. Thirdly, they may represent the zonal survivors of forms that once occupied the intervening region.

The first theory would not be entertained by any student of the distribution of birds. But the unsupported statement of his belief would not carry much weight with those who think of birds as mobile creatures whose migrations carry them over thousands of miles, and which, therefore, may readily cover shorter distances. But some birds are as sedentary as others are mobile, and permanently resident species become so delicately adjusted to the influence of their environment that they are as closely confined to it as though they were not possessed of powers of flight. There are literally thousands of illustrations of this fact. The zonal bird-life of Roraima and Duida supplies cases in point. Consider, for example, the birds that are restricted to each mountain, or the two sparrows (*Zonotrichia*) on Roraima, whose ranges are separated by a cliff of only 1400 feet in height (see Fig. 23).

But, for the sake of argument, let us assume, that Roraima and Duida might have received this comparatively recent part of their bird-life by flight from the Andes. It would then be natural to expect that Duida, being the nearer, would have become the home of the larger number. Only 14 of the 38 forms in this Andean element are known in Venezuela from east of the Meridan Andes and Duida's chances of receiving Andean life are much greater, therefore, than those of Roraima; but, as our analysis shows, there is essentially no difference in the Andean element possessed by each mountain, evidence that the presence of this element is not due to the fortuitous occurrence of birds carried from their homes by the action of storms or the capture of casual wanderers.

Further evidence combating the flight theory may be found in the indigenous flora of Roraima, which, like its bird-life, has a strong Andean element. In his introduction to papers by N. E. Brown and others on the botanical collections made by McConnell and Quelch on Roraima,<sup>1</sup> I. H. Burkhill shows that 21 montane genera are common to Roraima and the Andes. Seven of these extend as far south as Chile and occur also in the mountains of southern Brazil, leaving 14 restricted to Roraima and the Andes, none of them ranging south to Bolivia.<sup>2</sup>

<sup>1</sup>Trans. Linn. Soc., (2) VI, 1901, p. 6.

<sup>2</sup>The study of Tate's large collections of plants from both Roraima and Duida now being made by Henry A. Gleason, of the New York Botanical Garden, will doubtless throw much light on this problem.

In the same report (p. 93) Stephani comments on the discovery by McConnell and Quelch of the summit of Roraima of many species of liverworts previously known only from the Andes.

The resemblance between the larger number of the Roraiman-Duidan forms and their Andean representative is close enough to indicate that they were separated from each other, or their common ancestor, at no very remote period. But so far as I am aware there is nothing in the known geology of the two mountain groups, or in that of the areas between them, to suggest their recent connection. Furthermore, such a connection would have been necessary at both ends of the Roraiman-Duidan region, for it contains species which are related to those of north-eastern Venezuela as well as to those which find their nearest allies in Colombia and Ecuador.

We have left, therefore, the theory that the representatives of Andean forms in Roraima and Duida are the survivors of birds that once occupied the intervening region, and although the evidence supporting it is very far from being conclusive, this theory more nearly explains the facts in the case than either of those already considered.

In the first place it is within the bounds of probability. We find, indeed, in the group of Roraiman-Duidan forms of apparent tropical origin several whose distribution approaches that shown by the Andean element in these mountains. For example, closely allied races of *Dysithamnus mentalis spodionotus* of Roraima and Duida occupy the Subtropical Zone in Colombia, Ecuador, and Peru. Eliminate the intervening Tropical Zone forms and we should have a condition resembling that which exists between so large a proportion of Andean and Roraiman-Duidan species today.

*Chamaeza brevicauda* is also both tropical and subtropical and affords, therefore, a similar illustration.

*Grallaria guatemalensis*, which is also found in the tropics and subtropics, belongs in a group of foothill species which may reach the subtropics or may not range above the tropics but which are not found away from mountains. Such a distribution may represent a stage in the history of a species with a once much wider range.

The four races of *Cnemotriccus pæcilurus* are all subtropical, but Hellmayr, as cited beyond, records a specimen of *C. p. venezuelanus* from the "Rio Içanna an affluent of the upper Rio Negro."

*Compsothlypis pitiayumi* may also be called a foothill species. In the main its range is the Subtropical Zone from Texas to southeastern Brazil and through northern Venezuela to Trinidad, but in places

(eastern Panama, western Ecuador, Trinidad, etc.) it is found in the tropics.

*Zonotrichia capensis* is chiefly subtropical and temperate but in French Guiana, eastern Brazil and the islands of Curaçoa and Aruba off the coast of western Venezuela, it inhabits the Tropical Zone. In this case especial attention should be called to our discovery of a single specimen of the lower of the two Roraiman forms of this species near Sta. Isabel on the Rio Negro!



Fig. 28. *Oxyruncus cristatus cristatus* and races.  
Illustrating discontinuous distribution.

Distributionally, these six species might be considered as intermediates between the tropical and Andean groups. Indeed, I find that I have placed the two last-named in the former group, though we are here supposed to be dealing only with the latter.

Although not known from the Andes of South America and hence not included in our table of Andean forms, there is one Roraiman bird which I feel should be especially cited as illustrating interrupted distribution: that is *Oxyruncus cristatus*. I have placed it under forms with affinities in southeastern Brazil, but it might equally well be classified as

of Central American origin. As shown beyond, four closely related races of this bird are known, respectively, from the subtropics (and tropics) of southeastern Brazil, from Roraima at 4200 and 5000 feet, and at a lower altitude on the Merumé Mts.; from both the Subtropical and Tropical Zones in eastern Panama and the Subtropical Zone in western Panama and Costa Rica.

This is evidently a very ancient form of bird-life, sole member of its family. Like other "relict" types it has doubtless outlived its near relatives because of its stability, only subspecific differences separating the birds of the localities named in spite of their complete and obviously prolonged separation—a fact which warns us to be cautious when we attempt to judge of the age of a race by the extent of its differentiation. While it is possible that the Panama forms may belong in that group of species whose presence in the Subtropical Zone of eastern and western Panama and absence from the intervening region suggest that their ranges were once more nearly connected,<sup>1</sup> there is no reason to believe that in recent geologic times the mountains of Guiana were connected with those of southeastern Brazil, and if *Oxyruncus* ever occurred in the intervening area the causes of its extinction there we may not hope to discover. If cases of this kind that impress us with the depth of our ignorance concerning the earlier stages of bird distribution, they at least give us some conception of the extent of the changes that have occurred and bring far within the range of probabilities the theory here advanced to account for the Andean element in the Roraiman-Duidan fauna.

If it be admitted that the cases cited support this theory of disappearance from intervening areas, we are then logically led to consider the causes of this disappearance. Here, it must be confessed, we are almost wholly at sea. Species increase and decrease in our own day without our being able to learn the factors which affect their numbers; how, then, may we hope to discover the influences which controlled them in an indeterminate past of which we know little? However, we are safe in assuming that climate then, as now, affected the distribution of animals, and we look for some evidence of its action in the present distribution of the birds we have under consideration. Possibly we may find such evidence in the exceptionally interesting range of *Zonotrichia capensis*.

This is one of the most abundant birds of South America, widely distributed through the subtropics, extending southward (and in places

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<sup>1</sup>See Bull. Amer. Mus. Nat. Hist., XXXVI, 1919, p. 151.



Fig. 29. The Distribution of *Zonotrichia capensis*.

- |                                     |                                    |
|-------------------------------------|------------------------------------|
| 1. <i>Zonotrichia c. antillarum</i> | 4. <i>Zonotrichia c. insularis</i> |
| 2. " " <i>septentrionalis</i>       | 5. " " <i>macconnelli</i>          |
| 3. " " <i>costaricensis</i>         | 6. " " <i>roraimae</i>             |

Dotted area, remaining South American races.

upward) to the Temperate Zone where, with some variation in characters, it reaches the Straits of Magellan. It is also found in the subtropics of Costa Rica, Guatemala, and the island of Santo Domingo and in the Tropical Zone of the islands of Curaçoa and Aruba and in French Guiana.

Here is a range which excites one's imagination. The capture by Dr. W. J. Abbott of this species, as well as a form of *Loxia leucoptera*, in the mountains of Santo Domingo, is one of the most unexpected and important additions to our knowledge of bird distribution made in recent years.

How can we explain the occurrence of this characteristic South American bird in the Subtropical Zone of a Greater Antillean island? Influenced by chronology rather than morphology, we are apt to think of newly-discovered forms as those most recently evolved, and for this reason, in connection with its alleged generic distinction, it was natural for us to think of this Santo Domingo race as derived from South America. But recognizing now its generic identity with *Zonotrichia*, is it not more obviously of North American than of South American origin? Its zonal association in Santo Domingo with the unquestionably northern *Loxia* supports this view.

The climate which prevailed in the eastern United States during the last Ice Age is believed by palæontologists<sup>1</sup> to be responsible for the remarkably rich Pleistocene mammalian fauna of Florida. Crowded southward into the peninsula there followed an over population which eventually resulted in the extinction of approximately one-third of the fauna. The difference between the existing mammal fauna and that of the Pleistocene is due chiefly to the non-existence of many species of the earlier period.

Wetmore's studies<sup>2</sup> of the far less complete record of Florida's Pleistocene bird-life yield essentially similar results; the earlier fauna evidently closely resembled that of today but, like the mammal life, was distinguished by the presence of a number of species now unknown in the state. From the environmental stresses of this period mammals could not escape, but the more mobile birds may well have been induced to seek new territory toward the south.

This theory offers a not-unreasonable explanation for the presence of the strong northern element which we find today in the Greater Antilles. Birds like *Grus americana nesiotus*, *Colinus virginianus cubanen-*

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<sup>1</sup>Simpson, G. G., *Amer. Nat.*, 1931, pp. 258-276.

<sup>2</sup>Smith, *Misc. Coll.*, 1931, LXXXV, 2, pp. 1-41.

sis, *Campephilus principalis bairdi*, *Colaptes chrysocaulosus*, *Ammodramus savannarum savannarum*, *Loxia leucoptera megaplaga* and others seem obviously of northern origin and to this number it seems more reasonable to add *Zonotrichia* than to believe that it has reached Santo Domingo from South America.

Under the impetus of the southern movement, which we assume carried it from Florida southward, individuals may have continued southward to the coast of northern South America. Evidences of this emigration are found in the presence today of a race of this bird on the islands of Curaçoa and Aruba. There the absence of mountains has forced it to remain at sea-level. But just as in Santo Domingo it sought a congenial climate in the higher mountains so, on reaching the mainland of South America, it has sought a favorable altitude where it was available. In French Guiana and certain places in the Brazilian coast it still occurs locally at sea-level. But in Venezuela, Colombia, and Ecuador it is found only in the mountains, usually at Subtropical and Temperate Zone elevations. Thence, through these zones, it extends to the Magellan region.

So we may believe that those individuals which reached the interior of British Guiana and southern Venezuela found, on the slopes and summit of Roraima, a climate approximating that to which they were accustomed. It will take more than one specimen to determine whether the example of *Zonotrichia capensis roraimæ* collected by the Tyler Duida Expedition on the Rio Negro (see beyond) was an stray from Roraima or a survivor from an earlier period. *Zonotrichia* has apparently also entered South America through Central America where evidences of the route followed are found in its current existence in the mountains of Guatemala and Costa Rica.

Other cases might be cited in which climatic influences during comparatively recent times have affected the distribution of birds in northern South America, none more convincing than the presence of a horned lark (*Otocoris*) on the savanna of Bogotá.

Climatic changes far less extensive than those produced by a glacial period may exert a marked influence on the distribution of life in the area affected. Decreased rainfall, for example, may change marshes into dry plains or forested regions into grassy savannas and thus deprive certain species of a favorable habitat while offering new territory to others. To illustrate: the peculiar little flycatcher, *Habroura pectoralis*, is an inhabitant of grassy or reedy marshes, and, since this type of country is of local occurrence, its habitat requirements are apparently responsible for its broken distribution. True *pectoralis* is recorded from



the Province of Buenos Aires and Mendoza, Argentina north to Matto Grosso, and eastern Bolivia. Thence the species is unknown until the forests of Amazonia have been crossed when it reappears along the Orinoco and Caura and on the Takatu Mountains of British Guiana, and Mt. Roraima, where we took three specimens at 5000 feet, as *Habroura pectoralis brevipennis*. A third race, *bogotensis*, is found in the Temperate Zone of the savanna of Bogotá. With the drying up of its haunts in the Orinoco Valley this species, north of the Amazon, would presumably be restricted to the Andes and Mts. Roraima and Takatu.

On the other hand, *Sicalis citrina*, a species of dry plains, is also found on the savanna of Bogotá, and on Roraima we took it up to 6500 feet. It occurs also in favorable country in the intervening lowlands, but increased rainfall in the areas would readily render them unsuitable for its occupation when, again, we should have a wide interval separating the ranges of birds found in the Andes and on Roraima.

Cases of interrupted distribution among birds are indeed so frequent that we take them for granted even when we have not the slightest clue to the causes which have occasioned them. Note, for example, *Pyroderus scutatus* and *Phibalura flavirostris*, unknown between the southeastern Brazil region and northeastern Peru and eastern Bolivia respectively, and also *Porphyriops melanops* unrecorded from between the savanna of Bogotá, Colombia, and northern Argentina. The latter, I may say in passing, I believe, like *Zonotrichia capensis*, to be of northern origin. In these, and other instances that might be cited, there is no question involved of a former connection of their present ranges in the region from which they are now missing. Owing to any one or more of those obscure causes which influence the numbers of a species, they are not now found in regions they presumably once occupied, and our best attempts to explain their absence must remain within the realm of theory.

In attempting to account for the hiatus in the ranges of certain birds which, either as the same or representative species, are common to the Subtropical Zone in Roraima-Duida and the Andes, we should consider also the discontinuity which exists in the ranges of a number of species common to the Subtropical Zone of the Andes of north central Venezuela and northeastern Venezuela. In a paper based on Tate's explorations on Mt. Turumiquire in the latter region,<sup>1</sup> I showed that of thirty-four subtropical species of northeastern Venezuela no less than thirty-two, as the same or representative forms, are known from the

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<sup>1</sup>Amer. Mus. Novit., No. 191, 1925.

Caracas-Valencia region. And it is of especial significance to note that five<sup>1</sup> of these birds are represented in the Roraima area, and also on Mt. Duida.

Just as the age of a stratum is determined by the fossils occurring in it, so the presence of these birds in three separated regions may be accepted as evidence that the cause or causes responsible for the hiatus in the ranges of the birds common to north central and northeastern Venezuela also occasioned the gap in the ranges of the birds common to one or both of these regions and the Roraiman-Duidan area.

The individual instances cited above are illuminating so far as they go, but as we observe our problem grow far beyond the limits of the relations of the zonal faunas and floras of Roraima, Duida, and the Andes, I feel that we must look for far-reaching influences to account for these pronounced cases of discontinuous distribution. It is said, for example, that in mid-Tertiary times South America was composed of three landmasses—Guianan, Andean, and southeastern Brazilian—separated by arms of the sea that flooded valleys of the Orinoco and Amazon and thence spread southward to what is now Argentina.

We are warranted, I feel, in suggesting that the ranges of such ancient types as *Pyroderus* and *Phibalura*, for example, may have been separated by this sea, but to explain the situation now presented in Venezuela by a phenomenon of this kind would call for a comparatively recent flooding of the Orinoco region following a period of elevation, and I have been unable to find geological evidence in support of such a theory. We may also appeal to far-reaching climatic changes which would affect the limits of zonal boundaries; but proper consideration of the potentialities of such changes calls for a more thorough study of the existing tropical fauna than I can make at this time.

NATURE OF THE DIFFERENTIATION SHOWN.—There is no uniformity of variation in the differences which distinguish Andean forms from their Roraiman-Duidan representatives, such as is so marked in the forms of tropical origin. Both groups live at corresponding elevations under conditions which characterize the Subtropical Zone. There is, consequently, no reason why we should expect constancy in their comparative differentiations. The variation in the degree of these differentiations, ranging from forms so closely allied that they intergrade by individual variation, to those so distinct that it may be open to question whether they are mutually representative, suggests that, viewed as a whole, a

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<sup>1</sup>*Mecocerculus leucophrys roraimæ*; *Myioborus verticalis pallidiventris*; *Chlorophonia cyanea roraimæ*; *Tangara guttata guttata*; *Tangara whiteleyi*.

prolonged period was required to form and segregate the Andean element in the Roraiman-Duidan fauna.

#### INDIGENOUS FORMS WITH SOUTHEAST BRAZIL AFFINITIES

	Roraima	Duida	
<i>Oxyruncus cristatus hypoglaucus</i>	1		Races in S. E. Brazil, W. and E. Panama and Costa Rica Apparently represents <i>E. plumbeiceps</i> , S. E. Brazil to S. E. Peru
<i>Euscarthmornis russatus</i>	1		

The range of *Oxyruncus* has already been commented on. Possibly at an earlier stage in history it may have had a range similar to that of *Chlorophonia cyanea* and its near allies today. Its absence from Duida may be only apparent.

#### INDIGENOUS FORMS WITH GUATEMALAN AFFINITIES

	Roraima	Duida	
<i>Campylopterus hyperythrus</i>	1	1	} Representative species; nearest relative <i>C. rufus</i> of Guatemala
<i>Campylopterus duidæ</i>			

This is one of the most distinct of Roraima-Duida birds, so far removed from the Guatemalan bird that it cannot with certainty be considered to represent that species. The distinctness of the Roraiman and Duidan forms from each other bespeaks their long separation.

#### INDIGENOUS FORMS OF UNKNOWN ORIGIN<sup>1</sup>

It will be observed that most all the forms below enumerated are common to both mountains, four being found in Roraima only, while two are known only in Duida. What stage in the history of the Roraiman-Duidan region these birds represent we do not know, but if they belong to the period prior to the segregation of the existing isolated mountain areas on which the Roraiman-Duidan fauna is found, they must be of very great age. Nevertheless we are impressed by their

<sup>1</sup>Total, 3 genera, 17 species (3 with subspecies).

general resemblance to prevailing types of birds, only three of them (all monotypes) belonging to distinct genera.

	Roraima	Duida	
<i>Nannopsittaca panychlorus</i>	1	1	Genus indigenous
<i>Waldronia milleri</i>		1	Genus indigenous
<i>Lophornis pavoninus pavoninus</i> }	1	1	Representative races
<i>Lophornis pavoninus duidæ</i> }		1	
<i>Thamnophilus insignis</i>	1	1	
<i>Automolus roraimæ</i>	1	1	Possibly a representative of <i>A. ochrolæmus</i>
<i>Roraimia adusta</i>	1	1	Genus indigenous
<i>Mecocerculus nigrifrons</i>	1	1	Possibly a distinct genus
<i>Euscarthmus duidæ</i>		1	
<i>Elænia dayi</i> }	1		Representative forms
<i>Elænia tyleri</i> }		1	
<i>Myiophobus roraimæ</i>	1	1	
<i>Chloropipo uniformis uniformis</i> }	1		Representative forms. Nearest relative <i>Chloropipo holochlora</i> ; Panama to Peru
<i>Chloropipo uniformis duidæ</i> }		1	
<i>Lathria streptophora</i>	1		
<i>Euchlornis whitelyi</i>	1		Genus, Subtropical, N. E. Venezuela to Bolivia
<i>Microcerculus ustulatus</i> }	1		Representative species
<i>Microcerculus duidæ</i> }		1	
<i>Cichlopsis gularis</i>	1		Remaining species Ecuador and Eastern Brazil. Nearer former
<i>Diglossa major</i>			
<i>Diglossa duidæ</i>			

#### SUMMARY AND CONCLUSIONS

Mt. Duida, Venezuela, near the headwaters of the Orinoco, is shown to have an upper zonal avifauna essentially like that of the Mt. Roraima region about 400 miles east-northeast.

The existence of other high mountains north of the Pacarima range with sufficient altitude to support a subtropical fauna indicates that the avifauna hitherto known only from Roraima and its immediate dependencies may extend over a much larger area. These facts suggest that this fauna once occupied a much wider area of which these mountains formed a part.

Both mountains are of sandstone. Roraima and its neighbors are considered remnants of a once continuous tableland which became dissected by erosion and is now represented by isolated fragments (Tate).

Mt. Duida, it is suggested, owes its origin to block faulting (Tate and Hitchcock). No fossils have been found on either mountain.

The marked dissimilarity in the basal topography of the mountains is responsible for the differences in the contact of their Tropical and



Fig. 30. *Campylopterus hyperthyrus* of Roraima and allies.

Subtropical Zones. On Roraima they meet at about 4000 feet and their boundaries inosculate over a wide area. On Duida they meet at about 3200 feet and their boundaries are more sharply defined.

There are evidences of the former existence of a Temperate Zone on both mountains.

An analysis of the distinctive avifauna shows that its age extends from the present to an unknown past.

About one-fourth the indigenous birds have been derived from tropical ancestors, most of which still exist in the region in which the

mountains are situated. About one-fourth are too distinct to afford evidence of their immediate ancestry.

The remainder is composed chiefly of forms showing more or less close resemblance to birds of the Andean Subtropical and, in smaller part, Temperate Zones.

The existence of these representative forms in such widely separated regions may be explained by the disappearance of their common ancestors, or connecting forms, in the intervening area.

The cause of their disappearance is attributed chiefly to the influence of climatic changes,

Forms of tropical origin are usually larger and darker than those from which they have sprung. Mutually representative forms on Roraima and Duida, and on these mountains and in the Andes exhibit no characteristics which may be attributed to the influence of environment.

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PART II  
ANNOTATED LIST OF SPECIES<sup>1</sup>  
FAMILY TINAMIDÆ. TINAMOUS  
**Crypturornis soui soui** (Hermann)

*Tinamus soui* HERMANN, 'Tabl. Affinitat,' 1783, p. 165 (Cayenne).

*Crypturus soui*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 10 (Mt. Roraima and localities in Tropical Zone).<sup>2</sup>

Roraima: Arabupu, 3 ♂, 6 ♀.

I have no topotypical material for comparison and merely follow current usage in referring British Guianan specimens to true *soui*.

FAMILY CRACIDÆ. GUANS AND CURASSOWS  
(94) **Penelope granti** Berlepsch

*[Penelope] granti* BERLEPSCH, Nov. Zool., XV, 1908, p. 297 (new name for *Penelope marail* of Grant but not of Gmelin); CHUBB, 'Bds. British Guiana,' I, 1916, p. 25 (tropical localities).

*Penelope marail*, GRANT, 'Cat. Bds. Brit. Mus.,' XXII, 1893, p. 495 (Takutu River, British Guiana).

Roraima: Arabupu, 4 ♀, 1 (?).

According to Chubb ('Birds of British Guiana,' pp. 25-26), *granti* and *marail* occur together. We have Guianan specimens of the latter from Kamakusa, Tumatumari, and the Waremia River, but our only Guianan specimens of *granti* are from Arabupu. Size appears to be the most constant character separating the two forms, particularly the length of the tail, which in *granti* averages 350, and in *marail* 250 mm. In fresh plumage there is little or no difference in the color of the primaries, while a male of *marail* from Kamakusa (tail 255 mm.) is very near Arabupu specimens in general tone of color and the markings of the abdominal region. These specimens suggest that the two birds are mutually representative and do not occur together.

A series from the base of Duida and the Cassiquiare River is very near to, if not identical with *granti*, thus extending its known range westward and suggesting that it merges with, or at least is representative of *jacuacu* Spix.

**Ortalis motmot** (Linnæus)

*Phasianus motmot* LINNÆUS, 'Syst. Nat.,' I, 1776 ("Brasilia").

*Ortalis motmot*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 27 (Roraima and tropical localities).

Roraima: Arabupu, 1 ♀.

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<sup>1</sup>Known from above 4000 feet on Mt. Roraima and from above 3250 feet on Mt. Duida.

<sup>2</sup>References, in the main, are restricted to the original description and Chubb's 'Birds of British Guiana.' The order followed is that of Brabourne and Chubb's 'Birds of South America.'

Agrees with two specimens from the Rio Cotinga in Brazil, south of Roraima, in being grayish below with little or no olivaceous wash, while specimens from Santarem have the underparts strongly tinged with that color. As specimens from the lower Orinoco (Maripa, Bolivar, La Union) show both types of color, it is probably an expression of individual or seasonal variation.



Fig. 31. *Columba albilinea roraimæ* and Andean races.

FAMILY COLUMBIDÆ. PIGEONS AND DOVES

*Columba rufina andersoni* Cory

*Columba rufina andersoni* CORY, Field Mus. Pub. 182, 1915, p. 294 (Serra da Lua, near Boa Vista, N. Brazil).

*Columba rufina*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 38 (Roraima).

Roraima: Arabupu, 1 ♂ ad., 1 ♀ ad.; Caracarahy, Rio Branco, 2 ♀; Frechal, Rio Surumu, 1 ♀.

These birds are essentially toptotypical of *andersoni*. They differ, obviously, from *sylvestris*, but, for lack of specimens from French Guiana, I am unable to state their relationship to true *rufina* (from which they are said to differ "in having the lower abdomen and under tail-coverts slate-gray").

**Columba albilinea roraimæ** Chapman

*Columba albilinea roraimæ* CHAPMAN, Amer. Mus. Novit., No. 341, 1929, p. 1 (Mt. Roraima, 6000 ft.).

*Columba albilinea*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 39 (Mt. Roraima).

Mt. Roraima: Philipp Camp; Rondon Camp; 5. Mt. Duida: Valle de los Monos, 725 ft., 2; 1st Peak, Provisional Camp; Vegas; Desfiladero; Cumbre No. 5; 15-16.

RANGE.—The race, Roraima and Duida; remaining races, Cumbre of Valencia, and doubtless Mérida region, Venezuela; Subtropical to Temperate Zones of Santa Marta Mts., southward to Bolivia, northward to Costa Rica.

A strongly marked race of this not very variable species, distinguished by its darker colors. The capture of two specimens on Duida at an elevation of only 725 feet is surprising. They are the only ones I have seen from the Tropical Zone. Possibly in pursuance of the long flights that pigeons often make for food, they may have left their true zone to feed at lower levels.

## FAMILY SCOLOPACIDÆ. SNIPES AND SHOREBIRDS

**Capella brasiliensis** (Swainson)

*Gallinago brasiliensis* SWAINSON, 'Faun. Bor.,' 1831, p. 400 (Equi. Brazil). CHUBB, 'Bds. British Guiana,' I, 1916, p. 133 (Mt. Roraima and Tropical Zone).

Roraima: Arabupu, 1.

**Capella undulata** (Boddaert)

*Scolopax undulata* BODDAERT, 'Tabl. Pl. Enl.,' 1783, p. 54 (Cayenne).

*Homoptilura undulata*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 134, Pl. IV (Mt. Roraima and Tropical Zone).

Roraima: Arabupu; Paulo; 2.

## FAMILY ACCIPITRIDÆ. HAWKS, KITES, ETC.

**Rupornis magnirostris magnirostris** (Gmelin)

*Falco magnirostris* GMELIN, 'Syst. Nat.,' I, 1788, p. 282 (Cayenne).

Roraima: Paulo, 1 ♀; Arabupu, 1 ♂.

These specimens are not fully adult, but they apparently are to be referred to true *magnirostris*.

**Falco fusco-cærulescens fusco-cærulescens** Vieillot

*Falco fusco-cærulescens* VIEILLOT, 'Nouv. Dict. d'Hist. Nat.,' XI, 1817, p. 90 (Paraguay). CHUBB, 'Bds. British Guiana,' I, 1916, p. 276 (Mt. Roraima and Tropical Zone).

Roraima: Arabupu, 2 ♂ im., 1 ♀ im.

## FAMILY BUBONIDÆ. OWLS

**Otus choliba duidæ** Chapman

*Otus choliba duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 7 (Mt. Duida, 5000 ft.).

Mt. Duida: Savanna Hills; Cumbre 2500 ft.; 4.

RANGE.—The race, Mt. Duida; remaining races, Tropical Zone, Uruguay to Costa Rica.

A zonal form of *Otus choliba crucigerus*, of which we have a specimen from the base of Duida (725 ft.). It is not only much darker than *crucigerus* but darker than any other known screech owl, whether of the *choliba* or *asio* group. There is a typical specimen of *choliba choliba*, in the British Museum, collected by Whitely at an altitude of 3500 feet near Roraima.

***Otus vermiculatus roraimæ* (Salvin)**

*Scops roraimæ* SALVIN, Bull. Brit. Orn. Club, (6) XLIV, 1897, p. 38 (Roraima; type examined).

*Otus crucigerus*, CHUBB (*nec* Spix), 'Bds. British Guiana,' I, 1916, p. 288 (part).

Duida: Agüita, 2, brown phase.

RANGE.—The race, Roraima and Duida, and probably adjoining parts of Tropical Zone; the species, northern South America to western Panama.

Our specimens from Duida agree essentially with the type and a topotype (both in the brown phase) of *roraimæ* in the British Museum. Access in that hospitable institution to the type of *Otus guatemalæ* Sharpe and an excellent series of both this species and *O. vermiculatus* Ridgway enabled me for the first time to appreciate the differences between these two birds. The extent of feathering on the tarsus is variable and may be artificially affected by wear incident to labeling. The color characters of these dichromatic birds are notoriously difficult to define, but the shorter tail and tarsus of *vermiculatus* afford characters which are apparently diagnostic. With these two forms defined it is evident that *roraimæ* represents *vermiculatus*. The feathers on the tarsus may extend somewhat lower; the upperparts, while very near those of one Veraguan specimen, are darker than in eight others, and the lowerparts posterior to the breast are more sharply marked than in any specimens of true *vermiculatus*, in this respect approaching *choliba*.

Re-examination of the type and two specimens of *Otus "guatemalæ" napensis* Chapman, in the light of this additional material, shows that it represents *vermiculatus* rather than *guatemalæ*. The tarsus is more fully feathered in *napensis* but in color, and especially in size, it is nearer to *vermiculatus* than to *guatemalæ*. Our four specimens from eastern Ecuador, compared with two from Veragua, indicate that *napensis* is more finely marked below than *vermiculatus* and in this respect is even less like *roraimæ*. A specimen in the British Museum from the Balzar Mts., western Ecuador, is in the red phase but has the tarsi scantily feathered and in measurements is nearer *vermiculatus*. It is probable,

therefore, that the immature specimen from Cerro Manglar Alto, recorded by me as possibly representing *guatemalæ*, should also be referred to *vermiculatus*, or a form of it.

In view of these facts it might be concluded that *vermiculatus* was a southern representative of *guatemalæ* and that the latter did not range below Nicaragua, but we have long had a specimen of *Otus* in our collections from Cristobal Colon on the Paria Peninsula of northeastern Venezuela (No. 120,332, June 17, 1913, ♀, brown phase) which, although the tarsal feathering is no more extended than in some examples I refer to the *vermiculatus* group, agrees with *guatemalæ* in size and is exceedingly near two specimens of that bird in color. If this example be correctly determined, it would appear that *guatemalæ* and *vermiculatus* are specifically distinct.

The fact that, on Roraima, *roraimæ* is unknown from above 3500 feet, and has not been found on Duida from above 3250 feet, may indicate that this form belongs in the Tropical rather than the Subtropical Zone.

#### Measurements

	SEX	WING	TAIL	TARSUS
<i>O. guatemalæ</i> , Guatemala (type)	?	176	89	31 <sup>1</sup>
“ Vera Paz, Guatemala	?	165	84	30 <sup>1</sup>
“ Jalapa, Nicaragua	♂	167	85	31.5
“ “ “	♀	167	80	32
? “ Cristobal Colon, Venezuela	♀	160	86	30
<i>O. v. vermiculatus</i> , Calovevora, Veragua,	♂	164	76	28 <sup>1</sup>
“ “ “ “	♂	160	76	28 <sup>1</sup>
“ “ “ “	♂	155	75	28 <sup>1</sup>
“ “ subsp., Balzar Mts., Ecuador	?	140	67	26 <sup>1</sup>
“ <i>roraimæ</i> , Roraima, 3500 ft. (type)	♂	148	77	25 <sup>1</sup>
“ “ “ “	♀	158	78	27 <sup>1</sup>
“ “ “ “	♀	160	78	27 <sup>1</sup>
“ “ Duida, 3250 ft.	♂	155	79	26
“ “ “ “	♀	158	78	26
“ <i>napensis</i> , Curaray, E. Ecuador	♂	165	75	26
“ “ Macas, “	?	160	75	26
“ “ “Napo” “	♀	164	75	27

#### *Glaucidium brasilianum duidæ* Chapman

*Glaucidium brasilianum duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 8 (Mt. Duida, 4700 ft.).

(?) *Glaucidium phalænooides*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 293 (upper Takutu Mts., Roraima, 3500 ft., Merumé Mts., B. G.).

<sup>1</sup>In the British Museum.

Mt. Duida: Agüita; Savanna Hills; Cumbre, 5000 ft.; 5.

RANGE.—The race, Duida (and Guiana Mts.); remaining races, Argentina to Arizona.

Like *Otus c. duidæ*, this owl is a zonal form of a widely distributed basal ancestor, and it is more deeply colored than any other known race of its species. The possibilities of *G. jardinei* being a zonal representative of *brasilianum* are, however, to be considered. I have seen no Guianan specimens and include Chubb's localities provisionally.

#### FAMILY PSITTACIDÆ. PARROTS AND PAROQUETS

##### *Ara hahni* (Souancé)

*Psittacara hahni* SOUANCÉ, Rev. et Mag. de Zool., 1856, p. 58 (Colombia).

*Ara hahni*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 305 (Mt. Roraima and Tropical Zone).

Roraima: Arabupu, 1 ♂; Paulo, 3.

RANGE.—Through the tropics of northern South America.

We have no topotypical specimens.

##### *Pyrrhura egregia* (Sclater)

*Conurus egregius* SCLATER, Ibis, 1881, p. 130, Pl. IV (Demarara).

*Pyrrhura egregia*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 313 (Mt. Roraima, Merumé Mts., Kamarang River, Annai).

Roraima: Arabupu, 1 ♂, 2 ♀.

RANGE.—Known from British and Dutch Guiana.

##### *Nannopsittaca panychlorus* (Salvin and Godman)

*Brotogetys panychlorus* SALVIN AND GODMAN, Ibis, 1883, p. 211, Pl. IX, fig. 1 (Mt. Roraima).

*Bolborhynchus panychlorus*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 314 (Roraima).

Mt. Roraima: summit, 8000 ft., 12; Kamarang River, B. G. (Whitely). Mt. Duida: 550 ft., 4; High Point, 7100 ft., 4.

RANGE.—Known only from Roraima and Kamarang River, British Guiana, and Duida.

Although all our specimens were obtained on the summit of Roraima, their collector, Mr. Carter, informs me that the birds were not shot on the mountain but flying over it as they passed each evening in flocks, evidently en route to their roost. Their feeding place was not discovered. That in Guiana the species is not confined to Roraima is indicated by a specimen in our collection collected by Whitely on the Kamarang River. At Duida the species was taken both at the base and on the summit of the mountain. In spite of its occurrence in the Tropical Zone its restricted range indicates that it may breed in the Subtropical

Zone and descend to the tropics in search of food. Ridgway (Bull. U. S. Nat. Mus., 50, VII, p. 114) writes that this species is "evidently related to both *Brotogeris* and *Urochroma*, but is very distinct from either."

***Pionus menstruus* (Linnæus)**

*Psittacus menstruus* LINNÆUS, 'Syst. Nat.', 1766, p. 148 (Surinam).

*Pionus menstruus*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 329 (Mt. Roraima and Tropical Zone).

Roraima: Arabupu, 1 ♀.

A typical example of this wide-ranging, non-variable species.

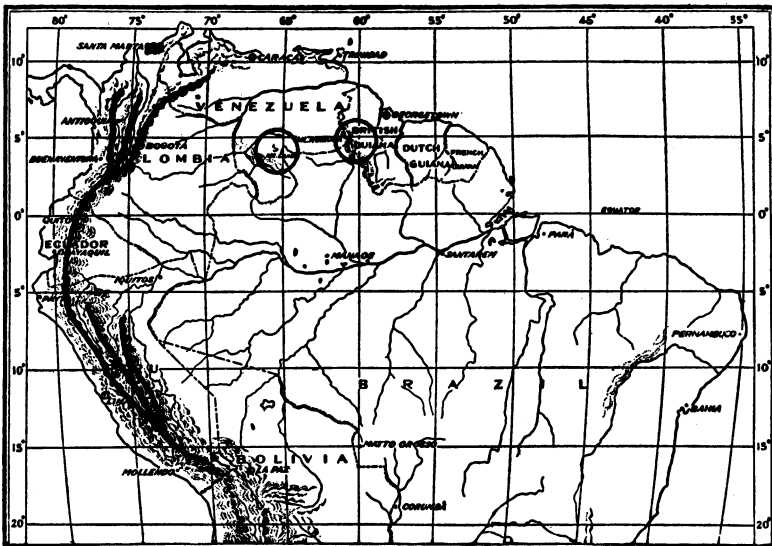


Fig. 32. *Systellura ruficervix roraimæ* and Andean races.

FAMILY CAPRIMULGIDÆ. GOATSUCKERS

***Thermochalcis cayennensis cayennensis* (Gmelin)**

*Caprimulgus cayennensis* GMELIN, 'Syst. Nat.,' I, 1789, p. 1031 (Cayenne).

*Thermochalcis cayennensis*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 365 (Mt. Roraima; Merumé Mts.; and Tropical Zone).

Roraima: Arabupu, 1 ♂, 1 ♀; Philipp Camp, 3 ♂, 2 ♀.

The males from Philipp Camp measure: wing, 140, 146, 150; tail, 109, 116, 118 mm. A Cayenne male measures: wing, 133; tail, 109 mm. In color, the Roraiman birds agree with examples from Cayenne.

***Systellura ruficervix roraimæ* Chapman**

*Systellura ruficervix roraimæ* CHAPMAN, Amer. Mus. Novit. No. 341, 1929, p. 2 (Mt. Roraima, 6000 ft.).

*Thermochalcis ruficervix*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 366 (Roraima, 5000 ft.).

Mt. Roraima: Philipp Camp, 2. Mt. Duida: Valley Head; Provisional Camp; Cumbre, 5800 ft.; 2; ♂, 1 ♀.

RANGE.—The race, Roraima and Duida; remaining races, Temperate Zone, Mérida region, Venezuela, Santa Marta Mts., and southward on all Andean ranges to Peru.

A larger and darker form of the Andean race. The latter is characteristic of the Temperate Zone and is consequently one of the representatives of this zone in the Roraiman-Duidan region.

***Nyctipolus whitelyi* (Salvin)**

*Antrostomus whitelyi* SALVIN, Ibis, 1885, p. 438 (Mt. Roraima, 3500 ft.).

*Caprimulgus whitelyi*, HARTERT, 'Cat. Bds. Brit. Mus.,' XVI, 1892, p. 573, Pl. XII; CHUBB, 'Bds. British Guiana,' I, p. 1916, p. 368 (Mt. Roraima, 3500 ft.).

RANGE.—Roraima.

I have not seen this species. It appears to be nearly allied to *N. nigrescens* (Cabanis) of the Tropical Zone in Guiana and southward.

## FAMILY CYPSELIDÆ. SWIFTS

***Aëronautes montivagus tatei* (Chapman)**

*Duidia tatei* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 11 (Mt. Duida, Venezuela).

Mt. Duida: 7100 ft., 1.

On the appearance of the American Museum Novitates containing the description of this swift as *Duidia tatei*, Dr. Hellmayr called my attention to its resemblance to *Micropus montivagus*, adding that the München Museum contained specimens of this species (hitherto recorded only from the mountains of Bolivia and Peru) from northern Venezuela. Subsequently, I learned that there is also a series from northern Venezuela in the Carnegie Museum, while in the American Museum I discovered two specimens from Bolivia and one from Peru, the latter of which I had shot myself! Mr. Todd has kindly loaned me his Venezuelan birds, and with 14 specimens before me I can now view the status of the Duidan bird from a new standpoint.

At once it is evident that the bare tarsus forming the chief character of the proposed *Duidia* is apparently due to individual variation, several of the Carnegie Museum specimens having the tarsi feathered quite to the toes. I am unable therefore to see how this species can be distin-



guished generically from *Aëronautes melanoleucus*. I have already called attention to its general resemblance in color to that species, which possibly may represent *montivagus*, as *Panyptila cayennensis* is represented by *P. sancti-hieronymi*. From the South Andean swifts currently referred to the genus *Micropus*,<sup>1</sup> *Aëronautes* is distinguished chiefly by its relatively shorter wings and tail, less deeply forked tail, stiffer and more pointed rectrices.

Doubtless, because of the difficulty of collecting these rapid, high-flying birds, *A. montivagus* is not a common bird in collections and I add, therefore, comments on the birds before me as well as on the status of the Duidan bird.

The female averages duller throughout and usually has less white at the ends of the rectrices, but these characters are not constantly diagnostic. Although no male is as dull (brown) as the dullest female, some females are as nearly if not quite as black as the blackest male. Again, while no female has as much white at the tip of the rectrices as the male, in which this marking is most highly developed, two females and one male have practically no white on the tail. Males, however, appear to have the throat and breast always whiter than in the female, in which these parts are decidedly grayer.

My material does not reveal the extent of seasonal variation, but in the Venezuelan series one of two March females agrees with three June females, while the second is browner above. The condition of the ovaries is not stated.

In the Venezuelan series the June males are essentially alike in general color, while the July bird with "active gonads" is in slightly worn plumage and apparently for this reason is somewhat less lustrous. With only three specimens from Bolivia and Peru, satisfactory conclusions regarding the relations of birds from this area to those from the Andes of Venezuela cannot now be reached. Their measurements show no significant differences in size and I can detect none in color. It seems probable, therefore, that they are not separable.

The single male from Duida is pronouncedly blacker and glossier than any other male in the series, its color being jet black with bluish reflections rather than sooty black with somewhat olivaceous reflections. It was taken in January and had the testes greatly enlarged. I have no other specimen wholly comparable with it, and it therefore remains to be determined whether its characters are seasonal or racial. They im-

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<sup>1</sup>*Micropus atdecolus atdecolus* (d'Orbigny and Lafresnaye), *M. a. parvulus* Berlepsch and Stolzmann, *M. a. peruvianus* Chapman.

press me as being the latter rather than the former, and, in view of the geographic variation which distinguishes the zonal birds of the Duidan fauna I recognize *tatei*, at least provisionally, as a race of *montivagus*.

LOCALITY	DATE	SEX	WING	TAIL
Vermejo (3500 ft.), Santa Cruz, Bolivia,	Oct. 25, 1915	♂ <sup>1</sup>	111	45.5
“ “ “	Oct. 25, 1915	♀ <sup>2</sup>	112	45.5
Urumbamba Cañon (8000 ft.), Peru	July 31, 1916	♀ <sup>3</sup>	115	42
Sierra de Carabobo, Venezuela	June 25, 1914	♂	111	41
“ “ “	June 27, 1914	♂	109	40.5
“ “ “	June 26, 1914	♂	110	43
“ “ “	June 27, 1914	♂	111	42.5
Pico Miguata (9069 ft.), Venezuela	July 15, 1929	♂ <sup>4</sup>	112	42
Sierra de Carabobo “	June 26, 1914	♀	108	42
“ “ “	June 26, 1914	♀	109	42
“ “ “	June 26, 1914	♀	111	43
Galipan, Cerro de Avila “	March 14, 1914	♀	107	41
“ “ “	March 16, 1914	♀	113	43
Mt. Duida (7100 ft.), “	Jan. 12, 1929 <sup>5</sup>	♂ <sup>5</sup>	113	44

#### FAMILY TROCHILIDÆ. HUMMINGBIRDS

##### *Phaëthornis augusti incanescens* (Simon)

*Anisoterus augusti incanescens* SIMON, 'Hist. Nat. Trochil.' 1921, pp. 16, 257 (Quonga Mts., Merumé and Roraima).

*Phaëthornis augusti*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 384 (Quonga; Roraima).

Mt. Roraima: Paulo, 1 ♂, 1 ♀; Arabupu, 1 ♀?; Philipp Camp, 1 ♀.

Venezuelan specimens from Cuchivano (700 ft.) and San Antonio (1800 ft.), to Las Trincheras, Carabobo, and the Mérida region agree and evidently represent true *augusti*. From the four Roraiman birds they differ in being greener above with less tawny on the upper tail-coverts, the basal two-thirds of the tail darker (greener), the lower tail-coverts without buff tint. This race appears to be more of a subtropical than tropical form.

##### *Doryfera johannæ guianensis* (Boucard)

*Hemistephania ginanensis* [sic] BOUCARD. 'Hummingbird,' 1891, III, p. 10 (Merumé Mts., British Guiana).

*Doryfera johannæ*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 378 (Roraima and Merumé Mts.).

*Doryfera johannæ dissita*, CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 12 (Mt. Duida, 4700 ft.).

<sup>1</sup>Testes much enlarged.

<sup>2</sup>Eggs.

<sup>3</sup>Ovaries not enlarged.

<sup>4</sup>Gonads Active.

<sup>5</sup>Testes greatly enlarged.

Roraima: 4200 ft., 1 ♀. Mt Duida: Foothills Camp; Caño Seco; Agüita; Valley Head; Savanna Hills; 6 ♂, 7 ♀.

RANGE.—The race, Duida, Roraima and Merumé Mts.; remaining race, Tropical and Subtropical Zones, East Andes, Colombia to Peru.

This species is known chiefly from the Subtropical Zone, but we have ten specimens from the Tropical Zone at the base of the Andes in eastern Ecuador, while on Duida we have one from 750 feet at the base of the mountain, one from 2000 and another from 2250 feet. There are no records of this species east of the Andes except those given above. Whether it occurs in the intervening area or whether it was once more widely distributed and is now restricted to its present range is a matter for speculation.

Dr. Hellmayr has called my attention to Boucard's description of the Guianan bird.

#### **Campylopterus hyperythrus** Cabanis

*Campylopterus hyperythrus* CABANIS, Schomb. 'Reis. Guiana,' III, 1848, p. 709 (British Guiana = Mt. Roraima, 6000 ft.); CHUBB, 'Bds. British Guiana,' I, 1916, p. 391 (Mt. Roraima, "Bartica"; the latter locality is evidently an error).

Mt. Roraima: Philipp Camp; Rondon Camp; 6.

RANGE.—Mt. Roraima.

The relationships of this hummingbird are discussed under the following species.

#### **Campylopterus duidæ** Chapman

*Campylopterus duidæ* CHAPMAN, Amer. Mus. Novit., 1929, No. 380, p. 13 (Mt. Duida, 5000 ft.).

Mt. Duida: 1st Peak, 4700; Agüita, 2d Peak, 5000; Provisional Camp; Central; Vegas; Savanna; Desfiladero; 16.

RANGE.—Mt. Duida.

This species, *C. hyperythrus* of Roraima, and *C. rufus* of the mountains (5000-7000 ft.) of Guatemala, although specifically distinct, are so much more like each other than they are like other members of this strongly-marked genus that they form a distinct group within the genus. That *duidæ* and *hyperythrus* are mutually representative seems highly probable; nevertheless, in the color of the underparts, *hyperythrus* is nearer to *rufus* than to *duidæ*, while in having a large patch on the lateral rectrices *duidæ* is nearer *rufus*, although this mark is basal in the former, subapical in the latter. Whether the Central and South American birds are mutually representative, we shall doubtless never know, but the suggestive fact remains that the Roraiman and Duidan species find their nearest and only close relative in the mountains of Guatemala.

**Saucerottea cupreicauda cupreicauda** (Salvin and Godman)

*Amazilia cupreicauda* SALVIN AND GODMAN, Ibis, 1884, p. 452 (Mt. Roraima).

*Saucerottea cupreicauda*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 398 (Mt. Roraima, Merumé Mts., Quonga, B. G.).

Mt. Roraima: Paulo; Arubupu; Philipp Camp; 5 ♂, 7 ♀.

RANGE.—The race, Mt. Roraima, Merumé Mts., Quonga, British Guiana. It is also recorded from the mountains west of Suapure on the Caura River, by Simon, on the authority of specimens collected by S. Klages; remaining race, Mt. Duida. Possibly the Simon record may refer to the Duidan race.

This race, *S. c. duidæ*, and *S. viridigaster* of the Bogotá region and northward are obviously mutually representative. In having the tail uniformly colored, *duidæ* agrees with *viridigaster*, but in the color of the tail and lower tail-coverts *duidæ* is nearer *cupreicauda*. It is thus intermediate between the two, and, so far as resemblance goes, it would be just as logical to treat both the Duidan and Roraiman birds as races of the Andean form as races of each other. The probability of their ranges being connected, induces me to connect the two more eastern birds. It should be noted, however, that we have a specimen of *viridigaster* from Villavicencio, altitude, 1600 feet.

**Saucerottea cupreicauda duidæ** Chapman

*Saucerottea cupreicauda duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 13 (Mt. Duida, 4700 ft.).

Mt. Duida: 1st Peak, 4700; Second Peak, 5200; Savanna Hills; 4 ♂, 7 ♀.

The status of this race is discussed above.

**Chlorostilbon prasinus subfurcatus** Berlepsch

*Chlorostilbon subfurcatus* BERLEPSCH, Ibis, 1887, p. 297 (Mt. Roraima; 3500–4000 ft.). CHUBB, 'Bds. British Guiana,' I, 1916, p. 403 (Roraima; Ituribisi, Abary, Kamuni Rivers; Annai, Georgetown, B. G.).

Mt. Roraima: Arabupu; Philipp Camp; 5 ♂, 3 ♀. Mt. Duida: Laterite Valley; Savanna Hills; 15 ♂, 9 ♀.

Compared with three adult males from Cayenne, which Berlepsch and Hellmayr accept as the type-locality for *prasinus*, the Roraiman males have the upperparts, especially crown and region about the base of the bill, more golden or coppery; this difference may, in part, be due to age, and even to the age of the skin, for it is less evident in an apparently adult male collected on Roraima in 1881. But there can be no doubt that in Roraiman males the tail is forked to the depth of two and a half to three and a half millimeters, while in Cayenne specimens it is square. In the latter the bill appears to be somewhat heavier than in *subfurcatus*. Specimens from Duida may average somewhat bluer below

and are slightly larger than those from Roraima, and apparently have the tail a little more forked—a feature expressed in its greater length. Possibly the Duidan bird should be separated. It is noteworthy that there are no specimens of this species in our large collections from the country at the base of Duida on the Casiquiare, Rio Negro and Rio Uaupes. We have, however, a single male from Ayacucho on the Orinoco, just below Maipures Falls, which is probably *Chlorostilbon caribæus nanvus* Berlepsch and Hartert. It has the tail a little more deeply forked than in Duidan birds, the wing-quills browner, but is apparently a member of the *prasinus* group in which I should place also *melanorhynchus* and *assimilis* from west of the Andes, and *phæopygus* (Tschudi)<sup>1</sup> (= *daphne* auct.) from eastern Peru. In the East Ecuadorean form the female has the underparts largely green, except the throat, which is gray. We have three females in this plumage, one each from Rio Suno, Puerto Indiana (at the junction of the Napo and Amazon), and Orosa on the opposite side of the Amazon. For this form the name *napensis* Gould from the Napo seems available. The whole group is greatly in need of revision.

## Measurements

	SEX	WING	TAIL
Cayenne.....	♂	44	21
“ .....	♂	44	21
Roraima.....	♂	44	25
“ .....	♂	43	23.5
“ .....	♂	43	23
“ .....	♂	44	23
“ .....	♂	45	22
Duida.....	♂	47	26.2
“ .....	♂	48	26
“ .....	♂	48	27
Cayenne.....	♀	42	24
Roraima.....	♀	44	22
“ .....	♀	44	21.5
“ .....	♀	43	23
“ .....	♀	44	24
Duida.....	♀	47.2	25
“ .....	♀	48	26
“ .....	♀	47	25
“ .....	♀	46.5	27

***Thalurania furcata fissilis* Berlepsch and Hartert**

*Thalurania furcata fissilis* BERLEPSCH AND HARTERT, Nov. Zool., XI, 1902, p. 87 (Suapure, Orinoco).

<sup>1</sup>Zimmer. 1

*Thalurania fissilis*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 404 (Mt. Roraima, and tropical localities).

Roraima: Arabupu, 3 ♂, 3 ♀.

RANGE.—Chiefly Tropical Zone; the species, northeastern South America; the race, eastern Venezuela and British Guiana.

These specimens, and others from British Guiana, agree with topotypes of *fissilis* in having the lower tail-coverts without whitish edgings as in true *furcata* of Cayenne. The Roraiman males are not fully adult and the poor condition of the skins does not show whether the purple dorsal band is complete, but it is probable that they should be referred to this form.

Simon synonymizes this race under *forficata* Cabanis and Heine, but their type should be examined before this view is adopted.

#### ***Thalurania furcata orenocensis* Hellmayr**

*Thalurania furcata orenocensis* HELLMAYR, ANZ. ORN. GEZ. BAYERN, 1921, No. 4, p. 32 (Nericagua, Venezuela).

Mt. Duida: Playa del Rio; Foothills Camp; Caño Seco; Agüita; Laterite Valley, 2d Peak; 10 ♂, 7 ♀.

RANGE.—The race, upper Orinoco region ranging upward to the Subtropical Zone on Mt. Duida.

I have seen no authentic specimens of *orenocensis*, but Duidan specimens are apparently to be referred to that race. They differ from British Guiana and lower Orinoco birds in lacking a complete purple band across the back. In some specimens there are a few purple feathers among the interscapulars, but the purple areas on each side of the breast are in no instance wholly connected. Our one adult male from above 2250 feet is much darker above and has the rump and upper tail-coverts far more bronzy than in any other bird of the series. It may represent a subtropical race.

#### ***Colibri germanus* (Salvin and Godman)**

*Petasophora germana* SALVIN AND GODMAN, Ibis, 1884, p. 451 (Mt. Roraima, 5000–6000 ft.); CHUBB, 'Bds. British Guiana,' I, 1916, p. 406 (Mt. Roraima, 5000–6000 ft.).

Mt. Roraima: Philipp Camp; Summit; 2. Mt. Duida; Agüita; Vegas; Valley Head; Central Camp; Desfiladero; 23.

RANGE.—Mts. Roraima and Duida.

This is an obvious representative of *Colibri iolotus* of the Subtropical Zone from the Caracas region westward to Colombia and the Santa Marta Mts., southward to Bolivia. The Mexican and Guatemalan representative is *C. thalassinus*. From *iolotus*, *germanus* is distinguished

chiefly by having all the green areas darker, the purple area more extensive, the "scaled" breast bluer. These differences are doubtless all caused by the same pigmental factor. There are differences of degree and I believe that if the ranges were connected the two forms would interbreed. I have not sufficient material to offer an independent opinion on the status of *C. i. brevipennis* Cory from Caracas.

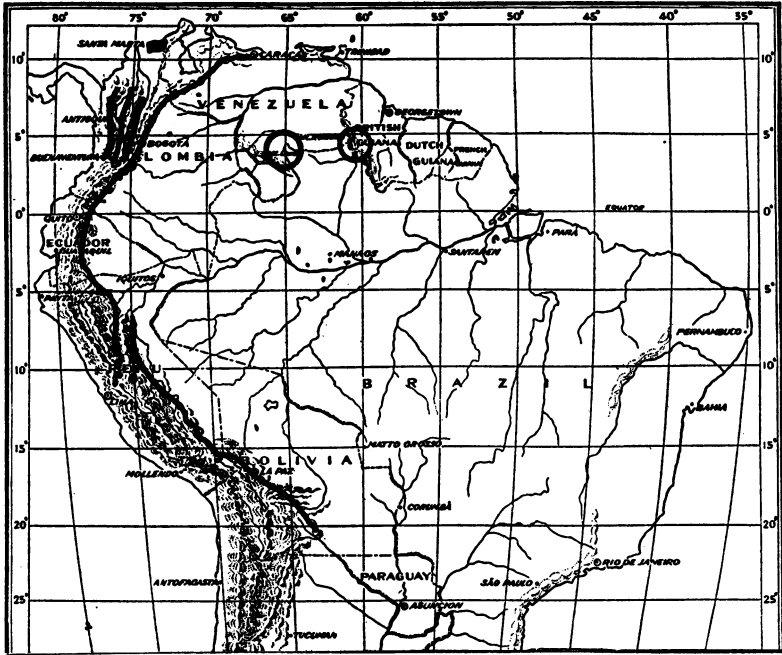


Fig. 33. *Colibri germanus* of Roraima and Duida and ally.

**Colibri delphinae (Lesson)**

*Ornismaya delphinae* LESSON, Rev. Zool., 1839, p. 41 (Guiana).

*Petasophora delphinae*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 407 (Mazaruni and Anarika Rivers, Mt. Roraima and Merumé Mts.).

Mt. Duida: Laterite Valley, 3.

RANGE.—Tropical Zone upward to Subtropical and, locally, Temperate Zone, Guianas and Trinidad west to Colombia, including Santa Marta Mts., northward to Guatemala and southward to Peru.

This wide-ranging species shows no recognized geographic variation with either latitude or altitude.

**Waldronia milleri** Chapman

*Waldronia milleri* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 14 (Mt. Duida, 4700 ft.).

Mt. Duida: Central Camp; Vegas; Savanna Hills; Laterite Camp, 15; 12 ♂, 13 ♀.

RANGE.—Mt. Duida.

This new hummingbird bears a general resemblance to *Polytmus thaumantias* but the absence of tomial serrations apparently indicates that the resemblance is superficial.

**Heliodoxa xanthogonys** Salvin and Godman

*Heliodoxa xanthogonys* SALVIN AND GODMAN, Ibis, 1882, p. 80 (Merumé Mts., type examined).

*Heliodoxa xanthogenys* [sic], CHUBB, 'Bds. British Guiana,' I, 1916, p. 419 (Mt. Roraima, Merumé Mts. [?], Lower Mazaruni River).

Roraima: Arabupu, 2 ♀. Mt. Duida: Laterite Valley; 1st Peak, 4700 ft.; 2 ♂, 1 ♀.

RANGE.—Mt. Duida; Roraima and Merumé Mts. (The McConnell Coll. record from the Lower Mazaruni River requires confirmation).

An apparent representative of *Heliodoxa jacula* of the Subtropical Zone in Colombia, western Ecuador, Panama, and Costa Rica. We have two males (one adult) and a female from Duida but only two females from Roraima. Compared with the type in the British Museum the adult male from Duida has the throat-patch bluer, less violet, the breast greener.

**Anthracothonax nigricollis nigricollis** (Vieillot)

*Trochilus nigricollis* VIEILLOT, 'Nouv. Dict. d'Hist. Nat.,' VII, 1817, p. 349 (Brazil).

*Anthracothonax viridigula*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 411 (tropical localities).

Roraima: Paulo, 1 ♀.

A wide-ranging species of the Tropical Zone from Paraguay to Panama.

**Calliphlox amethystina** (Boddaert)

*Trochilus amethystinus* BODDAERT, 'Tabl. Pl. Enl.,' 1783, p. 41 (Cayenne).

*Calliphlox amethystina*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 424 (Roraima and Merumé Mts., Kamuni River).

Mt. Duida: Savanna Hills; 1st Peak, 4700; 2 ♀.

It is impossible to say from these two specimens whether the species presents any racial variation in the Subtropical Zone of Mt. Duida, but in view of its stability throughout its range from Venezuela to Argentina it is probably typical on Duida.



**Lophornis pavoninus pavoninus** Salvin and Godman

*Lophornis pavoninus* SALVIN AND GODMAN, Ibis, 1882, p. 81 (Merumé Mts.).  
CHUBB, 'Bds. British Guiana,' I, 1916, p. 426 (Merumé Mts., Mt. Roraima, [?]  
Bartica, McConnell Coll.).

Roraima; 3000 ft., 1 ♂.

RANGE.—The race, Roraima and Merumé Mts. (the record from Bartica requires confirmation); remaining race, Mt. Duida.

A very distinct species with closely related, representative races in British Guiana and on Mt. Duida.

**Lophornis pavoninus duidæ** Chapman

*Lophornis pavoninus duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 15  
(Mt. Duida, 4700 ft.).

Mt. Duida: Vegas, Valley Head; 1 ♂, 2 ♀.

A slightly differentiated representative of the Guianan race.

## FAMILY TROGONIDÆ. TROGONS

**Pharomachrus pavoninus** (Spix)

*Trogon pavoninus* SPIX, 'Av. Bras.,' I, 1824, p. 47, Pl. xxxv (Tabatinga and Maribitañas).

Mt. Duida: Foothills Camp; Caño Seco; Agüita; 2 ♂, 1 ♀.

RANGE.—Tropical Zone, from the base of the East Andes in Colombia, Ecuador, and Peru, east to Mt. Duida, Venezuela.

The capture of a single typical specimen at 3250 feet brings this Tropical Zone species to the lower border of the Subtropical Zone on Duida. The species seems not to have been recorded before from east of the Rio Negro.

**Trogonurus collaris collaris** (Vieillot)

*Trogon collaris* VIEILLOT, 'Nouv. Dict. d'Hist. Nat.,' VIII, 1817, p. 330 (Cayenne).  
Mt. Duida: Caño Seco; Valley Head; 2 ♂, 1 ♀.

RANGE.—Tropical Guiana west to Colombia south to Bolivia.

A male from an altitude of 5000 feet and two males and two females from 2250–2700 feet seem wholly typical of this species. Although we have specimens from French Guiana and Trinidad, Chubb does not record this species from British Guiana.

**Trogonurus personatus roraimæ** Chapman

*Trogonurus personatus roraimæ* CHAPMAN, Amer. Mus. Novit., No. 341, 1929, p. 3  
(Mt. Roraima, 6800 ft.).

*Trogon personatus*, CHUBB, 'Bds. British Guiana,' 1916, I, p. 431 (Mt. Roraima).  
Mt. Roraima: above Paulo, 5000–6000 ft.; Philipp Camp, Rondon Camp; 3 ♂.

RANGE.—The race, Mt. Roraima; remaining races, Mt. Duida and Subtropical Zone from Peru northward through Ecuador and Colombia to Santa Marta Mts. and Mérida region of Venezuela.

The Roraiman and Duidan forms of this trogon are very closely related to one another but clearly differentiated from the Andean forms.

### *Trogon personatus duidæ* Chapman

*Trogon personatus duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 16 (Mt. Duida, 2250 ft.).

Mt. Duida: Caño Seco; Laterite Valley; Cumbre No. 2; 6 ♂, 1 ♀.

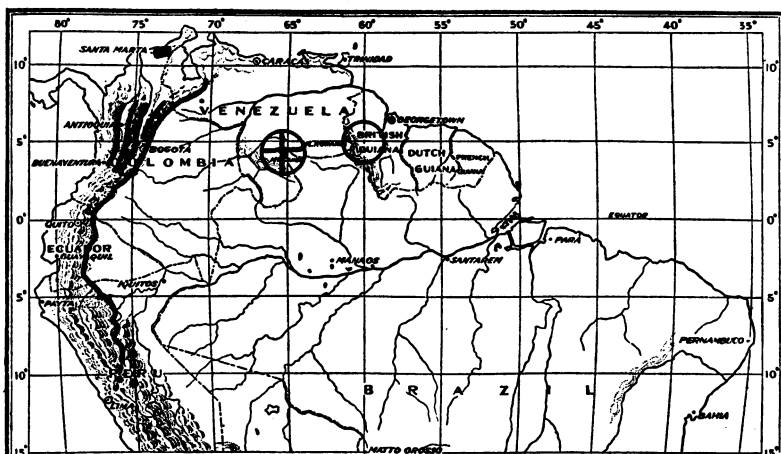


Fig. 34. *Trogonurus personatus roraimæ* and races.

A slightly differentiated representative of *T. p. roraimæ*. Its occurrence at as low an altitude as 2250 feet, whence we have three specimens, is worthy of note.

### FAMILY CUCULIDÆ. CUCKOOS

#### *Piaya cayana cayana* (Linnæus)

*Cuculus cayanus* LINNÆUS, 'Syst. Nat.,' 1766, p. 170 (Cayenne).

*Piaya cayana*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 439 (tropical localities).

Roraima: Paulo, 1 ♂, 2 ♀. Duida: Esmeralda; Valley Head; 4.

The tail, seen from below, in these specimens is nearly black (except for the white tips) to the base of the feathers and is darker than in toptotypical examples of true *cayana*. The latter, however, are in worn plumage and not strictly comparable. A wide-ranging species of the Tropical Zone.

**Tapera nævia nævia** (Linnæus)

*Cuculus nævius* LINNÆUS, 'Syst. Nat.,' 1766, p. 170 (Cayenne).

*Tapera nævia*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 443 (Roraima and tropical localities).

Roraima: Paulo, 1 ♂; Arabupu; 2 ♀.

Agrees with toptypical specimens from French Guiana. A wide-ranging species of the Tropical Zone.

## FAMILY RAMPHASTIDÆ. TOUCANS

**Aulacorhynchus derbianus whitelyanus** (Salvin and Godman)

*Aulacorhynchus whitelyanus* SALVIN AND GODMAN, Ibis, 1882, p. 83 (Merumé Mts.). CHUBB, 'Bds. British Guiana,' I, 1916, p. 462 (Kanuku Mts., Quonga, Merumé Mts., Mt. Roraima, 3000-3700 ft.).

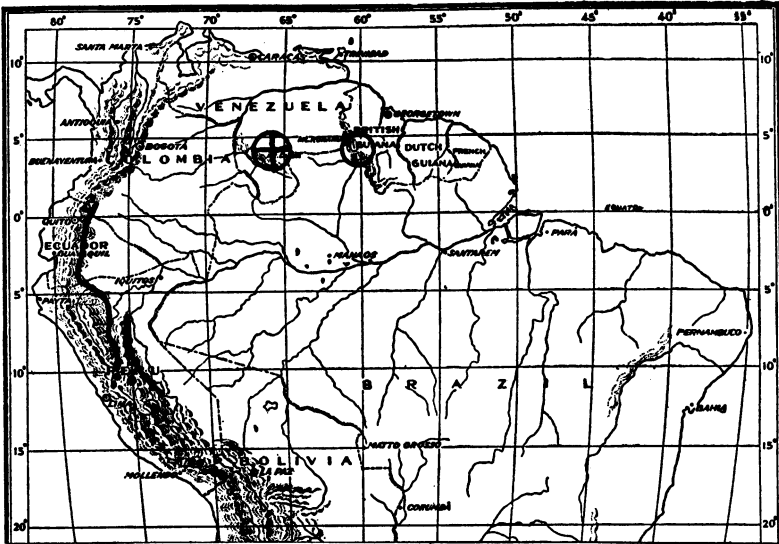


Fig. 35. *Aulacorhynchus derbianus whitelyanus* of Roraima and races.

Roraima: Paulo; Arabupu; 2.

RANGE.—The race, Subtropical Zone in British Guiana; remaining races, Mt. Duida and Subtropical Zone of eastern Ecuador and eastern Peru.

This race and the closely related *A. d. duidæ* are evidently representatives of *A. d. derbianus* of the Subtropical Zone of Ecuador and Peru. Both differ from *derbianus* chiefly in having more red in the maxilla and in the absence of a blue nuchal band, but these and other differences are so nearly bridged by individual variation that I have no hesitation in

grouping all three forms as races. In its broader brown tail-tip the Duidan form is nearer the Andean bird, but in other respects, except its greener tail, it agrees with *whitleyanus*.

***Aulacorhynchus derbianus duidæ* Chapman**

*Aulacorhynchus derbianus duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 16 (Mt. Duida, 3250 ft.).

Mt. Duida: Caño Seco; 1; Agüita; 1st Peak, 4700 ft.; 13.

The relationships of this race are presented above.

FAMILY GALBULIDÆ. JACAMARS

***Brachygalba lugubris lugubris* (Swainson)**

*Galbula lugubris* SWAINSON, 'Anim. in Menag.,' 1838, p. 329, "Conocou" = Cuano or Canuku; see Hellmayr, 1929, Field Mus. Pub. 255, p. 425 (Mts. of Demarara).

*Brachygalba lugubris*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 470 (Roraima, Merumé).

Roraima: Paulo, 4; Arabupu, 5; Philipp Camp; 1.

Roraiman specimens may be considered toptotypical. They differ from a series of *fulviventris* Selater of the east Bogotá region in having the abdomen white without ochraceous wash and, in my opinion, are only racially separable from that form. Two native-made skins from the "Napo" are referable to *caquetæ* Chapman, to which race it is probable that the "Pebas" specimen in the British Museum should be referred.

Specimens from northeastern Brazil referred by Hellmayr (*loc. cit.*), for lack of material, to *lugubris*, I have elsewhere described as *Brachygalba lugubris naumburgi*.<sup>1</sup> We have a series of nine specimens from Maranhão and Piauí. They are obviously intermediate between true *lugubris* and *melanosterna*.

FAMILY BUCCONIDÆ. PUFFBIRDS

***Chelidoptera tenebrosa tenebrosa* (Pallas)**

*Cuculus tenebrosa* PALLAS, 'Neue Nord. Beytr.,' III, 1782, p. 2 (Surinam).

*Chelidoptera tenebrosa*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 478 (Roraima, Merumé, and tropical localities).

Roraima: Arabupu, 1 ♂, 2 ♀.

A Tropical Zone species found throughout northern South America, east of the Andes.

<sup>1</sup>Amer. Mus. Novit. No. 450, 1931.

## FAMILY PICIDÆ. WOODPECKERS

***Chloronerpes rubiginosus guianæ* Hellmayr**

*Chloronerpes rubiginosus guianæ* HELLMAYR, Verh. Orn. Ges. Bayern, XIII, 3, 1918, p. 314 (Yuruani River, alt. 2700 ft., west of Roraima, S. E. Venezuela).

*Chloronerpes rubiginosus*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 483 (Mt. Roraima, Merumé Mts., Makauria, Anarika, Mazaruni, Kamarang Rivers).

*Chloronerpes rubiginosus roraimæ*, PENARD, Proc. N. E. Zool. Club, VII, 1919, p. 29 (Mt. Roraima, alt. 3500 ft., British Guiana).

Roraima: Arabupu, 2 ♂, 1 ♀. Mt. Duida: Agüita; Vegas; Central Camp; Valley Head; 5 ♂, 2 ♀.

These specimens measure: ♂, wing, 115–120, tail, 68–71; ♀, wing, 115–118, tail, 66–67 mm. They therefore evidently belong to the large form described by Hellmayr. The Roraiman birds are typical of the race described by Penard. Hellmayr, however, includes Bartica Grove, as well as Merumé and Roraima, in the range of *guianæ*, which he thus considers a form of the lowlands as well as of the mountains in Guiana. Specimens from Bartica Grove, Camacusa, and Quonga, in the British Museum, agree with those from Roraima in size and thus confirm this belief. Specimens collected by Tate at La Trinidad (5500 ft.) in north-eastern Venezuela average larger than Trinidad Island birds and have the throat narrowly streaked with black. I, however, follow Hellmayr in referring them to *trinitatis*. True *rubiginosus* is somewhat larger, nearer *guianæ*, has the rump and upper tail-coverts greener than in the other forms mentioned, while the former is barred and the breast-bars are narrower and greener.

The zonal distribution of *rubiginosus* is peculiar. Some races are subtropical, others, tropical; but, on the whole, it is restricted to the subtropics and in my belief *guianæ* will prove to be a mountain race.

## Measurements

	SEX	WING	TAIL
<i>C. r. rubiginosus</i>			
Silla de Caracas, Venezuela.....	♀	115	67
Cerro de Avila ".....	♀	113	69
Loma Redonda ".....	♂	115	68
" ".....	♂	119	68
<i>C. r. trinitatis</i>			
La Trinidad, 5500 ft., N. E. Venezuela.....	♂	116	66
" " ".....	♂	109	63
" Guacharo ".....	♂	108	65
" Princetown " (type).....	♂	104	61
" ".....	♂	103	58

Measurements (*Continued*)

	SEX	WING	TAIL
La Trinidad, Princetown.....	♂	104	62
“ “ .....	♀	98	57
<i>C. r. tobagensis</i>			
Tobago.....	♂	111	
“ .....	♂	109	65
“ .....	♀	110	65
“ .....	♀	112	65
<i>C. r. guianæ</i>			
Mt. Roraima.....	♂	119	71
“ .....	♂	119	68
“ .....	♀	118	67
Mt. Duida.....	♂	120	71
“ .....	♂	120	69
“ .....	♂	115	67
“ .....	♀	116	70
“ .....	♀	115	66
Bartica Grove, British Guiana.....	♂	119	69
Quonga, 1000 ft., British Guiana.....	♂	118	68

**Veniliornis kirkii monticola** Hellmayr

*Veniliornis kirkii monticola* HELLMAYR, Verh. Orn. Ges. Bayern, XIII, 3, 1918, p. 315 (Mt. Roraima, 5000 ft.).

Roraima: Arabupu, 2 ♂, 2 ♀.

RANGE.—The race, Roraima; remaining races, Tropical Zone, Tobago to Panama and western Ecuador.

This species does not appear to have been recorded from Guiana, except on Roraima, where the well-marked form described by Dr. Hellmayr is found. The Roraiman bird is evidently, therefore, an isolated subtropical form of tropical origin. It is not included in Chubb's book on Guianan birds.

**Phlœocestes rubricollis** (Boddaert)

*Picus rubricollis* BODDAERT, 'Tabl. Pl. Enl.,' 1783, p. 37 (Cayenne).

*Campephilus rubricollis*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 494 (Merumé Mts.; tropical localities).

Roraima: Paulo, 1 ♀.

A species of the Tropical Zone from Bolivia to Guiana.

**Ceophlœus lineatus lineatus** (Linnæus)

*Picus lineatus* LINNÆUS, 'Syst. Nat.,' 1766, p. 174 (Cayenne).

*Ceophlœus lineatus*, CHUBB, 'Bds. British Guiana,' I, 1916, p. 496 (Roraima; tropical localities).

Roraima: Arabupu, 1 ♀.

A Tropical Zone species ranging from Paraguay to Mexico; the present race inhabits the South American portion of this range, east of the Andes.

***Picumnus buffoni undulatus* Hargitt**

*Picumnus undulatus* HARGITT, Ibis, 1889, p. 354 (Roraima); CHUBB, 'Bds. British Guiana,' I, 1916, p. 499 (Roraima; near the coast).

Roraima: 1 ♂ (McConnell); Paulo, 1 ♂. Duida: above Agüita, 4000 ft., 1 ♀ im.; Cunucunuma River, 440 ft., 1 ♀ ad., 2 ♀ im.

This is apparently a representative of *buffoni* of Cayenne from which it differs in having the back and wing-coverts barred rather than spotted, the underparts less yellow. Specimens from an altitude of 4000 ft. on Duida and from the Cunucunuma River, near its western base, agree and are apparently not separable from *undulatus*. An adult male from Maripa on the Caura River is very near *undulatus*, but two males from La Union on the Caura and Nericagua on the Orinoco are nearer *buffoni*, indicating intergradation of the two forms. Chubb, on the authority of Schomburgk, records a *Picumnus* from the coast of Guiana and refers it to *undulatus*, but it possibly may be *buffoni buffoni*.

FAMILY FORMICARIIDÆ. ANTBRIDS

***Taraba major duidæ* Chapman**

*Taraba major duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 17 (Mt. Duida, 6200 ft.).

Mt. Duida: Central Camp; Vegas; Valley Head; 2d Peak; Ridge No. 22, 6700 ft.; 6 ♂, 4 ♀.

RANGE.—The race, Mt. Duida; remaining races, Tropical Zone, Argentina to Guatemala.

A large, dark, zonal form of *Taraba major* evidently derived from *T. m. semifasciata* of which we have specimens from the base of Mt. Duida. I recall no previous records of *Taraba major* from above the Tropical Zone. Its ascent to the Subtropical Zone on Duida and evolution into a well-marked race is a particularly interesting demonstration of the origin of an upper zonal form from a contiguous basal ancestor.

In Guiana this species is confined to the Tropical Zone where it is represented by *T. s. semifasciata* which has not been recorded from Roraima.

## Measurements

		SEX	WING	TAIL
	Mt. Duida, alt. 4700 ft.....	♂	99	84
	“ “ 4800 “ .....	♂	98	86
	“ “ 5000 “ .....	♂	97	83
	“ “ 5200 “ .....	♂	94	85
	“ “ 6600 “ .....	♂	99	87
Base	“ “ 325 “ .....	♂	94	80
“	“ “ 325 “ .....	♂	92	75
	Aramanduba, Amazon.....	♂	91	75
	Santa Isabel, Rio Negro.....	♂	95	76
	San Gabriel, “ .....	♂	92	75
	Caura, Orinoco.....	♂	90	74
	Cumanacoa, Venezuela.....	♂	93	73
	Trinidad, B. W. I.....	♂	92	74
	Mt. Duida, alt. 4700 ft.....	♀	95	88
	“ “ 6200 “ .....	♀	93	82
	“ “ 6200 “ .....	♀	95	84
	“ “ 6600 “ .....	♀	95	82
Base	“ “ 325 “ .....	♀	95	78
“	“ “ 325 “ .....	♀	90	76
“	“ “ 325 “ .....	♀	93	80
	Obidos, Amazon.....	♀	89	78
	Munduapo, Orinoco.....	♀	92	75
	Caura, “ .....	♀	90	75
	Cumanacoa, Venezuela.....	♀	88	75
	Trinidad, B. W. I.....	♀	89	73

***Thamnophilus insignis* Salvin and Godman**

*Thamnophilus insignis* SALVIN AND GODMAN, Ibis, 1884, p. 450 (Roraima).

*Erionotus insignis*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 19 (Mt. Roraima).

Mt. Roraima: 5000 ft., 1 ♀. Mt. Duida: Savanna Hills; Central Camp; Vegas; Valley Head; Cumbre 15, 6600 ft.; Desfiladero; 20 ♂, 15 ♀.

RANGE.—Mts. Roraima and Duida.

The male bears some resemblance to *Thamnophilus amazonicus*, of the Guianas and southward to Bolivia; but the female differs from the male only in having the crown chestnut instead of black and is thus so unlike the females of other species of this group that the exact relationships of the species are not clear.

There is much variation in the markings of the head. Some males have the entire crown to the base of the bill shining black, but, as a rule, there are more or less concealed white bars on the forecrown similar to those on the nape. A similar variation is shown in the female.

Duidan birds average slightly larger with longer tails (♂: Duida, 73; Roraima, 67 mm.) than Roraiman specimens but agree with them in color.



**Thamnophilus punctatus punctatus** (Shaw)

*Lanius punctatus* SHAW, Genl. Zool., VII, 1809, p. 327 (Cayenne).

*Erionotus punctatus*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 17 (Roraima and tropical localities).

Roraima: Paulo, 2♂, 2♀; Arabupu, 2♂, 2♀.

A Tropical Zone species ranging from southern Brazil to Honduras. The present race is found from the Amazon to the Paria Peninsula, including the Guianas. Our specimens agree with Cayenne examples.

**Dysithamnus mentalis spodionotus** Salvin and Godman

*Dysithamnus spodionotus* SALVIN AND GODMAN, Ibis, 1883, p. 211 (Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 21 (Roraima, "Makauria River, McConnell").

Roraima: Arabupu; Paulo; 13♂, 10♀. Mt. Duida: Agüita; Laterite Valley; 4♂, 2♀.

RANGE.—The race, Roraima and Mt. Duida; remaining races, Tropical and Subtropical Zones from Argentina to Guatemala.

This race is very near *D. m. extremus* of western Colombia and *D. m. napensis* of eastern Ecuador, but it is impossible to say whether this resemblance has any significance. The identity of the Roraiman and Duidan birds, however, emphasizes the close faunal affinity of the bird-life of these two mountains.

**Herpsilochmus roraimæ** Hellmayr

*Herpsilochmus roraimæ* HELLMAYR, Verh. Zool. Bot. Ges. Wien, LIII, 1903, p. 208 (Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 39 (Mts. Roraima, Tweekuey, Kamarang River).

Roraima: Arabupu, 2♂, 2♀. Mt. Duida: Agüita; Laterite Valley; 3♂, 1♀.

RANGE.—Mountains of British Guiana; Mt. Duida.

This species appears to be a representative of *Herpsilochmus sticturus* of the Tropical Zone in the Guianas and eastern Venezuela. From *H. s. sticturus* it differs chiefly in its larger size and increased amount of white on the tail, the central rectrices being spotted on both webs, while in *sticturus* disconnected rather elongate white areas appear only on the inner webs. The white areas in the remaining rectrices are also larger.

Our pair of *sticturus* was shot at Tumatumari on the Potaro River, British Guiana, the male on July 31, the female on July 28, 1913. The latter has the crown black-spotted with white and with no trace of ochraceous on lores or forehead. The male has the center of the back as in the average specimen of *roraimæ*.

If I am correct in the identification of the female, Salvin's original description of "pileo medio rufescente ornato" must apply to some other bird.

**Schistocichla<sup>1</sup> leucostigma saturata** (Salvin)

*Heterocnemis saturata* SALVIN, Ibis, 1885, p. 427 (Roraima).

*Sclateria saturata*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 58 (Roraima).

Roraima: Arabupu, 1 ♀.

RANGE.—The race, Roraima; remaining races, Tropical Zone, Guianas to Peru.

In the color of the back, this specimen is very near *Schistocichla l. subplumbea* of eastern Ecuador, but the underparts are slightly duller, the wing-covert spots are slightly larger, and the tail is longer (61 mm.). In the latter character it is nearer *S. l. leucostigma*, from the Potaro River, but it differs, from the female of that form in its darker underparts and blacker feet. The latter character, however, is variable. We have Ecuadorean specimens of *subplumbea* with feet quite as pale as in some specimens of *leucostigma* from Guiana.

**Chamaeza brevicauda fulvescens** Salvin and Godman

*Chamaeza fulvescens* SALVIN AND GODMAN, Ibis, 1882, p. 79 (Merumé Mts., British Guiana); CHUBB, 'Bds. British Guiana,' II, 1921, p. 78 (Mt. Roraima; Merumé Mts.).

● Merumé Mts. (Whitely), 1.

RANGE.—The race, mountains of British Guiana; remaining races, tropical and subtropical areas in southeastern Brazil, Paraguay, Bolivia, and northward through the eastern Andes to the Caracas region in Venezuela.

Our single specimen of *fulvescens*, a topotype, is more rufescent above than *C. b. punctigula* of eastern Ecuador, but is nearer to that race than to *columbiana*. In its fulvescent throat and breast it differs from them both. The fact that we did not find this species on Mt. Duida by no means implies that it does not occur there.

**Grallaria guatimalensis roraimæ** Chubb

*Grallaria regulus roraimæ* CHUBB, 'Bds. British Guiana,' II, 1921, p. 80 (Mt. Roraima; type examined).

RANGE.—The race, Mt. Roraima; remaining races, foothills of the Andes from southeastern Peru north through eastern and western Ecuador and Colombia to the Santa Marta Mts., thence in the Subtropical Zone, northwestward to southern Mexico and eastward to the island of Trinidad.

Comparison of the type of *roraimæ* with a single topotypical specimen of *aripoensis* shows that the Roraiman bird is slightly paler below, with the back somewhat browner, less olivaceous, the wings and tail rather more rufous. At the best the two very nearly resemble each other.

<sup>1</sup>Todd, Proc. Biol. Soc. Wash., XL, 1927, p. 165.

***Myrmothera simplex simplex* (Salvin and Godman)**

*Grallaria simplex* SALVIN AND GODMAN, Ibis, 1884, p. 451 (Mt. Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 83 (Mt. Roraima).

Mt. Roraima: Philipp Camp, 2.

RANGE.—The race, Mt. Roraima; remaining race, Mt. Duida.

*Myrmothera simplex* is apparently a representative of *Myrmothera campaniosoma* of the Tropical Zone of northern South America, east of the Andes. In the color of the upperparts it is nearest, indeed closely resembles *M. c. campaniosoma* of the Guianas and southward, but the breast is gray, unstreaked, and the mandible terminally black.

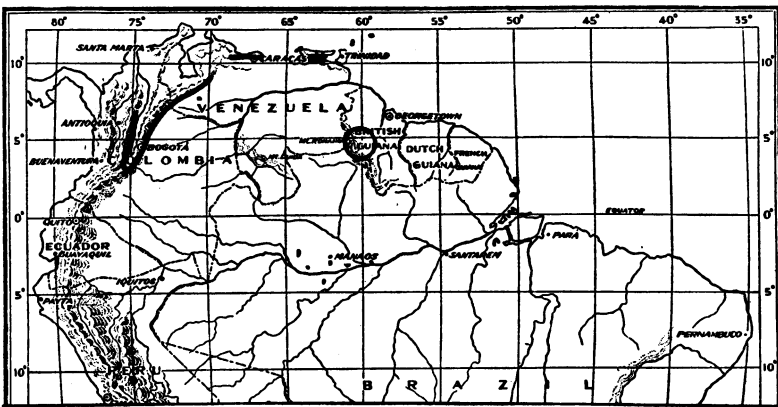


Fig. 36. *Grallaricula nana kukanensis* and Andean races.

***Myrmothera simplex duidæ* Chapman**

*Myrmothera simplex duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 17 (Mt. Duida, 4800 ft.).

Mt. Duida: Valley Head; Provisional Camp; Desfiladero; 12.

RANGE.—Mt. Duida.

A closely related representative of *M. s. simplex*.

***Grallaricula nana kukanamensis* Chubb**

*Grallaricula nana kukanamensis* CHUBB, Bull. Brit. Orn. Club, XXXVIII, 1918, p. 86 (Kukenam Mts., 5000 ft.); 'Bds. British Guiana,' II, 1921, p. 86 (Kukenam Mts.).

Mt. Roraima: Philipp Camp, 2.

RANGE.—The race, Mts. Roraima and Kukenam; remaining races, Subtropical and humid Temperate Zones from eastern Ecuador north through Colombia (except Santa Marta), east to northeastern Venezuela.

Mt. Kukenam is so near to Mt. Roraima that these two specimens may be considered topotypical. They have the broad bill of *G. n. cumanensis* of northeastern Venezuela, but the mandible is darker in true *nana*. They also agree with *cumanensis* in the coloration of the upperparts. Below, however, they are more richly colored than our single specimen of *cumanensis* and are nearer true *nana*.

Our fourteen specimens, representing all the recognized races of this species, except *occidentalis* Todd of western Colombia, are so closely related as obviously to represent but a single species. Its occurrence in Roraima in connection with its sedentary, terrestrial habits and weak powers of flight, particularly emphasize the Andean element in Roraiman bird-life.

#### FAMILY FURNARIIDÆ. OVENBIRDS, ETC.

##### *Cranioleuca demissa* (Salvin and Godman)

*Synallaxis demissa* SALVIN AND GODMAN, Ibis, 1884, p. 449 (Mt. Roraima, 5000 to 6000 ft.).

*Synallaxis poliophrys*, CHUBB (not of Cabanis), 'Bds. Brit. Guiana,' II, 1921, p. 94 (Mt. Roraima).

Mt. Roraima: Philipp Camp; Rondon Camp, 3. Mt. Duida: Savanna Hills; Vegas; Valley Head; Desfiladero; 8.

RANGE.—Mts. Roraima and Duida.

Dr. Hellmayr's surmise that *Synallaxis demissa*, described from Roraima, is not the same as *S. poliophrys* Cabanis of Cayenne, is obviously well founded. I have not seen a specimen of *poliophrys*; but certainly Cabanis' description ("guttre albo nigroque variegata plumis singures nigris albo terminatis") does not apply to a bird in which the chin and adjoining part of the throat are not conspicuously whiter than the olive-gray breast, the feathers with a faint blackish margin. Furthermore, if *poliophrys* has been properly referred to *Synallaxis*, the two birds do not even belong in the same genus, for *demissa* has twelve rectrices!

The relationships of *demissa* appear indeed to be with *Cranioleuca curtata* of the Subtropical Zone from Colombia to Bolivia. From that species it differs only in its grayer underparts, but some specimens are so near *C. c. griseipectus*, the Ecuadorean form, that the differences between them seem of not more than subspecific value. Duidan and Roraiman birds agree in color, but the former average slightly larger.

##### *Synallaxis albescens josephinae* Chubb

*Synallaxis albigularis josephinae* CHUBB, Bull. Brit. Orn. Club, XXXIX, 1919, p. 60 (Mt. Roraima, British Guiana).

Roraima: Paulo, 2 ad., ♀ 1 im., ♂, 1 im. ♀; Philipp Camp, 3 ad. ♂, 1 ad. ♀ 2 im., ♂.

The form of *Synallaxis albescens* occupying the greater part of northern South America has hitherto been referred to *albigularis* Sclater of eastern Ecuador. Since the publication of my report on the bird-life of that country we have acquired an excellent series of the Ecuador bird. It proves to be not only specifically distinct from *albescens* but to belong in quite a different group. From the northern form of *albescens* (*albigularis* of authors generally) for which the name *occipitalis* Madarasz<sup>1</sup> seems available, *albigularis* Sclater differs fundamentally in having the rectrices shorter (particularly the rudimentary outer pair), broader, stiffer, more loosely barbed and sharply pointed. These characters are shown in juvenal as well as in fresh, unworn adult plumage. The rectrices resemble in shape and structure those of *S. brunneicaudalis*. In color *albigularis* bears a close resemblance to *S. hypospodia* from which, however, it differs markedly in having pointed instead of rounded rectrices. It is darker throughout with grayer breast and sides than *occipitalis* and the juvenal plumage is much richer, the underparts being nearly uniform tawny olive.

Sclater described *albigularis* from a single imperfect specimen in a collection believed to be from the Rio Napo, loaned to him by Jules Verreaux, which bore Lafresnaye's MS. name "*Synallaxis albigula*." I have not seen this specimen.

However, the species for which I accept Sclater's name is the only member of the genus known from the Tropical Zone of eastern Ecuador with which his description agrees. Later in the same year he referred specimens from Zamora and the Rio Napo (whence we have examples) to *albigularis*, and there is small room for doubt that his name is here correctly applied.

Of *albigularis* we have twenty-three specimens (as listed beyond) which show that it ranges at least from the Rio Napo in eastern Ecuador southward through eastern Peru to the junction of the Ucayali and Urubamba and down the Amazon to Teffé.

Of *occipitalis* Madarasz I unfortunately lack topotypes, but all the attending circumstances make it probable that a series of eight freshly plumaged specimens from and near Barquisimeto, about 150 miles northeast of Mérida, represent that form. They are distinguished by their comparatively pale colors, grayish nuchal region, and light hazel crown and wing markings. With the probable exception of *perpallida* Todd of the northern Maracaibo and Goajira region (which should be compared with *occipitalis*), they represent the opposite extreme in color

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<sup>1</sup>*Synallaxis occipitalis* Madarasz, Ann. Mus. Nat. Hung., 1903, I, p. 463 (Valle and Escorial, near Mérida, Venezuela).

from the ruddy *albescens albescens* with its chestnut-auburn crown and wing-markings and rich saccardo-umber back.

Specimens from Roraima are intermediate in color between these extremes but in their darker shades are nearer to true *albescens* than to *occipitalis*. In the width of the frontal band, larger bill and feet, and length of tail *josephinæ* is nearer *occipitalis*. A series from about the base of Duida agrees with one from Roraima though none has the tail over 75 mm. in length.

Specimens from northeastern Venezuela and Trinidad are referred by Hellmayr to *nesiotis* of Margarita Island, of which I have no examples. As a whole they are intermediate between *occipitalis* and *josephinæ*, nearer the latter. With them I should place three worn adults and one juvenal from Cotiza near Caracas, but a series of freshly plumaged birds is required to determine the status of the Caracas bird. An adult in unworn plumage from Ciudad Bolivar agrees with the Barquisimeto birds, but, as a whole, a series from the lower Orinoco agrees with a series from northeastern Venezuela.

In view of what has been said above it is obvious that the status of this species in Colombia should be re-determined, but I have not the material to do this satisfactorily. Two specimens from the lower Magdalena are very near *occipitalis*. Four from the Bogotá region (Fusugasugá, Quetame, Villavicencio) belong apparently with the lower Orinoco series which, with northeastern Venezuela and Trinidad birds, require comparison with topotypes of *nesiotis*.

Comparison of west Colombian birds with a series (unfortunately in worn plumage) from Santiago, Panama, indicates that Hellmayr correctly referred them to *hypoleuca* Ridgway.

As a result of this brief review of our material it is obvious that we must radically change our conception of the distribution of *Synallaxis albescens*. It is not represented in upper Amazonia but belongs in that group of birds inhabiting rather open country with scattered growth instead of unbroken forest, which ranges through eastern south America and in some instances extends westward to Bolivia and northward to the Caribbean or even Central America (e.g., *Turdus leucomelas*, *Basileuterus auricapillus*, *Emberizoides herbicola*). An immature specimen from Frechal, Rio Surumu, and two worn adults from Arumanduba on the north bank of the lower Amazon together with Dr. Snethlage's record of specimens from Marajo and Mexiana, and Dr. Hellmayr's from Itacoatiará and Maranhão, in connection with further specimens in our collection show that the range of the species, broken by the Amazon, extends from Central America through eastern Brazil to Bolivia.

As a contribution to a fuller understanding of this subject I list below the specimens contained in the American Museum, identifying provisionally those the status of which is open to question.

## SPECIMENS EXAMINED

*Synallaxis albescens albescens*.—BRAZIL: Gilbues, Piauhy, 1000 ft., 1; Toasciro, 1000 ft., Bahia, 1; Feguil, 800 ft., central East Bahia, 1; Boa Nova, 2600 ft., south-east Bahia, 2; Morro do Chapen, 3600 ft., Bahia, 2; Passo da Entrada, 2000 ft., Rio Grande do Sul, 2. PARAGUAY: Puerto Pinasco, 2. BOLIVIA: Todos Santos, 1300 ft., Cochabamba, 2; Mission San Antonio, Cochabamba, 1300 ft., 4; Yungas, 3600 ft., Cochabamba, 1.

*Synallaxis albescens josephinae*.—BRAZIL: Arumanduba, left bank lower Amazon, 2 (?); Frechal, Rio Surumu, 1 (?). VENEZUELA: Roraima, Paulo, 4000 ft., 4; Philipp Camp, 5000 ft., 6; Roraima, 1; near Duida, Esmeralda, 5; Savanna Grande, 3; Campamento, 350 ft., 6; Valle de los Monos, 725 ft., 3.

?*Synallaxis albescens nesiotis*.—VENEZUELA: Maripa, Orinoco, 4; Caicara, 3; Bolivar, 2; Bermudez, 7; Cotiza, Caracas, 4. TRINIDAD, 19. COLOMBIA: Villaviciencio, 2; Quetame, 2; Fusugasugá, 1; San Antonio, Cundinamarca, 1.

*Synallaxis albescens occipitalis*.—VENEZUELA: Barquisimeto, Lara, 5; El Cuji, Lara, 4; COLOMBIA: Lower Magdalena (Calamar and near), 2 (?).

*Synallaxis albescens hypoleuca*.—COLOMBIA: Palmira, Cauca, 2; Cali, Cauca, 2; Florida, Cauca, 1; Caldas, 1; La Frijolera, Antioquia, 1. PANAMA: Santiago, Veraguas, 6.

*Synallaxis albescens latitabunda*.—COSTA RICA: Buenos Aires, 3.

*Synallaxis albigularis*.—ECUADOR: Zamora, 4; Curaray and Napo, 5. PERU: Puerto Indiana, Amazon, and Napo, 4; Apiyacu (Pebas), 1; Orosa, 1; Sarayacu, Ucayali, 4; Lagarto, upper Ucayali, 3; Sta. Rosa, upper Ucayali, 3. BRAZIL: Tefé, Solimoés, 1.

## Measurements

	SEX	WING	TAIL	OUTER RECTRIX	CULMEN
<i>S. a. albescens</i>					
Morro do Chapen, 3600 ft., S. E. Bahia..	?	55	77	31	13
Feguil, 800 ft., E. Cent. Bahia.....	?	55	75	32	12.5
Boa Nova, 2600 ft., S. E. Bahia.....	♂	55	76	29	13.2
“ “ “ .....	♀	55	76	34	13.2
<i>S. a. occipitalis</i>					
Barquisimeto, Est. Lara, Venezuela....	♂	57	81	25	13.9
“ “ “ .....	♂	55	75	25	13.9
“ “ “ .....	♂	56	81	22	13.5
El Cuji, “ “ .....	♂	57	83	25	14.2
<i>S. a. josephinae</i>					
Roraima, Venezuela.....	?	57	85	32	16.2
Philipp Camp, 5000 ft., Roraima.....	?	57	86	27	15
<i>S. albigularis</i>					
Curaray and Napo, Ecuador.....	♀	56	65	18	16.2
Napo and Amazon.....	♀	54	68	17	15.2
“ “ “ .....	♂	55	70	17	15.2
“ “ “ .....	♂	55	70	21	15.5

**Synallaxis mæsta macconnelli** Chubb

*Synallaxis macconnelli*, CHUBB, Bull. Brit. Orn. Club, XXXIX, 1919, p. 78 (Mt. Roraima).

Roraima (McConnell), 1.

RANGE.—The race, Mt. Roraima; remaining races, see below.

The Roraiman bird closely resembles both *Synallaxis mæsta*, of the Andean foothills in eastern Colombia, and *S. cabanisi*, of the Subtropical Zone in eastern Peru. It has the crown, including forehead and line above the eye, chestnut as in *cabanisi*, but in the markings of the throat and general tone of color it agrees with *mæsta*. It is a question to which of the two *macconnelli* is nearer. Hellmayr ranks it as a subspecies of *cabanisi*. It is certainly only racially related to one or the other. It is obvious, therefore, that the Colombian and Peruvian birds are very near each other. Their ranges, however, appear to be separated by the East Ecuador bird I have called *Synallaxis mæsta brunneicaudalis*<sup>1</sup>; but the intergradation of the Colombian and Ecuadorean birds remains to be proved. It agrees with *mæsta* in the extent of the chestnut crown, but there is somewhat less white in the throat, the bill is larger, the body-colors above and below are much grayer (much as in *S. brachyura*), and in fresh plumage the barbs of the rectrices do not appear to be so closely interlocked. In somewhat older, but still unworn plumage, this difference is more pronounced, the barbs being largely disconnected though the barbules are present. None of our specimens of *mæsta* or *cabanisi* is in this condition. If the bird which, largely on geographical grounds, I assume to be *brunneicaudalis* is, in fact, a representative of *mæsta* and *cabanisi* it may possibly be a non-intergrading mutant,

## Measurements

## Males

	WING	TAIL	CULMEN
<i>S. macconnelli</i> , Roraima.....	61	73	17
<i>S. m. mæsta</i> , Villavicencio, Colombia.....	61	68	16.5
“ “ “ .....	58	62	16.5
“ “ “ .....	65	69	17
“ “ “ .....	61	..	17
<i>S. m. obscura</i> , La Morelia, “ .....	62	..	18
<i>S. m. brunneicaudalis</i> , Rio Suno, Ecuador.....	61	68	18
“ “ “ .....	69	74	19
“ “ “ .....	65	65	19
“ “ “ .....	67	69	19
“ Zamora “ .....	68	74	18
<i>S. m. cabanisi</i> , Tulmayo, 4000 ft. ....	65	..	17.3
“ Peru.....	61	65	17

<sup>1</sup>Bull. Amer. Mus. Nat. Hist., LV, 1916, p. 341.



**Roraimia adusta** (Salvin and Godman)

*Synallaxis adusta* SALVIN AND GODMAN, Ibis, 1884, p. 450 (Mt. Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 100 (Mt. Roraima).

*Roraimia adusta*, CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 18 (Crit.).

Mt. Roraima: Philipp Camp, 5. Mt. Duida: Central Camp; Valley Head; Provisional Camp; Desfiladero; 20.

RANGE.—Mts. Roraima and Duida.

This is one of four genera, all monotypic, confined to the Roraiman-Duidan fauna. Its origin is not apparent. Its general relationships are discussed in the American Museum publication referred to above.

Compared with six specimens from Roraima the chestnut of the postocular stripe in a Duidan series is more pronounced, and, in adults, this color appears above the lores and on the forehead; whereas it is missing from these parts in most Roraiman specimens. It is probable, however, that this difference is due to immaturity.

**Automolus roraimæ** Hellmayr

*Automolus roraimæ* HELLMAYR, Verh. Orn. Ges. Bayern, XIII, 1917, p. 199; new name for *Philydor albigularis* SALVIN AND GODMAN (not of Spix), Ibis, 1884, p. 450 (Mt. Roraima).

*Automolus albigularis*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 104 (Mt. Roraima).

Roraima: Rondon Camp, 1. Duida: Laterite Valley; Central Camp; Valley Head; Savanna Hills; Desfiladero; 19.

RANGE.—Mts. Roraima and Duida.

A distinct species possibly representing *Automolus ochrolæmus* of the Tropical Zone from Bolivia north through lower Amazonia to the Guianas and through Panama to southern Mexico. We have specimens of *A. o. turdinus* from the country at the base of Duida.

## FAMILY DENDROCOLAPTIDÆ. WOODCREEPERS

**Sittasomus griseicapillus amazonus** Lafresnaye

*Sittasomus amazonus* LAFRESNAYE, Rev. Zool., 1850, p. 590 (upper Amazon); CHUBB, 'Bds. British Guiana,' II, 1921, p. 118 (Roraima, 3500 ft.; Camacusa; Merumé).

Roraima: Paulo, 1♂, 1♀; Arabupu, 2♂, 1♀.

A member of a group inhabiting the Tropical Zone from Paraguay to Mexico. The present race occupies the region from Peru to Guiana. Roraiman specimens agree with others from eastern Ecuador. I now follow Dr. Hellmayr in ranking *amazonus* (and consequently the more northern forms) as a race of *griseicapillus*, but I should accord *sylviiellus* and *reiseri* specific rank.

## FAMILY TYRANNIDÆ. FLYCATCHERS

**Mecocerculus leucophrys roraimæ** Hellmayr

*Mecocerculus leucophrys roraimæ* HELLMAYR, ANZ. ORN. GES. BAYERN, IV, 1921, p. 30 (Mt. Roraima).

*Mecocerculus setaphagoides*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 134 (Roraima; other localities doubtless incorrect).

Mt. Roraima: Philipp Camp; Rondon Camp, 28. Mt. Duida: Provisional Camp; Savanna Hills; Vegas; Central Camp; Valley Head; Desfiladero; 33.

RANGE.—The race, Mts. Roraima and Duida; remaining races, chiefly arid or semi-arid Temperate Zone from the Santa Marta Mts., southward to northern Argentina and eastward to the Mérida region, thence in the Subtropical Zone to northeastern Venezuela.

The present race is smaller in size, darker above, and, with the exception of true *leucophrys*, yellower below than any of the remaining six races of the species. Adults in fresh plumage have the margins of the wing-coverts and inner wing-quills deep ochraceous-buff but this color fades to whitish. Duidan specimens average very slightly darker above, and the crown in some examples is deeper in tone than the back, but the difference is not of racial value; a fact which emphasizes the close affinity of the bird-life of the Roraiman and Duidan areas.

**Mecocerculus nigrifrons** (Salvin and Godman)

*Leptopogon nigrifrons* SALVIN AND GODMAN, Ibis, 1884, p. 446 (Mt. Roraima; type examined).

*Mecocerculus nigrifrons* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 18 (Mt. Duida).

Mt. Duida: Laterite Valley; Savanna Hills; 6.

RANGE.—Mts. Roraima and Duida.

A very distinct species heretofore known only from the type.

I regret to say that the reference by the original describers of this species to the genus *Leptopogon* resulted in my failure to identify it with the bird I named *Mecocerculus nigrifrons*, while its omission from Chubb's 'Birds of British Guiana' caused me to overlook it as a Roraiman bird. I discovered the oversight the day my paper on Duidan birds was printed.

In that paper it was stated that this bird might require generic separation. Possibly that may be the best way out of the situation, for it cannot, in my opinion, properly be placed with *Leptopogon*; indeed, of the two genera, it seems unquestionably nearer *Mecocerculus*. As before stated, it agrees with the type of that genus in having the wings and tail of nearly equal length. In *Leptopogon*, on the contrary, the tail, as the appended measurements show, is much shorter than the wing. It also agrees with *Mecocerculus*, and differs from *Leptopogon*, in having the

tarsus decidedly longer than the bill. The bill is nearer that of *Leptopogon*, but in general coloration, particularly of the "silky" white underparts so distinctive of most species of *Mecocerculus*, it strikingly resembles that genus.

#### Measurements

	SEX	WING	TAIL	TARSUS	CULMEN
<i>Mecocerculus nigrifrons</i> .....	♂	61.5	60	21	14
" " .....	♂	66	63	22	14
" " .....	♂	64	63	20	14
<i>Leptopogon s. venezuelensis</i> .....	♂	69	57	15.5	14.5
" " .....	♂	66	56	15.3	15.7
" " .....	♂	66	58	15.1	15.3
<i>Mecocerculus nigrifrons</i> .....	♀	54	53	18	13
" " .....	♀	56	54	17.5	13
<i>Leptopogon s. venezuelensis</i> .....	♀	66	56	15	14.5
" " .....	♀	65	53	15.2	15.1
<i>Mecocerculus s. roraimæ</i> .....	♂	63	63	19	13.5
" " .....	♂	64	63	19.1	13
" " .....	♂	64	63	19.2	13.5
" " .....	♀	60	59	19.1	13
" " .....	♀	59	59	18	13

#### *Platyrrhynchus mystaceus insularis* Allen

*Platyrrhynchus insularis* ALLEN, Bull. Amer. Mus. Nat. Hist., II, 1889, p. 143 (Tobago).

*Placostomus insularis*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 144 (Roraima; Tweek-quey).

Roraima: Paulo, 1 ♂; Arabupu, 2 ♀.

A species of the Tropical Zone ranging from southeastern Brazil, and Bolivia to Panama. The present race inhabits British Guiana, northern Venezuela, Trinidad, and Tobago.

#### *Platyrrhynchus coronatus gumia* (Bangs and Penard)

*Placostomus coronatus gumia* BANGS AND PENARD, Bull. Mus. Comp. Zool., LXII, 1918 (Paramaribo, Dutch Guiana).

*Placostomus gumia*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 146 (tropical localities).

Roraima: Arabupu, 2 ♂, 1 ♀.

A Tropical Zone species ranging from Bolivia to the Guianas and Nicaragua. Hellmayr records specimens of the present race from the Guianas and Rio Jary, Brazil. Our female agrees with the type of *gumia*, a female, kindly loaned me by Mr. Bangs. The two Roraiman males are considerably brighter, but a female from Macouria Creek and an unsexed

specimen, both collected by McConnell, are decidedly duller below and seem to be nearer *superciliaris*.

***Euscarthmornis russatus* (Salvin and Godman)**

*Euscarthmus russatus* SALVIN AND GODMAN, Ibis, 1884, p. 445 (Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 158 (Roraima).

Mt. Roraima, 5000, 6000 ft., Philipp Camp; Rondon Camp; 4.

RANGE.—Mt. Roraima.

Evidently a representative of *Euscarthmornis plumbeiceps* of southeastern Brazil, from the vicinity of Rio de Janeiro southward and westward to Paraguay and southeastern Peru. It resembles *plumbeiceps* in pattern and general color but is larger and the colors are all stronger and richer, and the tawny of the underparts extends to the abdomen.

***Euscarthmornis duidæ* Chapman**

*Euscarthmornis duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 19 (Mt. Duida, 4700 ft.).

Mt. Duida: Vegas; Laterite Valley; Central Camp; Savanna Hills; Cumbre No. 15, 6600 ft.

RANGE.—Mt. Duida.

Apparently a member of the *Euscarthmornis margaritaceiventer-impiger* group but its characters are too distinct to afford a clue to its immediate ancestry.

***Habrura pectoralis brevipennis* Berlepsch and Hartert**

*Habrura pectoralis brevipennis* BERLEPSCH AND HARTERT, Nov. Zool., IX, 1902, p. 40 (Caicara, Venezuela).

*Habrura brevipennis*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 166 (Roraima; Takutu Mts.).

Roraima: Paulo, 3♂.

A species of peculiar distribution. True *pectoralis* is recorded from the province of Buenos Aires and Mendoza north to Matto Grosso and eastern Bolivia, whence the species is unknown until one reaches the Orinoco and Caura rivers, Roraima, and the upper Takutu Mountains in British Guiana where the present race is found; while *bogotensis* is found in the arid Temperate Zone of the Colombian Andes. As an inhabitant of marshes, the wants of this species are specialized, a fact that may in part account for its broken range. We have no Orinocan specimens.

***Elænia flavogaster flavogaster* (Thünberg)**

*Muscicapa flavogaster* THÜNBERG, Mem. Acad. St. Petersb., VIII, 1822, p. 286 (Brazil).

*Elænia pagana macconnelli*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 186 (Roraima and tropical localities).

Roraima: Paulo, 1 ♂ (wing, 85; tail, 76 mm.); Philipp Camp, 1 ♀, 5400 ft. (wing, 79; tail, 82 mm.).

Two maximum size specimens of this wide-ranging species of the Tropical Zone. The crest feathers are darker centrally than in specimens from Bahia and Rio de Janeiro.

#### ***Elænia olivina* Salvin and Godman**

*Elainea olivina* SALVIN AND GODMAN, Ibis, 1884, p. 446 (Mt. Roraima).

*Elainea pagana olivina*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 187 (Roraima).  
Mt. Roraima: Arabupu; Philipp Camp; 3. Mt. Duida: Laterite Valley; 1st Peak, 4700 ft.; 3.

RANGE.—Mts. Roraima and Camacusa, British Guiana, Mt. Duida.

Very closely resembling *Elænia pallatangæ* of the Subtropical Zone from Colombia to Peru (fourteen specimens examined). In most instances I should rank *olivina* as a subspecies of the Andean bird, but in view of the slight differences separating species in this group, and in default of actual intergrades I hesitate to take this step.

#### ***Elænia dayi* Chapman**

*Elænia dayi* CHAPMAN, Amer. Mus. Novit., No. 340, 1929, p. 3 (Mt. Roraima).

Mt. Roraima: Summit 8600 ft., 1.

RANGE.—Mt. Roraima. Known only from the type.

The darkest and, next to *E. tyleri*, one of the most distinct species of the genus. Beyond the fact that it is represented on Mt. Duida by *E. tyleri*, its relationships are not clear. In color and proportions it resembles *Elænia obscura* of the Subtropical Zone of Peru and Bolivia.

#### ***Elænia tyleri* Chapman**

*Elænia tyleri* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 20 (Mt. Duida, 5000 ft.).

Mt. Duida: Provisional Camp; Valley Head; Savanna Hills; Vegas; Desfiladero; 22.

RANGE.—Mt. Duida.

A specifically distinct representative of *Elænia dayi* of Mt. Roraima.

#### ***Myiobius barbatus barbatus* (Gmelin)**

*Muscicapa barbata* GMELIN, 'Syst. Nat.,' I, 1789, p. 933 (Cayenne).

*Myiobius barbatus*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 215 (Roraima and tropical localities).

Roraima: Arabupu, 2 ♂, 3 ♀.

A Tropical Zone species ranging from Matto Grosso to Colombia and the Guianas. The present race occupies most of this area north of the Amazon.

**Myiobius fasciatus fasciatus** (P. L. S. Müller)

*Muscicapa fasciata* P. L. S. MÜLLER, 'Syst. Nat.,' Suppl., 1766, p. 172 (Cayenne).

*Myiobius fasciatus*, CHUBB, 'Bds. British Guiana,' II, 1916, p. 217 (Roraima).

Roraima: Paulo, 1 ♀.

The species ranges from Argentina to Mexico; the race occupies the Guianas and Trinidad and the north coast of Venezuela west to Colombia.

**Myiophobus roraimæ** (Salvin and Godman)

*Myiobius roraimæ* SALVIN AND GODMAN, Ibis, 1883, p. 207 (Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 216 (Mts. Roraima and Twek-quey, Kamarang and Takutu rivers).

Roraima: Arabupu, 4. Mt. Duida: Laterite Valley, 2.

RANGE.—Subtropical Zone in British Guiana; Mt. Duida.

A distinct species, whose characters afford no clue to its immediate ancestry.

**Pipromorpha macconnelli roraimæ** Chubb

*Pipromorpha oleaginea roraimæ* CHUBB, Ann. Mag. Nat. Hist., IV, 1919, p. 303 (Mt. Roraima); 'Bds. British Guiana,' II, 1921, p. 172 (Mt. Roraima and Merumé Mts., British Guiana).

Roraima: Arabupu, 1. Mt. Duida: Caño Seco, El Puente; 2700 ft., 2; Agüita; 1; Central Camp; Vegas; 6.

RANGE.—The race, Merumé Mts., Mts. Roraima and Duida; remaining races, Tropical Zone, British to French Guiana and Pará, thence south of the Amazon to Bolivia.

No bird more impressively demonstrates the close relation existing between the avifaunas of Roraima and Duida than this flycatcher. Heretofore known only from the mountains of Guiana, its discovery extends its known range nearly 400 miles westward. The lowest point at which it was taken is the highest point at which *Pipromorpha o. oleaginea* was found. At this altitude, therefore, both birds were found, thus confirming Mr. Todd's belief in their specific distinctness.<sup>1</sup>

While the shape of the outer primary in *Pipromorpha* is no doubt affected by age, it seems to possess some racial significance. Thus in forty-two specimens of *parca*, taken in every month of the year, only one, a male taken October 11 at Chicoral on the Magdalena River, has the outer primary somewhat narrowed terminally; while in the others it is

<sup>1</sup>See his revision of the gen us, Proc. Biol. Soc. Wash., XXXIV, 1921, pp. 173-192.

essentially normal and rounded. But in fifteen of nineteen specimens of *pallidiventris*, taken in northeastern Venezuela and Trinidad in March, May, June, July, August, and November, the outer primary is either greatly narrowed toward the tip, or a subapical notch reduces the terminal portion of the vane to less than half its width at the middle of the feather. In *roraimæ*, a January male from Roraima, one male and six females from Duida (December, January) have the outer primary more or less attenuate, but unnotched; in one male and three females the tip is pointed rather than rounded. On the other hand, in five December males of *P. o. oleaginea* from 2250 feet on Duida the outer primary shows no unusual narrowing.

In true *macconnelli* the whole inner vane of the outer primary appears to be narrowed, but my series of this race is not large enough to reveal its variations in the form of this feather.

#### **Ornithion inerme Hartlaub**

*Ornithion inerme* HARTLAUB, Journ. für Ornith., 1853, p. 35 (Bahia); CHUBB, 'Bds. British Guiana,' II, 1921, p. 179 (tropical localities).

Roraima: Arabupu, 1 ♂.

A Tropical Zone species found throughout the greater part of this zone north of the Amazon and south to Bahia.

#### **Megarhynchus pitangua pitangua (Linnæus)**

*Lanius pitangua* LINNÆUS, 'Syst. Nat.,' I, 1766, p. 136 (Brazil).

*Megarhynchus pitangua*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 209 (Roraima and tropical localities).

Roraima: Arabupu, 1 ♂, 1 ♀.

A species of the Tropical Zone ranging from Paraguay to Mexico. The present race occupies the South American portion of the range, except in western Ecuador.

#### **Hirundinea ferruginea ferruginea (Gmelin)**

*Todus ferrugineus* GMELIN, 'Syst. Nat.,' 1788, p. 446 (Cayenne).

*Hirundinea ferruginea*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 213 (Mts. Roraima and Twek-quey).

Roraima: 5000 ft., Mt. Duida; 4700; 6100 ft.; Esmeralda near base of Duida; 9.

RANGE.—The race, locally, in the Tropical Zone from Cayenne to the upper Rio Negro and in the mountains of British Guiana and on Mt. Duida ascending to the Subtropical Zone; remaining race, Andes from Colombia to southern Peru chiefly Subtropical Zone, in rocky cañons, ravines, and similar places.

None of these specimens shows more than a slight suffusion of rufous on the inner webs at the base.

**Myiarchus phænotus** Salvin and Godman

*Myiarchus phænotus* SALVIN AND GODMAN, Ibis, 1883, p. 207 (Merumé Mts.); CHUBB, 'Bds. British Guiana,' II, 1921, p. 229 (Mt. Roraima, upper Takutu Mts.; Merumé Mts.).

Roraima: Paulo; Arabupu; 7. Mt. Duida: Caño Leon, 325 ft., 3; Valle de los Monos, 725 ft., 2; Central Camp, Vegas; 6.

RANGE.—Subtropical Zone in British Guiana and Mt. Duida and at the base of the latter mountain.

Five specimens from the base of Duida agree with eight from the tableland. At this point, therefore, the species occurs in the Tropical Zone without showing any evidence of intergradation with *swainsoni*, a fact indicating the specific distinctness of these two forms. The only other member of this genus taken at the base of Duida is a race of *M. ferox*.

## Measurements

	SEX	WING	TAIL
Roraima.....	4♂	83-93	78-85
" .....	2♀	83-90	76-78
Duida.....	5♂	83-89	73-79
" .....	5♀	83-85	73-76

**Cnemotriccus pœcilurus salvini** (Sclater)

*Empidochanes salvini* SCLATER, 'Cat. Bds. Brit. Mus.,' XIV, 1888, p. 218 (Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 222 (Roraima).

Mt. Roraima: Philipp Camp; Rondon Camp; 6. Mt. Duida: Savanna Hills; Central Camp; 2.

RANGE.—The race, Mts. Roraima and Duida; remaining races, Subtropical Zone from the Caracas region to Bolivia (but not Santa Marta group).

Three Duidan specimens are in fresh, six Roraiman birds in worn plumage, the former, therefore, being somewhat more richly colored below. There is much variation in the amount of ochraceous-tawny in the rectrices. In the three Duidan and in two Roraiman birds this color is almost wanting or merely tints the inner webs of the feathers, chiefly basally. In the remaining five Roraiman birds it is more pronounced, and in one it occupies as much of the tail as in the average specimen of true *pœcilurus*. This bird must be very near *venezuelanus* Hellmayr, described from the Subtropical Zone of the Méridan Andes, and, surprisingly enough, recorded also from the Rio Içanna "an affluent of the upper Rio Negro" and hence in the Tropical Zone. Possibly this specimen should be referred to *salvini*.

**Myiochanes fumigatus duidæ** Chapman

*Myiochanes fumigatus duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 21 (Mt. Duida, 4400 ft.).



?*Horizopus ardesiacus*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 224 (Mts. Roraima and Twek-quey).

Mt. Duida: Laterite Valley, 4.

RANGE.—The race, Mt. Duida (and Mts. and Roraima Twek-quey, British Guiana?); remaining races, Subtropical Zone from Caracas region, Venezuela, westward to Colombia (except Santa Marta Mts.), southward to northwestern Argentina).

Specimens in the British Museum from Roraima and Twek-quey are too faded to serve the purposes of exact comparison.

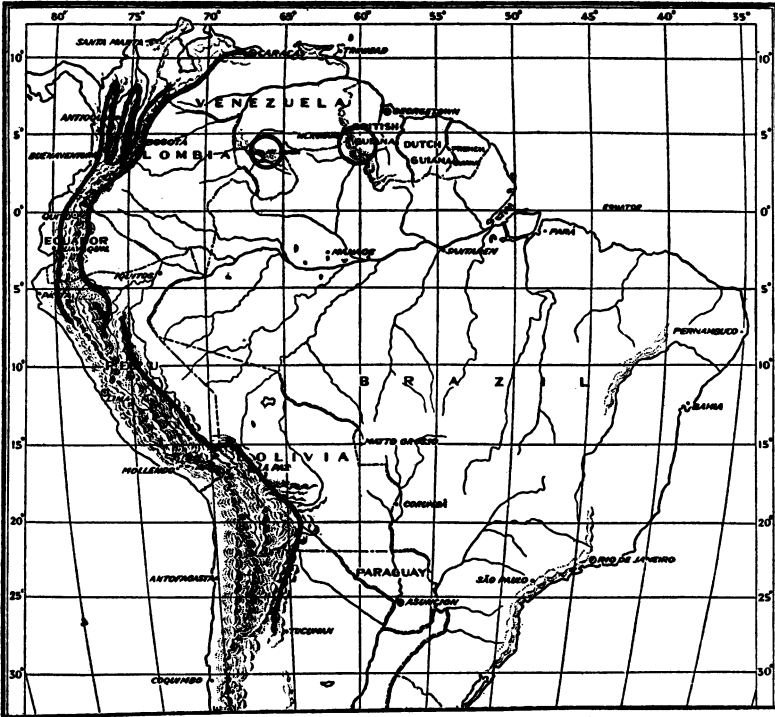


Fig. 37. *Myiochanes fumigatus duidae* and Andean races.

***Tyrannus melancholicus despotes* (Lichtenstein)**

*Muscicapa despotes* LICHTENSTEIN, Verz. Doubl., Berl. Mus., 1823, p. 55 (Bahia).

*Tyrannus satrapa*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 234 (Roraima and tropical localities).

Roraima: Arabupu, 1 ♂; Philipp Camp, 1 ♀.

The species ranges from Argentina to Mexico; the race inhabits eastern Brazil from Bahia to the Guianas and northern Venezuela and the coastal islands.

## FAMILY OXYRUNCIDÆ. SHARPBILLS

**Oxyruncus cristatus hypoglaucus** (Salvin and Godman)

*Oxyrhamphus hypoglaucus* SALVIN AND GODMAN, Ibis, 1883, p. 206 (Mt. Roraima).

*Oxyruncus hypoglaucus*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 240 (Mts. Roraima and Merumé).

Roraima: Arabupu, 4; Merumé Mts.

RANGE.—The race, Subtropical Zone, Mts. Roraima and Merumé, British Guiana; remaining races, Subtropical Zone, southeastern Brazil, eastern Panama (also Tropical Zone, locally), western Panama and Costa Rica).

In the amount of yellow on the underparts the Brazilian and Costa Rican forms, at the extremes of the range of the species, are alike, while the two intervening forms—*hypoglaucus* of Guiana and *brooksi* of eastern Panama—closely resemble each other in the comparative absence of yellow on the underparts. Indeed, comparison of four specimens of the former with two of the latter (Tacarcuna, 1 ♂, ♀ 1), shows them to be so nearly alike that there can be but little doubt of their intergradation by individual variation.

The widely interrupted distribution of the four races of this, the only species of its family, is an admirable illustration of relict distribution.

## FAMILY PIPRIDÆ. MANAKINS

**Pipra suavissima** Salvin and Godman

*Pipra suavissima* SALVIN AND GODMAN, Ibis, 1882, Pl. I, p. 79 (Merumé Mts.); CHUBB, 'Bds. British Guiana,' II, 1921, p. 247 (Mts. Roraima and Merumé; numerous Tropical Zone localities).

Roraima: Arabupu, 2 ♂, 2 ♀. Mt. Duida: Agüita, 3 ♂, 1 ♀.

RANGE.—Tropical and Subtropical Zones, British Guiana and west to Mt. Duida.

Adult males from Roraima and Duida have the belly deeper orange than those from Potaro Landing, British Guiana, and may be separable. While doubtless representing *P. serena* of French Guiana the two birds impress me as being sufficiently unlike to be ranked as species.

**Chloropipo uniformis uniformis** Salvin and Godman

*Chloropipo uniformis* SALVIN AND GODMAN, Ibis, 1884, p. 424 (Mt. Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 250 (Mts. Roraima, Merumé, and Tweekuey, British Guiana).

Roraima: 4200 ft., 10.

RANGE.—The race, Subtropical Zone, British Guiana; remaining race, Mt. Duida.

The nearest known relative of this species is *Chloropipo holochlora* of the Tropical Zone from Panama to Peru, but the two are so unlike that it is impossible to say whether or not they are mutually representative.

**Chloropipo uniformis duidæ** Chapman

*Chloropipo uniformis duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 21 (Mt. Duida, 4400 ft.).

Mt. Duida: Agüita; Provisional Camp; Vegas; Valley Head; Savanna Hills; Central Camp; Desfiladero; 16.

A very close representative of *Chloropipo u. uniformis*.

**Ceratopipra cornuta** (Spix)

*Pipra cornuta* SPIX, 'Av. Bras,' II, 1825, Pl. VII, fig. 2, p. 5 (in sylvis fl. Amazonum).

*Ceratopipra cornuta*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 253 (Mt. Roraima).

*Pipra iracunda*, SALVIN AND GODMAN, Ibis, 1884, p. 447 (Mt. Roraima).

*Ceratopipra iracunda*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 254 (Mt. Roraima).

Mt. Roraima: 4000, 4200 ft. Mt. Duida: 2250 ft.

A young male from Duida extends the known range of this species which appears to occupy the region south of the lower Orinoco, east of the Rio Negro, to Roraima and south to the Amazon. I have seen no Amazon specimens. *Ceratopipra iracunda* described by Salvin and Godman from Roraima as similar to *cornuta* but with the throat black is known only from the type. Its figure in the 'Catalogue of Birds of the British Museum' (XIV, Pl. XIX) shows, however, that the chin is red, so reducing the differences between it and *cornuta* that it is difficult to believe that two manakins so closely resembling each other could occupy the same area. It seems probable, therefore, that *iracunda* is based on an immature or mutant example of *cornuta*, a conclusion I find Dr. Hellmayr has reached before me.<sup>1</sup>

**Schiffornis turdinus olivaceus** (Ridgway)

*Scotothorus olivaceus* RIDGWAY, Proc. Biol. Soc. Wash., XIX, 1906, p. 118 (Rio Mato, Venezuela); CHUBB, 'Bds. British Guiana,' II, 1921, p. 264 (Roraima and tropical localities).

Roraima: Arabupu, 1 ♂, 1 ♀.

The species is found throughout the humid Tropical Zone from southeastern Brazil and southeastern Peru to southern Mexico. The race, of which these specimens are typical, ranges from eastern Venezuela to British Guiana.

## FAMILY COTINGIDÆ. COTINGAS, ETC.

(3228a) **Pachyrhamphus polychropterus tristis** (Kaup)

*Psaris marginatus tristis* KAUP, P. Z. S., 1851, p. 48 (no locality; Cayenne suggested by Bangs and Penard).<sup>2</sup>

<sup>1</sup>Gen. Av. Pipridæ, 1910, p. 14.

<sup>2</sup>Bull. Mus. Comp. Zool., LXIV, 1921, p. 384.

*Pachyrhamphus macconnelli*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 274 (Roraima and tropical localities).

Roraima: Paulo, 1 ♀.

I follow Bangs and Penard in referring a Roraiman specimen to this form. The species occupies the Tropical Zone from Argentina to Honduras; the race is found in eastern Colombia, northern Venezuela, Trinidad, Tobago, the Guianas, and, according to Hellmayr, south to the Tapajóz and the coast of Maranhão.

#### ***Lathria streptophora* Salvin and Godman**

*Lathria streptophora* SALVIN AND GODMAN, Ibis, 1884, Pl. xiv, p. 448 (Mt. Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 280 (Mt. Roraima; Twek-quey Mts.).

Roraima: 5000 ft. (Whitely), 1.

RANGE.—Roraima and Twek-quey, British Guiana.

Although this strikingly distinct species finds its nearest relative in *Lathria cinerea* of the Tropical Zone in British Guiana and elsewhere, it differs from that species too widely to be considered a representative of it. Aside from its pink markings (which might be considered mutational, though the pink throat in certain species of *Platypsaris* indicates that their origin is deep-seated), the disproportionately short tail, highly developed rump-feathers, and chestnut crissumed female, all differentiate *streptophora* from *cinerea*.

If this species advertises its presence by loud notes, as does *cinerea*, its absence from both our Roraiman and Duidan collections indicates its rarity on the former, and perhaps absence from the latter mountain.

#### ***Euchlornis whitelyi* (Salvin and Godman)**

*Pipreola whitelyi* SALVIN AND GODMAN, Ibis, 1884, p. 449 (Roraima, 6000 ft.); SALVIN, Ibis, 1886, Pl. xii, p. 502 (Twek-quey).

*Euchlornis whitelyi*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 296 (Mts. Roraima and Twek-quey).

RANGE.—Mts. Roraima and Twek-quey, British Guiana.

We have not taken this species. Salvin's plate confirms his statement that it is quite different from any species hitherto described and can be compared to advantage with none of them. The genus to which it belongs is (with the exception of the much smaller *E. sclateri*) confined largely to the Subtropical Zone from northeastern Venezuela to Bolivia.

#### ***Procnias averano carnobarba* (Cuvier)**

*Ampelis carnobarba* CUVIER, 'Regne Animal,' IV, 1817, p. 172, Pl. iv, fig. 4 ("Trinidad"; cf. Hellmayr).

*Procnias carnobarba*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 317 (Roraima; Cotinga River).

Roraima: Arabupu, 2♂.

A Tropical Zone species inhabiting Guiana, Trinidad, northern Venezuela, and northeastern Brazil (Maranhão).

#### FAMILY HIRUNDINIDÆ. SWALLOWS

##### *Pygochelidon cyanoleuca* (Vieillot)

*Hirundo cyanoleuca* VIEILLOT, 'Nouv. Dict.d' Hist. Nat.,' XIV, 1817, p. 509 (Paraguay).

*Atticora cyanoleuca*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 347 (Mts. Roraima and Kamakusa).

Roraima: Paulo, 1. Mt. Duida: Savanna Hills, 4.

RANGE.—Mts. Roraima and Duida, and Subtropical Zone generally from Costa Rica southward to Paraguay southeastern Brazil, and northeastern Venezuela.

The zonal affinities of this widely distributed swallow are shown by its presence on Mt. Duida.

##### *Alopochelidon fucata* (Temminck)

*Hirundo fucata* TEMMINCK, 'Pl. Col.,' IV, 1823, Pl. CLXI, fig. 1 (Brazil).

*Atticora fucata roraimæ*, CHUBB, Bull. British Orn. Club, XL, 1920, p. 155 (type examined); 'Bds. Brit. Guiana,' II, 1921, p. 348 (Roraima).

Roraima: Philipp Camp, 2; "Roraima," 1 (Whitely).

Measurements of seven specimens from Roraima (four in the British Museum including the type of *roraimæ*) compared with those of ten specimens from Ypanema and Chapada, Matto Grosso, Brazil; Sta. Elena, Uruguay; Cordova and Salta, Argentina, and the Uribamba Cañon, Peru, show that in the Roraiman birds the wing averages about 2 mm., the tail about 3 mm. shorter. This difference may, however, be individual and the Roraiman specimens may be winter visitants from the south. I can discover no racial variation in color.

##### *Stelgidopteryx ruficollis ruficollis* (Vieillot)

*Hirundo ruficollis* VIEILLOT, 'Nouv. Dict. d'Hist. Nat.,' XIV, 1817, p. 523 (Brazil = Rio de Janeiro; cf. Hellmayr).

*Stelgidopteryx æqualis*, CHUBB (*nec.* Bangs), 'Bds. British Guiana,' II, 1921, p. 350 (Roraima).

Roraima: Arabupu, 3.

Compared with toptotypical series of true *ruficollis* and *æqualis*, Roraiman specimens and one from the Rio Surumu, while intermediate, are clearly nearer the former. In general tone of color they are essentially as dark as *ruficollis*, but in their somewhat paler upper tail-coverts

and slightly smaller size they show an approach to *æqualis*. It is probable, therefore, that the range of *ruficollis* extends northward to about latitude 5° north. We have a specimen from La Morelia, southeast Colombia.

#### FAMILY TROGLODYTIDÆ. WRENS

##### *Pheugopedius coraya ridgwayi* (Berlepsch)

*Thryothorus ridgwayi* BERLEPSCH, Journ. für Orn., 1889, p. 293 (British Guiana).

*Pheugopedius griseigula*, CHUBB, 'Bds. Brit. Guiana,' II, 1921, p. 356 (Roraima).

Roraima: Paulo, 2♂, 1♀; Arabupu, 1♂.

These specimens agree with four others loaned me by Dr. Hellmayr, of which three were collected by Whitely on the Kamarang River (alt. 1500 ft.), and the fourth by Rodway on the Mazaruni River (alt. 50 ft.). The series of eight specimens obviously belong to one form and differ markedly from one example from Wismar on the Demarara, and three from Rockstone on the Essequibo, in their more richly and uniformly colored (antique brown instead of Brussels brown) breast and abdomen with the white throat more sharply defined from the breast.

The Wismar and Rockstone birds are not separable from a large comparable series from Manáos, and so closely resemble four specimens from French Guiana that it is probable they should be referred to true *coraya*. My series of that form, however, is not large enough to warrant a definite opinion here.

The question remains, which of the several names that have been applied to wrens of this group in British Guiana are applicable to the Roraiman, Kamarang, and Mazaruni specimens? The type of *griseigula* Lawrence<sup>1</sup> is in juvenal plumage and is without locality. While somewhat more richly colored than a specimen of the same age from Manáos it is not, in the light of the material before me, certainly identifiable. The next name, chronologically, to be considered is *ridgwayi* Berlepsch.<sup>2</sup> Here, again, we have no definite locality, but the type, at least, is adult and agrees, Dr. Hellmayr writes me, with the Kamarang bird, a specimen of which (Field Mus. No. 66350) is now before me, as well as with Bartica Grove specimens with which it has been directly compared. I accept Berlepsch's name, therefore, for the Roraiman bird.

Bartica Grove is on the west, Rockstone on the east bank of the Essequibo River, which apparently, therefore, divides the ranges of the two races of this wren found in Guiana.

<sup>1</sup>Ann. N. Y. Acad. Sci., II, 1883, p. 382.

<sup>2</sup>Journ. für Ornith., 1889, p. 293.

***Cistothorus platensis alticola* Salvin and Godman**

*Cistothorus alticola* SALVIN AND GODMAN, Ibis, 1883, p. 204 (Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 358 (Roraima).

*Cistothorus platensis caracasensis* CHAPMAN Amer. Mus. Novit., No. 2, 1921, p. 6 (Cotiza, Caracas, Venezuela).

Roraima: 4000, 5000 ft., 2♂ im.

RANGE.—The race, Mt. Roraima, Subtropical Zone, Caracas region, Mérida region; Santa Marta Mts.; remaining members of the group, *stellaris*, Transition and upper Zones of eastern North America; *elegans*, Subtropical Zone from Vera Cruz, Mexico to Honduras; *lucidus*, Costa Rica and western Panama; *meridæ*, Mérida, (3000 meters), Venezuela; *tamæ*, Paramo of Tama, Venezuela; *fulvescens*, Paramo of Guerero, Santander, Colombia; *apolinari*, Savanna of Bogotá, Colombia; *æquatorialis* upper Temperate Zone, east slope of East Andes above Bogotá; Paramo, Central Andes, Santa Isabel, and Valle de las Pappas, locally southward to southern Ecuador; *graminicola*, Paramo of Maraynioc south at least to Cedrobamba, Urubamba, Peru, and northwest Bolivia; *tucumanus*, Andes above Tucuman, 1200–1300 meters; *polyglottus*, southeastern Brazil to Paraguay; *platensis*, Buenos Aires and Entrerios to Cordova and Mendoza, south to Rio Negro; *hornensis*, Santiago, Chile, to Tierra del Fuego, and Falkland Islands.

It is my belief that the forms of the short-billed marsh wren are all descendants from a common ancestor which now exist as intergrading races or closely related representative species. Material, however, does not exist to show the real relationships, *inter se*, of all the members of the group; nor can they be determined from specimens alone. The two forms, *apolinari* and *æquatorialis*, which occur in the Bogotá region, might be considered as merely races of each other, but the former is confined to the Savanna of Bogotá and it is probable does not actually come into contact with the latter. The two birds are much too unlike to intergrade by individual variation, and all the available evidence, therefore, indicates their specific distinctness.

We also have specimens of *meridæ* and *alticola* labeled as taken at 3000 meters in the Mérida region, the former at Conejos and the Sierra Nevada, the latter at Escorial, and these birds also impress me as being specifically distinct. The stability of *alticola* is impressively demonstrated by its remarkable distribution.

Southward, there can be little doubt of the intergradation of *æquatorialis* with *graminicola*. Indeed, it is a question whether the two are separable. The remaining South American forms are certainly mutually representative. Whether they intergrade or not I am unable to say, but one cannot be far from expressing their real relationships in treating them as races.

The presence of a form of this sedentary species on Roraima is one of the most interesting facts connected with the geographic origin of the Roraiman fauna.

**Troglodytes musculus albicans** Berlepsch and Taczanowski

*Troglodytes musculus albicans* BERLEPSCH AND TACZANOWSKI, P. S. Z., 1883, p. 540 (Guayaquil).

*Troglodytes clarus*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 360 (Takutu Mts.). Roraima: Paulo, 2♂; Philipp Camp, 1♂; Rondon Camp, 1♀.

As a center of differentiation it is surprising to find that Roraima has not expressed itself on the house wren. These four birds can be repeatedly matched in color by specimens from western Ecuador. They have, however, longer tails and, were no other specimens to be considered, might be regarded as separable. This member in western Ecuadorean birds varies from 31 to 35, and averages 33 mm. in length; in the Roraiman birds it measures, 36, 38, 38, 41 mm. In specimens from the lower Orinoco and northeastern Venezuela (*clarus* Berlepsch and Hartert) the tail varies from 33 to 37 and averages 35 mm. in length. While the birds with the shortest tails are found in western Ecuador and those with the longest east of the Andes, the average difference is so slight that many specimens from each area can be duplicated in the other.

**Troglodytes rufulus** Cabanis

*Troglodytes rufulus* CABANIS, Schomb. 'Reis. Guiana,' 1848, III, p. 672 (Mt. Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 362 (Mt. Roraima).

Mt. Roraima: Philipp Camp; Rondon Camp; Summit; 20 ad., 6 juv.

RANGE.—Mt. Roraima.

This is one of the four species of birds taken on the summit of Roraima. It is represented on Duida by the very closely allied *T. duidæ*, and in spite of their much larger size the two are near enough to *Troglodytes solstitialis* of the Temperate Zone from western Venezuela to Argentina to suggest the possibility of their representing that species.

**Troglodytes duidæ** Chapman

*Troglodytes duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 22 (Mt. Duida, 4800 ft.).

Mt. Duida: Agüita; Provisional Camp; Vegas; Central Camp; Savanna Hills; Valley Head; Desfiladero; High Point Camp; 14 ad., 5 juv.

RANGE.—Mt. Duida.

A nearly related representative of *Troglodytes rufulus*. Young of the two forms, in juvenal plumage, differ more widely from one another than do the adults.

**Microcerculus duidæ** Chapman

*Microcerculus duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 23 (Mt. Duida, 6700 ft.).

Mt. Duida: Agüita; Valley Head; Savanna Hills; Central Camp; 9.



RANGE.—Mt. Duida.

A larger and more deeply colored representative of the Roraiman *M. ustulatus*.

**Microcerculus ustulatus** Salvin and Godman

*Microcerculus ustulatus* SALVIN AND GODMAN, Ibis, 1883, p. 204 (Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 370 (Roraima).

Mt. Roraima: 5000 ft. (Whitely), 1.

RANGE.—Mt. Roraima.

Represented on Duida by *M. duidæ*. The two are so unlike any other known species that their immediate ancestry cannot be determined. The remaining species of the genus inhabit the Tropical Zone.

FAMILY MIMIDÆ. MOCKERS

(3491) **Mimus gilvus gilvus** (Vieillot)

*Turdus gilvus* VIEILLOT, 'Ois. Am. Sept.,' II, 1807, p. 15, Pl. LXVIII bis (Guiana).

*Mimus gilvus*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 371 (Roraima and tropical localities).

Roraima: Arabupu, 1 ♂, 1 ♀.

Inhabits the Tropical Zone of northern South America. These two specimens are in somewhat worn plumage but apparently agree with others from the lower Orinoco.

FAMILY TURDIDÆ. THRUSHES

**Cichlopsis gularis** Salvin and Godman

*Cichlopsis gularis* SALVIN AND GODMAN, Ibis, 1882, p. 76 (Merumé Mts.); CHUBB, 'Bds. British Guiana,' II, 1921, p. 377 (Merumé Mts., Mt. Roraima).

Merumé Mts., "Roraima," 3500 ft., 2.

RANGE.—Merumé Mts., and Mt. Roraima, British Guiana.

In addition to the present species, the genus *Cichlopsis* contains only *C. leucogenys* of eastern Brazil, and *C. chubbi* of western Ecuador. The Guianan bird is most nearly related to the latter. Apparently they are the survivors of a once widely distributed species. I am not familiar with the Brazilian bird, but the differences between the Guianan and Ecuadorean representatives, both in size and color, are so pronounced that I cannot believe they would interbreed if their ranges met; and to treat them as races gives, in my opinion, an erroneous conception of their relationships.

**Turdus ignobilis murinus** Salvin

*Turdus murinus* SALVIN, Ibis, 1885, p. 197 (Merumé Mts., Roraima, 3000–5000 ft.).

*Planesticus murinus*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 384 (Mt. Roraima, Merumé Mts.; Araroá River).

Roraima: Paulo; Arabupu; 3. Mt. Duida: Valle de los Monos, 725 ft.; 1; El Puente, 2700 ft., 1; Agüita; Savanna Hills; Central Camp; 2d Peak, 5200 ft., 4.

RANGE.—The race, Merumé Mts., Mts. Roraima and Duida; remaining races, Tropical Zone, Colombia to Rio Madeira (and northern Venezuela to British Guiana).

The thrush of the Subtropical Zone on Mt. Duida agrees with specimens of *Turdus murinus* from Roraima. We have also one typical specimen from 2700 feet and another from 725 feet. At the base of Duida the upper zonal form, *murinus*, is apparently represented by a closely related, intergrading form which agrees with *arthuri* Chubb of the Tropical Zone in British Guiana, of which I have seen the type and topotype. Our specimens of *arthuri* are generally grayer than *murinus*, the back is less warmly olivaceous, the breast lacks the brownish wash, the throat is more finely streaked and the size is smaller, the tail is always shorter.

This form (*arthuri*) was not taken above 725 feet, and at this locality a typical example of each race was secured. From 330 feet we have six, and from 550 feet one typical *arthuri*, but from the latter altitude we have also an adult female which is wholly typical of *murinus* in color and equally typical of *arthuri* in size, the tail being only 78 mm. in length. The occurrence of typical individuals at the same locality and the characters of this intermediate specimen indicate that *murinus* and *arthuri* intergrade by hybridization. A specimen from 4000 feet on Roraima is less olivaceous above, has a grayer throat, and is smaller than *murinus*. It is also apparently an intermediate.

Assuming, then, that *murinus* is a zonal representative of the bird here called *arthuri*, it appears that the nearest relative of this bird is *Turdus ignobilis*.

Compared with the three currently recognized forms of that species, *arthuri*, the Tropical Zone race, agrees in size with *debilis*, the only one of the three found east of the Andes, and in color also is nearest that form. We have two specimens of *debilis* from the right bank of the lower Rio Negro, and it doubtless occurs thence westward to the Andes, indicating a more or less continuous distribution of the species from Ecuador to Guiana. Acting on this belief I rank *murinus*, and consequently *arthuri* as races of *ignobilis*.

## Measurements

	ALTI- TUDE	SEX	WING	TAIL	CULMEN	DEPTH OF BILL AT NOSTRIL
<i>Turdus i. murinus</i> , Duida.....	5200 ft.	♀	117	95		6.2
“ .....	4700 “	♀	116	95		6.0
“ .....	4700 “	♂	116	93	24	6
“ .....	4400 “	♀	123	95		6.7
“ .....	3250 “	♀	122	99	24	6
“ .....	3250 “	♀	116	93	24.5	5.9
“ .....	3250 “	♀	112	90	24.5	6.2
“ .....	2700 “	♀	115	95	23.5	6.7
“ .....	725 “	♂	113	91		6.2
<i>T. i. arthuri</i> , Duida.....	725 “	♂	112	80	23.5	6.1
“ .....	550 “	♀	108	78	22.6	5.3
“ .....	550 “	♂	103	79	22	5.9
“ .....	330 “	♂	107	75	22	5.5
“ .....	330 “	♂	110	83	22	6.3
“ .....	330 “	♂	112	80	21	5.5
“ .....	330 “	♀	110	80	22	5.8
“ .....	330 “	♀	110	83	21	6.2
“ .....	330 “	♂	105	77	23	5.9
<i>T. i. murinus</i> , Roraima.....	3700 “	♂	115	90	22	6.
“ .....	4200 “	♂	115	94	22	5.8
Intermediate “ .....	4000 “	♀	110	84	21.3	5.9

***Turdus leucomelas ehippialis* Sclater**

*Turdus ehippialis* SCLATER, P. Z. S., 1862, p. 109 (Nov. Granada Int.).

*Planesticus albiventer*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 382 (tropical localities).

Roraima: Arabupu, 2.

*Turdus leucomelas*, a species of the arid and semi-arid Tropical Zone, ranges from Paraguay through eastern Brazil to the Caribbean. Like many inhabitants of arid regions its plumage becomes excessively worn, and the characters which at best separate the slightly differentiated races then disappear or are obscured. Basing my determinations largely on specimens in fresh or but little-worn plumage, my identifications of our eighty-odd specimens, in the main, agree with conclusions reached by Dr. Hellmayr in a paper now in press, of which he has kindly loaned me the manuscript. The southern form, true *leucomelas* Vieillot, is browner throughout than *albiventer* Spix, which in turn differs from *ehippialis* only in the color of the lowerparts. In the latter the breast is grayer, the abdominal region more extensively white; while in *albiventer* the breast is washed with brownish spreading to the abdomen. Specimens occur,

however, from south of the Amazon, which are practically as pale as Colombian birds, but I have seen no Colombian birds so dark as the average specimen of *albiventer*. November and December birds from the lower Orinoco (Maripa three, Ciudad Bolivar two) in unworn "winter" plumage have the breast washed with a tint of brown and are therefore nearer to *albiventer* than to *ephippialis*. As the breeding season approaches this tint becomes less evident, and eight nesting birds collected in April and June agree with *ephippialis*. But irrespective of seasonal change I should say that the series, as a whole, is intermediate between *ephippialis* and *albiventer*.

Eleven specimens from the Roraiman plains and southward to Manáos average darker below than an equal number from Colombia, but they lack the brownish wash which characterizes the underparts of *albiventer*. In the color of the upperparts, *ephippialis* and *albiventer* agree, but the series from Roraima and southward has the gray of the head and nuchal region averaging slightly deeper, the back, rump, and quills more olivaceous. These differences are more pronounced in three specimens taken in December on the right bank of the lower Rio Negro, opposite a point not far above Manáos, but they are in too worn plumage to serve as a basis for satisfactory conclusions. While it seems probable that the differences these birds exhibit are racial, I feel that the description of further races in this group should be preceded by an intensive study of its seasonal plumage changes.

#### SPECIMENS EXAMINED

*Turdus leucomelas leucomelas*.—PARAGUAY (type-locality): Trinidad, 1. BRAZIL: Matto Grosso, Urucum, 7; Chapada, 13; Tapirapoan, 1; Juruena, 1; Itatiaya, 1 (worn plumage).

*Turdus leucomelas albiventer*.—BRAZIL: Bahia, 7; Maranhão, 10; Piauhý, 5; Ceará, 1; Pará (type-locality), 5; Tamonury, 1.

*Turdus albiventer ephippialis* (Bogotá, type-locality).—COLOMBIA: Honda, 3; Chicoral, 1; Bonda, Santa Marta, 6. VENEZUELA: Las Trincheras, Carabobo, 1; Galipan, above La Guayra, 1; Antonio, Bermudez, 1; Maripa, 7; Ciudad Bolivar, 5; Arabupu, 2. BRAZIL: Límáo, Rio Cotinga, 1; Frechal, Rio Surumu, 5; Manáos, 2; Cacao Pereira, right bank lower Rio Negro, 3.

#### *Turdus roraimæ roraimæ* Salvin and Godman

*Turdus roraimæ* SALVIN AND GODMAN, Ibis, 1884, p. 443 (Roraima, 5000–6000 ft.).

*Planesticus roraimæ*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 380 (Mt. Roraima). Mt. Roraima: Philipp Camp; Rondon Camp; 9.

RANGE.—The race, Mt. Roraima; remaining race, Mt. Duida.

This form and the following differ only in size, the Duidan bird being the larger. They are most nearly related to and possibly representative of *Turdus olivater olivater*, *T. o. sancta-martæ*, and *T. caucæ* of the Subtropical Zone in the Andes, of north central Venezuela, the Santa Marta group, and the Central Andes of Colombia, respectively.

***Turdus roraimæ duidæ* Chapman**

*Turdus roraimæ duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 23 (Mt. Duida, 6200 ft.).

Mt. Duida: Agüita; Valley Head; 1st Peak, 4700 ft.; Desfiladero; 18 ad., 2 juv.  
RANGE.—Mt. Duida.

A representative of the Roraiman form in which the tail and bill are constantly larger and the wing averages longer.

FAMILY VIREONIDÆ. VIREOS

***Vireosylva chivi roraimæ* (Chubb)**

*Vireo roraimæ* CHUBB, 'Bds. British Guiana,' II, 1921, p. 393 (Roraima; also Takutu Mts., Kamakusa; Annai; Bartica).

Roraima: Arabupu, 2 ♂.

These specimens differ from *V. c. griseola* Todd only in being slightly larger. They measure: wing, 75, 76; tail, 54, 55; culmen, 18 mm.

***Pachysylvia sclateri* (Salvin and Godman)**

*Hylophilus sclateri* SALVIN AND GODMAN, Ibis, 1883, p. 205 (Roraima, 3500-6000 ft.).

*Pachysylvia sclateri*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 397 (Roraima, Kamakusa).

Mt. Roraima: Paulo; Arabupu; Philipp Camp; 9. Mt. Duida: 1 m. north Laterite Valley, 4200 ft., 4.

RANGE.—Mt. Roraima and Kamakusa, British Guiana, Mt. Duida.

A distinct species in some respects resembling *Pachysylvia muscipina* of the Tropical Zone from the Guianas to southern Brazil, in others *P. pectoralis* of the Guianas. It seems, however, nearer the former, of which we have specimens from an altitude of 2250 feet on Duida and 700 feet on the Cunucunuma River.

***Cyclarhis gujanensis gujanensis* (Gmelin)**

*Tanagra gujanensis* GMELIN, 'Syst. Nat.,' I, 1789, p. 893 (Guiana).

*Cyclarhis gujanensis*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 401 (Roraima; upper Takutu Mts.).

Mt. Roraima: Arabupu, 2 ♀; Philipp Camp, 1 ♂; Rondon Camp, 1 ♀.

A wide-ranging species of the Tropical Zone. Lacking a topotypical series I can make no comment on these Roraiman specimens.

## FAMILY MNIOTILTIDÆ. WOOD WARBLERS

**Compsothlypis pitiaiyumi roraimæ** Chapman

*Compsothlypis pitiaiyumi roraimæ* CHAPMAN, Amer. Mus. Novit., No. 341, 1929, p. 4 (Mt. Roraima, 4200 ft.).

*Compsothlypis elegans*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 402 (Mt. Roraima).

Roraima: Paulo; Arabupu, 2. Mt. Duida: Provisional Camp; Valley Head; Vegas; Savanna Hills; Central Camp; Desfiladero; 14.

RANGE.—The race, Mts. Roraima and Duida; remaining races, generally subtropical Zone from southeastern Texas to Uruguay and eastern Brazil.

A series from Duida shows this to be a well-marked form distinguished particularly by its black or blackish tarsi and toes, and tip of the mandible. The breast averages slightly deeper than in *elegans*, but on the whole is much as in that race.

**Dendroica striata** (Forster)

*Muscicapa striata* FORSTER, Philos. Trans., XLII, 1772, p. 406 (Severn River).

*Dendroica breviunguis*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 405 (Roraima; Kamarang River).

Roraima: Arabupu, 1 ♂ im. (December 18). Duida: 1st Peak, 4700 ft., 1 ♀ im. (December 19).

Apparently under the impression that individuals of this species might breed in South America, Chubb used Spix's name based on a specimen from Pará.

**Setophaga ruticilla** (Linnæus)

*Motacilla ruticilla* LINNÆUS, 'Syst. Nat.,' I, 1758, p. 186 (Virginia).

*Setophaga ruticilla*, CHUBB 'Bds. British Guiana,' II, 1921, p. 412 (Roraima; Bartica).

Roraima: Paulo, 1 ♂, 3 ♀ (October 29, 30); Arabupu, 2 ♂, 2 ♀ (December 21; January 2). Duida: Caño Seco; Savanna Hills; Laterite Valley; 4 ♂ ad., 2 ♂ im., 3 ♀, 4? (December 31–February 25).

**Myioborus verticalis pallidiventris** (Chapman)

*Setophaga verticalis pallidiventris* CHAPMAN, Bull. Amer. Mus. Nat. Hist., XII, 1899, p. 153 (Quebrada Seca, northeastern Venezuela).

*Myioborus pallidiventris*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 414 (Roraima, Kamarang).

Roraima: Arabupu, 2. Mt. Duida: Agüita, 2.

RANGE.—The species, Subtropical Zone from Costa Rica to Bolivia and Santa Marta Mts. to northeastern Venezuela; Mts. Roraima and Duida.

So far as our topotypical specimens go the differences between *M. v. pallidiventris* and true *verticalis* are marked and constant, not one of seven specimens from northeastern Venezuela being matched by eighteen

specimens from Bolivia and southeastern Peru. The latter are of a deeper yellow below and have an ochraceous-tinted breast-spot which is lacking in the birds from northeastern Venezuela. Specimens from central Venezuela to central Peru, however, are variously intermediate in color, and on the basis of color alone the area of intergradation is so large that the race is too unsatisfactory to be tenable. However, in my work on



Fig. 38.

1. *Myioborus verticalis verticalis*. 2. *M. v. pallidiventris*. 3. *M. r. aurantiacus*.

Ecuadorean birds,<sup>1</sup> in discussing the variations of this species, I have called attention to the fact that the black at the base of the outer tail-feathers is more extensive in birds from northern Peru northward, though my statement is disguised by an unfortunate slip whereby what should read "black" on line six from the bottom of page 597, reads "white," while "white," in the heading on page 598, should read "black!"

One of our four specimens is in immature plumage; the extent of black on the two outer rectrices in the remaining three is as below:

<sup>1</sup>Bull. Amer. Mus. Nat. Hist., LV, 1926, p. 597.

## Black at Base

		OUTER RECTRIX	SECOND RECTRIX
Roraima.....	♂	19	21
“.....	♀	15	20
Duida.....	♀	16	22

So far as this character is concerned, these birds are *pallidiventris*. In color they agree with Bolivian rather than northeastern Venezuelan birds, but for that matter so do many specimens from Colombia and Ecuador.

***Myioborus castaneicapillus* (Cabanis)**

*Setophaga castaneicapilla* CABANIS, Schomb. 'Reis. Guiana,' III, 1848, p. 667 (British Guiana = Roraima, 7000 ft.).

*Myioborus castaneicapillus*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 415 (Mt. Roraima; Kamarang).

Mt. Roraima: Arabupu; Philipp Camp; Rondon Camp; 25.

RANGE.—Mt. Roraima and "Kamarang River" (=Twek-quey), British Guiana. Represented on Mt. Duida by *M. duidæ*.

This species resembles *M. brunneiceps* of the Subtropical Zone of Bolivia and northern Argentina, though the two are not sufficiently alike to be spoken of with certainty as mutually representative.

***Myioborus duidæ* Chapman**

*Myioborus duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 24 (Mt. Duida, 4800 ft.).

Mt. Duida: Agüita; Vegas; Provisional Camp; Valley Head; Central Camp; Savanna Hills; Desfiladero; 25.

RANGE.—Mt. Duida.

The Duidan and Roraiman species are evidently mutually representative.

The pigmental change which makes the yellow of the latter the orange of the former is doubtless less important biologically than the somewhat pronounced result would indicate. There is, however, no variation in the color of the underparts in our large series of both species. One set is uniformly yellow, the other uniformly orange. The white superciliary is always present in *duidæ* and often wholly absent in *castaneicapillus*; but in some specimens of the latter it is suggested as a faint, grayish supraloral stripe.

Both birds may possibly be considered representatives of *Myioborus brunneiceps* of the Subtropical Zone of Bolivia and northern Argentina. This species agrees with *castaneicapillus* in the color of the underparts, with *duidæ* in the development of the supraloral stripe, but differs



from them both in having the back greener, the nape grayer and more white in the three outer pair of rectrices.

***Basileuterus bivittatus roraimæ* Sharpe**

*Basileuterus roraimæ* SHARPE, 'Cat. Bds. Brit. Mus.,' X, 1885, p. 392 (Mt. Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 416 (Mt. Roraima; Merumé Mts.).



Fig. 39. *Basileuterus bivittatus roraimæ* and ally.

Roraima: Paulo; Arabupu; 20. Mt. Duida: Agüita; Valley Head, 1 m. north Laterite Valley.

RANGE.—The race, Subtropical Zone, British Guiana; Mt. Duida; remaining race, Andean foothills and Subtropical Zone, from southeastern Peru to northern Argentina.

I agree with Mr. Todd that *B. chrysogaster* is specifically distinct from *B. bivittatus*. The occurrence of typical specimens of both species in southeastern Peru (*bivittatus* on the Rio Inambari; *chrysogaster*, at

La Pampa and Astillero) supports this belief. In any event, *roraime* is nearest *bivittatus*, some of our specimens being so near examples of the Bolivian bird with an ochraceous or Mars yellow crown-patch that the intergradation of the two forms by individual variation seems not impossible.

**Basileuterus auricapillus olivascens** Chapman

*Basileuterus vermicivorus olivascens* CHAPMAN, The Auk, 1893, p. 343 (Princetown, Trinidad).

*Basileuterus olivascens*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 417 (Roraima, 3000-4000 ft.).

Roraima: 4000, 4200 ft.

RANGE.—The race, chiefly Tropical Zone; Guiana, northeastern Venezuela and Trinidad, west through the Orinoco Valley, to the east slope of the East Andes in Colombia; remaining races, eastern Brazil (Ceará) to the Province of Buenos Aires west to Tucuman and state of Santa Cruz, Bolivia. Unknown from Duida, Ecuador, or Peru.

Roraiman specimens are slightly larger and greener above than true *olivascens*, and the nuchal and postocular stripes have a very faint tinge of greenish which is lacking in both *auricapillus* and *olivascens*.

FAMILY MOTACILLIDÆ. PIPITS AND WAGTAILS

**Anthus lutescens lutescens** Pucheran

*Anthus lutescens* PUCHERAN, Archiv. du Mus., VII, 1855, p. 343 (Brazil).

?*Notiocorys abariensis*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 420 (Abary River; Roraima; Merumé Mts.).

Roraima: Paulo, 1; Arabupu, 1 ♂.

These two specimens, in fresh plumage, are closely matched by one from Trinidad, Rio Mamoré, Bolivia, and two from Paraguay. Two specimens from Abary, collected by McConnell, topotypes of *Notiocorys abariensis* Chubb, are in too worn plumage to reveal their characters properly.

FAMILY FRINGILLIDÆ. FINCHES, SPARROWS, ETC.

**Oryzoborus angolensis** (Linnæus)

*Loxia angolensis* LINNÆUS, 'Syst. Nat.,' I, 1766, p. 303 (eastern Brazil; see Hellmayr, Field Mus. Pub., No. 255, 1929, p. 293).

*Oryzoborus brevirostris*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 423 (Roraima; tropical localities).

Roraima: Paulo, 1 ♀; Arabupu, 1 ♂.

A widely distributed species of the Tropical Zone. The bill in specimens from the northern part of this bird's range averages smaller and the white spot at the base of the primaries is, as a rule, less evident, but these

characters seem to me to be too inconstant to warrant the recognition of *O. a. brevirostris* Berlepsch.

***Idiospiza homochroa duncani* (Chubb)**

*Duncanola duncani* CHUBB, Ann. and Mag. Nat. Hist., 1921, p. 193 (Mt. Roraima); 'Bds. British Guiana,' II, 1921, p. 440, Pl. VII (Mt. Roraima).

Mt. Roraima: Philipp Camp; Rondon Camp; Summit; 7♂ ad., 1♀ ad., 5 im. Mt. Duida: Desfiladero, Cumbre No. 15, 6600 ft.; Cumbre No. 17, 6700 ft.; High Point Camp, 7100 ft.; 3♂ ad., 1♀ ad., 3 im.

RANGE.—The race, upper altitudes of Mts. Roraima and Duida; remaining race, arid Temperate and Paramo Zones, from western Venezuela to Peru (represented on the Santa Marta Mts. by *I. oreophila?*).

This species varies so greatly with age and its plumage is subject to so much change in appearance by wear, that without comparable material it is impossible to determine to what extent, if any, specimens from different localities vary geographically.

Specimens from Duida and Roraima evidently agree, and, while they seem to differ from the Andean form, of which we have a large series, it is difficult to say with accuracy of just what these differences consist. However, so far as our material goes, the juvenal plumage (sexes alike) of *duncani* is more ochraceous throughout and both above and below more heavily streaked. The much heavier streaking above also characterizes *duncani* in the succeeding (first winter) plumage of both sexes as well as in the adult female. Fully mature males of *homochroa* in fresh, unworn plumage are uniform dark gray unstreaked, whereas *duncani* in this plumage is more or less washed with brownish, particularly on the abdomen. In the preceding plumage this difference is more pronounced, and *duncani* is more strongly streaked above.

It is noteworthy that on both Roraima and Duida this species of the Andean Temperate and Paramo Zones was found only at the higher altitudes.

***Volatinia jacarini jacarini* (Linnæus)**

*Tanagra jacarini* LINNÆUS, 'Syst. Nat.,' I, 1766, p. 314 (northeastern Brazil).

*Volatinia splendens*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 443 (Roraima and tropical localities).

Roraima: Paulo, 1♂, 1♀; Glycon Swamp, 6500 ft., 1♀.

The species ranges from Argentina to Mexico. The Roraiman bird belongs to the more southern form.

***Sicalis citrina citrina* Pelzeln**

*Sycalis citrina* PELZELN, 'Orn. Bras.,' 1870, p. 232 (Jaquariba, Brazil).

*Pseudochloris citrina antioquiæ*, CHAPMAN, Bull. Amer. Mus. Nat. Hist., XXXVI, 1917, p. 571 (Barro Blanco, Antioquia, Col.).

*Pseudochloris roraimæ*, CHUBB, Ann. and Mag. Nat. Hist., 1921, p. 194 (Mt. Roraima).

*Sicalis roraimæ*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 457 (Mt. Roraima).

Mt. Roraima: 3000, 4000, 5400, 5500, 6500 ft.; 3♂ ad. fresh, 1♂ ad. worn plumage; 2♂ im. fresh plumage; 2♀ ad. fresh plumage. Esmeralda Savanna, base of Duida, 330 ft., 6♂ ad. fresh, 1♂ ad. worn plumage; 6♂ im. plumage; 6♀ ad. worn, 7♀ ad. fresh plumage; 5♀ im. plumage. Additional specimens. Brazil: Gilboez, Piahy, 1500 ft., 1♂ ad. worn plumage, 1 im. Colombia: Barro Blanco, 7200 ft., 3♂ ad. worn plumage 1♀ ad. worn, 1♀ ad. fresh plumage. Venezuela: Cotiza, Caracas, 1♂ im. fresh plumage, 1 im.

RANGE.—This species occupies the Tropical Zone and upward to 7200 ft., from northern Venezuela and Santa Marta Mts. to northern Argentina.

These specimens, in my opinion, represent but one form. Certainly this is true of those from north of the Amazon, but a larger series from eastern Brazil is required to prove their identity with true *citrina*. Taken in connection with Dr. Hellmayr's statement, as quoted by Mr. Todd,<sup>1</sup> that he could not find the slightest differences in coloration between specimens from Bogotá and Roraima and von Pelzeln's types of *citrina*, the claims to a northern form (*browni* Bangs described from Santa Marta) rest on the alleged smaller size of the northern bird. This character, however, is not sustained by our series; worn males from Antioquia (including the type of *antioquiæ*) being quite as large as a comparable male from Piahy. These measurements, in connection with those presented by Mr. Todd from Dr. Hellmayr, seem to leave no excuse for continued recognition of a northern form.

#### ***Myospiza humeralis meridana* Todd**

*Myospiza humeralis meridana* TODD, Proc. Biol. Soc. Wash., XXX, 1917, p. 127 (Guarico, Lara, Venezuela).

*Myospiza humeralis*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 460 (Roraima; upper Takutu; Abary River).

Roraima: Paulo, 6♂ ad., 1♂ juv., 1♀ ad.; Arabupu, 3♂ ad., 1♂ juv., 1♀ ad., 1♀ juv.; Philipp Camp, 1♂ ad., 1♀ ad., 1♀ juv.

This species is found throughout the greater part of South America from Argentina to the Caribbean. These specimens agree with others from the coast region of Venezuela while a large series from the lower Orinoco resemble topotypical specimens of true *humeralis* from Cayenne. (See Wetmore's review of this group in Bull. U. S. Nat. Mus., 1926, No. 133, pp. 427-431.)

#### ***Zonotrichia capensis roraimæ* (Chapman)**

*Brachyospiza capensis roraimæ* CHAPMAN, Amer. Mus. Novit., No. 341, 1929, p. 5 (Mt. Roraima, 6000 ft.).

<sup>1</sup>Ann. Carn. Mus., XIV, 1922, p. 519.

*Brachyospiza macconnelli*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 461 (part).

Mt. Roraima: Paulo; Philipp Camp; Rondon Camp; 32 ad., 7 juv.

RANGE.—The race, slopes and savannas of Mt. Roraima (Merumé Mts.?); represented on the summit of the mountain by *Z. c. macconnelli*; remaining races, Subtropical Zone, island of Santo Domingo, southern Mexico, Guatemala, Costa Rica, western Panama, Colombia (including Santa Marta Mts.), northern Venezuela south through the Andes to the south Temperate Zone in Patagonia; Tropical Zone on Curaçoa and Aruba Islands, French Guiana; Tropical and Subtropical Zones in eastern Brazil.

The fact that two forms of *Zonotrichia capensis* exist on Mt. Roraima is an admirable illustration of how completely isolated a form may be by the nature of its environment. Only a cliff 1400 feet in height separates the range of this race from that of one occupying the summit of the mountain, but the mere fact of the existence of two forms in this area is proof that each one is closely confined to its own faunal zone. The singular distribution of *Zonotrichia capensis* is indicated by the outline of its range given above. It is known in British Guiana only from Roraima and the Merumé Mts., but in French Guiana it is found at sea-level. It is recorded from Maranhão and thence southward. We did not find it on Mt. Duida but to my intense surprise I find that the Olallas collected a female adult at Uacarã, on the Rio Negro near Santa Isabel, September 9, 1928. This bird is wholly typical of *roraimæ*, and fortunately the characters of that race are so strongly marked that there can be no doubt of the identity of the Rio Negro specimen. So far as I am aware this is the only record of this species from the Rio Negro, nor do I recall any from the shores of the Brazilian Amazon. The possible significance of this record has already been referred to.

Examination of specimens representing most of the recognized forms of this species and familiarity with it in life throughout the greater part of its South American range permit me to endorse Mr. A. J. van Rossem's contention<sup>1</sup> that *Brachyospiza* Ridgway is not separable from *Zonotrichia* Swainson.

#### *Zonotrichia capensis macconnelli* (Sharpe)

*Brachyospiza macconnelli* SHARPE, Trans. Linn. Soc., VIII, 1900, p. 53, Pl. iv, fig. 1 (Mt. Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 461 (Mt. Roraima).

Summit of Mt. Roraima, 8600 ft., 4 ad., 1 juv.

RANGE.—Summit of Roraima.

The larger size and darker colors of the form of *Zonotrichia capensis* of Roraima living on the summit as compared with the race occupying the slopes of the mountain, significantly associates its differentiating char-

<sup>1</sup>The Auk, 1929, p. 549.

acters with the higher altitude and greater humidity of its haunts. If, therefore, this be an instance of evolution by environment, it is of the utmost significance to observe that the differences between adults are shown also by nestlings and that consequently the racial characters are inherited. This appears to be the only bird living on the summit of Mt. Roraima.

**Emberizoides herbicola sphenurus** (Vieillot)

*Passerina sphenura* VIEILLOT, 'Nouv. Dict. d'Hist. Nat.,' 1817, p. 25 (Cayenne).

*Emberizoides sphenurus*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 463 (Roraima; tropical localities).

Roraima: Paulo, 3 ♂, 3 ♀; Arabupu, 4 ♂, 1 ♀; Philipp Camp, 1 ♂, 1 ♀. Duida: Esmeralda, 22; Savanna Grande, near Esmeralda, 25; Halfway Camp, 350 ft., 10; base Duida, 725 ft., 1.

A species of open grassy plains, ranging in its several forms, from Paraguay to Costa Rica. The present race inhabits the Guianas, Venezuela, and Colombia. I detect no differences between upper Orinoco and Roraiman specimens and others from Venezuela and from Colombia.

**Emberizoides duidæ** Chapman

*Emberizoides duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 25 (Savanna Hills, 4400 ft., Duida tableland, Venezuela).

Mt. Duida: Savanna Hills; Cumbre No. 17, 6700 ft.; 5.

RANGE.—Tableland of Mt. Duida, representing *Emberizoides herbicola* of South America generally and northward to Costa Rica.

This large, dark race was apparently derived from *E. h. herbicola* of which we have a large series from the savanna at the base of Duida.

**Arremon taciturnus taciturnus** (Hermann)

*Tanagra taciturnus* HERMANN, 'Tab. affin. Anim.,' 1783, p. 214 (Guiana).

*Arremon taciturnus*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 469 (Roraima; tropical localities).

Roraima: Paulo, 3 ♂, 2 ♀; Arabupu, 6 ♂, 6 ♀.

A Tropical Zone species which ranges from the Guianas southward to Matto Grosso, Bolivia, and southeastern Peru. The Peruvian and Bolivian form, *nigrirostris*, normally lacks the pectoral band, but we have a specimen from the Rio Tavara, southeastern Peru, and another from the Rio Chimon, Bolivia, in which it is nearly complete and another from Chapada, Matto Grosso, in which it is broken. The two forms evidently, therefore, intergrade by mutation.

***Atlapetes personatus* (Cabanis)**

*Arremon personatus* CABANIS, Schomb. 'Reis. Guiana,' III, 1848, p. 678 (Roraima).

*Atlapetes personatus*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 471 (Mt. Roraima).

Mt. Roraima: Philipp Camp; Rondon Camp; 18.

RANGE.—Mt. Roraima.

Represented on Mt. Duida by *Atlapetes duidæ* and closely resembling *Atlapetes fulviceps* (Lafresnaye and d'Orbigny) of the Subtropical Zone of Bolivia.

While the two birds are too unlike to be definitely considered as mutually representative, it is significant that some specimens of *personatus* show a trace of the yellow lores and yellow malar streak of *fulviceps*.

***Atlapetes duidæ* Chapman**

*Atlapetes duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 26 (Mt. Duida, 4700 ft.).

Mt. Duida: 1 m. north Laterite Valley; Central Camp; Vegas; Valley Head; Desfiladero; 12.

RANGE.—Mt. Duida.

Representing *Atlapetes personatus* of Mt. Roraima but with a chestnut, instead of yellow breast; and black, instead of gray, back, wings, and tail.

**FAMILY CÆREBIDÆ. HONEY CREEPERS*****Diglossa major* Cabanis**

*Diglossa major* CABANIS, Schomb. 'Reis. Guiana,' III, 1848, p. 676 (Mt. Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 475 (Roraima).

Mt. Roraima: Philipp Camp; Rondon Camp; Summit; 12.

RANGE.—Mt. Roraima.

The largest species of the genus and one of the most distinct Roraiman birds. The genus *Diglossa* occurs in the Temperate and Subtropical Zones from Mexico to Argentina, including northern Venezuela eastward to Turumiquire. Its Venezuelan members, however, (aside from *major*) belong in the "black" section of the genus and obviously bear no close or derivative relation to the Roraiman bird of whose origin we have no clue. Mr. Carter states that while this species occasionally visits the summit of Roraima it is not resident there.

***Diglossa duidæ* Chapman**

*Diglossa duidæ* CHAPMAN, Amer. Mus. Novit., No. 380, 1929, p. 26 (Mt. Duida, 6600 ft.).

Mt. Duida: Agüita; Savanna Hills; Central Camp; 1st Peak, 4700 ft.; Cumbre No. 6, 5800 ft.; Desfiladero; Cumbre No. 22, 6700 ft.; 47.

RANGE.—Mt. Duida.

In describing this species I compared it with *D. humeralis* of the Temperate Zone of the East Andes in Colombia, but Dr. Hellmayr writes me that he considers it more nearly related to *major*, and further consideration of the question leads me to the belief that he is right. The fact remains, however, that the differences between the two are as great as those on which many subgenera are based. They consist chiefly in the different proportions of the length of wing and tail, pattern of coloration and structure of the dorsal feathers. In *duidæ* the tail is only seventy-five per cent the length of the wing, in *major* it is ninety per cent. In *duidæ* the back and scapulars are unmarked, in *major* they have blue shaft streaks. In *duidæ* the lower tail-coverts are grayish like the belly, in *major* they are chestnut, as in the *mystacalis-pectoralis* group; furthermore, *major* shows evident traces of the mystacal stripe of this group, but there is no suggestion of this mark in our large series of *duidæ*. In *duidæ* the barbs of the dorsal feathers are less separated than in those of *major*. Without going into further detail it is evident that the two birds are too unlike to be considered as even representative forms.

## Measurements

	No.	SEX	WING	TAIL
<i>Diglossa major</i> .....	5	♂	87-90(90)	78-81(80)
“ “ .....	5	♀	80-85(83)	72-79(75)
“ <i>duidæ</i> .....	5	♂	71-75(73)	54-57(55)
“ “ .....	5	♀	68-69(68)	53-54(53.5)

***Cœreba guianensis roraimæ* Chapman**

*Cœreba guianensis roraimæ* CHAPMAN, Amer. Mus. Novit., No. 341, 1929, p. 6 (Mt. Roraima, 4200 ft.).

*Cœreba guianensis*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 473 (part).

Roraima: Paulo; Arabupu; 6. Mt. Duida: 4200, 4700 ft., 3; Laterite Valley; Savanna Hills; 3.

RANGE.—The race, Mts. Roraima and Duida; remaining race, Tropical Zone, British Guiana, eastern Venezuela, and northern Brazil west to the upper Rio Negro.

A dark race of *guianensis* which occurs to the north and south of both Roraima and Duida. We have no specimens of *guianensis* from the actual base of the latter mountain, but have a series from the Casiquiare.

## FAMILY TANAGRIDÆ. TANAGERS

***Chlorophonia cyanea*<sup>1</sup> roraimæ Salvin and Godman**

*Chlorophonia roraimæ* SALVIN AND GODMAN, Ibis, 1884, p. 444 (Mt. Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 489 (Roraima; Quonga; Bonasika River).

<sup>1</sup>*Pipra cyanea* Thünberg, Mem. Acad. Imp. Sci. St. Petersburg, VIII, 1822, pp. 283, 284; Rio de Janeiro. See Laubmann, Wissenschaft, Ergeb. Deutsch. Gran Chaco Expd. Vogel, 1930, p. 265.



Mt. Roraima: 3500 ft., Philipp Camp, 2. Mt. Duida: Caño Seco; Agüita; 1st Peak, 4700 ft.; Cumbre No. 6, 5800 ft.; 14.

RANGE.—The race, Subtropical Zone in British Guiana and on Mt. Duida; remaining races, or representatives, Subtropical Zone of northeastern Venezuela, northern Venezuela, Santa Marta Mts., Colombia, eastern Ecuador, Peru, Bolivia, Paraguay, northeastern Argentina, and southeastern Brazil.



Fig. 40. *Chlorophonia cyanea roraimæ* and races.

Excluding for a moment the Roraiman-Duidan race (1.) and the puzzling *torrejoni* of Peru (6.), the remaining five forms fall into the two following series, the members of which *inter se* are very closely related:

- A.—Male with a yellow frontlet and green back
  - 2. *minuscule* (northeastern Venezuela)
  - 3. *frontalis* (Caracas region)
  - 4. *psittacina* (Santa Marta).
- B.—Male with frontlet green, like crown, back blue
  - 5. *longipennis* (western Venezuela to Bolivia)
  - 7. *cyanea* (Paraguay, southeastern Brazil).

There is no evidence that the ranges of these groups meet, but so far as their distinguishing characteristics are concerned they are connected by the Roraiman-Duidan form which has the yellow frontlet of one and the blue back of the other, and is thus exactly intermediate between the two. Whether its derivative relationships are with the North Venezuelan yellow-fronted form, or the Colombian blue-backed *longipennis*, it is impossible to say.

The latter is barely separable from the Paraguay-southeast Brazil *cyanea* from which it differs only in having the underparts a shade deeper yellow, the head slightly darker green. The ranges of the two races are apparently separated by the region between Santa Cruz, Bolivia, and Sapucay, Paraguay, a distance of about 600 miles; nevertheless the differences between them are so slight that they are almost bridged by individual variation in our series, which includes only four males of *longipennis*. The range of *longipennis* in Peru, and part of Ecuador, is broken by that of *torrejoni* in which the male, as described, closely resembles the females of *longipennis* and *cyanea*. Whether *torrejoni* is actually the female or young male of *longipennis*, or whether it is a "hen-feathered" mutant which divides the range of *longipennis*, it is impossible to say. Our two specimens from Peru (Santo Domingo, 6000 ft.; Tulumayo, 4000 ft.) are both labeled "male" by that reliable collector, Harry Watkins, and on the label of the one taken at Santo Domingo (August 13, 1918) he has added to the sex-mark the letters T. M. E., meaning "testes much enlarged." No blue-backed specimen appears to be known from Peru, and our single "Ecuador" specimen (a trade-skin) is in the "*torrejoni*" plumage.

#### **Tanagra xanthogaster brevisrostris** (Bonaparte)

*Euphonia brevisrostris* BONAPARTE, Rev. Zool., 1851, p. 136 (Bogotá).

?*Tanagra xanthogaster*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 494 (Merumé Mts., Kamakusa, Kamarang).

Mt. Duida: Agüita, 2♂, 1♀.

RANGE.—The species, Tropical and Subtropical Zones, northern South America to Bolivia and southeastern Brazil; the race, eastern Colombia, eastern Ecuador and northeastern Peru to Mt. Duida (and Guiana?).

The difficulty of identifying satisfactorily Ecuadorean specimens of this species are set forth in my 'Bulletin' on the birds of that country (p. 650). I now find that the female presents excellent characters distinguishing specimens from the eastern and western slopes of that country. Those from the former have the breast and abdomen strongly suffused with buffy, the side a bright yellowish-green, while in those from western

Ecuador the breast is gray with usually no buffy tint, the abdomen with usually less buff than in the eastern bird and the green of the sides and flank is darker. The question arises, to which of these two forms does the name *quitensis* apply? The type-locality "Quito" has no exact meaning. No one can be certain from an examination of the type whether it came from eastern or western Ecuador. It is, however, more than probable that it was taken in the Gualea-Mindo region whence most so-called Quito birds come, and I suggest, therefore, that Gualea be known as the type-locality for this race. This leaves the way clear to refer all specimens from eastern Ecuador and northeastern Peru to the eastern Colombian form *brevirostris*. They are not wholly typical of that race, as I have explained in the paper referred to, but the females of both are much alike and there certainly is not room for another addition to this group. After reaching this decision it was gratifying to find that I was following in the steps of Dr. Hellmayr.<sup>1</sup>

The Duidan specimens agree with others from eastern Ecuador and hence should be referred to *brevirostris*. Guiana specimens I have not seen.

#### **Tanagra finschi** (Sclater and Salvin)

*Euphonia finschi* SCLATER AND SALVIN, P. Z. S., 1877, p. 19 (British Guiana).

*Tanagra finschi*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 495 (Takutu Mts., Rupununi River).

Roraima: Arabupu, 1 ♂, 1 ♀.

Agree with a pair from French Guiana. A Tropical Zone species of northern Brazil and the Guianas.

#### **Tangara paradisea cælicolor** (Sclater)

*Calliste cælicolor* SCLATER, 'Jard. Cont. Orn.,' 1851, p. 51 (Anolaima, Colombia).

*Tangara paradisea*, CHUBB, 'Bds. of British Guiana,' II, 1921, p. 504 (Roraima; ? Merumé Mts., Iring River).

Roraima: Paulo, 4 ♂, 1 ♀; Arabupu, 6 ♂, 2 ♀.

Roraiman specimens of this tanager are intermediate between the Cayenne and Colombian races. In color, they are nearer the former, the red of the rump averaging less extensive and less deep, the yellow paler than in *cælicolor*. In size, however, they agree with the Colombian bird to which I therefore refer them. The species was not found above the Tropical Zone on Duida, but a series from and near the base of the mountain agrees in color as well as in size with a series taken on the Rio Uaupes from near the Colombian boundary. The latter are like a single

<sup>1</sup>Archiv. für Naturg., LXXXV, 10, 1919 (1920), p. 17.

“Bogotá” skin, our only topotypical specimen of *cælicolor*, and, I assume, are typical of that race.

The exact relationships of *cælicolor* to the scarlet-rumped *chilensis* remain to be determined. Of this form we have two Colombian specimens: one from Andalucia, at the summit of the trail leading from the upper Magdalena over the eastern Andes to Caquetá; the second from Florencia on the Caquetá. These localities mark the northern known limit of the range of this form. Thence it extends southward to Bolivia and eastward to Engenho do Gama, and the upper Rio Roosevelt, Matto Grosso.

Of *cælicolor* I have seen from Colombia only the one Bogotá specimen above mentioned. It is probably not found west of the East Bogotá region. Whether between this region and Florencia it intergrades with *chilensis* remains to be determined, but in this connection it should be noted that the Andalucia and Florencia birds have the rump less intense red than the average example from Ecuador or Peru, a fact, however, which may be due to their state of plumage.

Specimens from the Uaupes have more scarlet on the rump than those from Roraima, suggesting the possibility of intergradation with *chilensis* between that point and the region at the eastern base of the Andes. On the other hand, the two forms may intergrade by hybridization, the occurrence of a yellow-rumped form on the upper Huallaga River, Peru, so like *cælicolor* that until recently it was considered that race, suggests that the characters separating *chilensis* and *cælicolor* may be mutational.

#### **Tangara punctata punctata (Linnæus)**

*Tangara punctata* LINNÆUS, 'Syst. Nat.,' I, 1766, p. 316 (Surinam).

*Tangara punctata*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 505 (Mt. Roraima, Merumé Mts., and Tropical Zone, British Guiana).

Roraima: Paulo, 1♂, 2♀. Mt. Duida: Valle de los Monos; Caño Seco; Agüita; 2♂, 4♀.

RANGE.—The species Tropical Zone, Guianas to the Amazon Valley, eastern Ecuador and southward to Bolivia. Unknown from Colombia or from Venezuela north of Duida. Its occurrence with *T. guttata guttata* indicates that it is not a representative of that species.

Roraiman and Duidan specimens are slightly larger than others from the lowlands of Guiana (Demerara River, 2♂; wing, 60–61; tail, 38–39.5. Roraima and Duida, 3♂; wing, 65–66; tail, 43–45 mm.) and have somewhat less blue on the forehead.

<sup>1</sup>*Tangara chilensis chlorophrys* Zimmer, Proc. Biol. Soc. Wash., XLII, 1929, p. 91.

***Tangara guttata guttata* (Cabanis)**

*Callospiza guttata* CABANIS, 'Mus. Hein.,' I, 1851, p. 26 (Roraima); new name for *C. punctata* Cabanis.

*Tangara guttata*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 507 (Mt. Roraima).

Mt. Roraima: Paulo; Arabupu, 17 ♂, 21 ♀; Philipp Camp, 1 ♂. Mt. Duida: Laterite Valley, 1 ♂.

RANGE.—The race, Mts. Roraima and Duida; remaining races, Subtropical Zone of northern Venezuela, Trinidad, northern Colombia, (except the Santa Marta Mts.), western Panama and Costa Rica.



Fig. 41. *Tangara guttata guttata* and races.

Specimens from northern Venezuela (Caracas to Guácharo) currently referred to the Roraiman form, average slightly smaller and more yellow-green, the yellow about the head is more pronounced, the breast averages more heavily spotted, and the throat, usually, has small black specks rarely present in true *guttata*. These characters, though slight, seem to entitle this form to recognition and it should be known as *Tangara guttata chrysophrys* (Sclater).<sup>1</sup> The recognition of a north

<sup>1</sup>Cont. Orn., 1851, p. 24, Pl. LXIX, fig. 2, Venezuela = Caracas, cf. Hellmayr and Seilern, Archiv. für Naturg., 1912, 78, p. 55.

Venezuelan form calls for a fresh consideration of the status of the Trinidad race *T. g. trinitatis* Todd.

## Measurements

		WING	TAIL
<i>T. g. guttata</i> , Arabupu, Roraima.....	♂	72	54
" " " " " .....	♂	70	50
" " " " " .....	♂	71	50
" " " Philipp Camp, Roraima.....	♂	71	51
" " " Paulo, " .....	♂	71	52
" " " Arabupu, " .....	♀	70	51
" " " " " .....	♀	69	49
" " " " " .....	♀	69	49
" " " " " .....	♀	67	48
" " " " " .....	♀	68	49
" " <i>chrysophrys</i> , Guacharo, Bermudez, Venezuela....	♂	68	48
" " " Zalipan, Avila, " .....	♂	66	47
" " " Loma Redonda, " .....	♂	68	48
" " " Las Palmas, Bermudez " .....	♀	67	47
" " " Cotiza, near Caracas, " .....	♀	66	47
" " " Zalipan, Avila, " .....	♀	68	50
" " " " " " " .....	♀	66	47

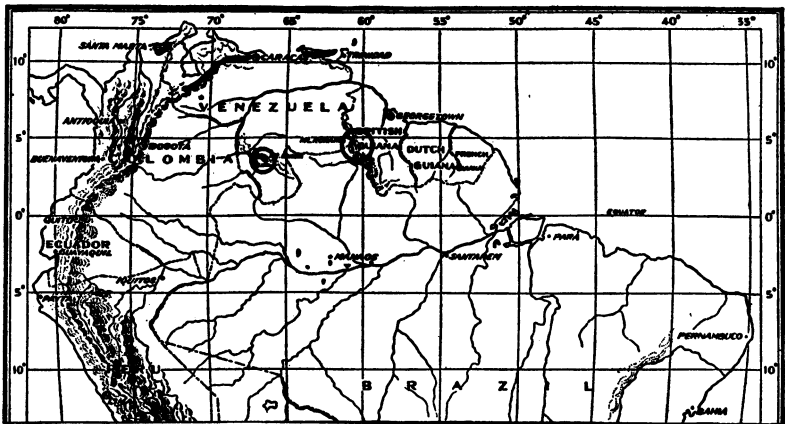


Fig. 42. *Tangara whitelyi* and ally.

***Tangara whitelyi* (Salvin and Godman)**

*Calliste whitelyi* SALVIN AND GODMAN, Ibis, 1884, p. 445, Pl. XIII (Roraima).

*Tangara whitelyi*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 573.

Mt. Roraima: Philipp Camp; Rondon Camp; 4♂, 3♀. Mt. Duida: Agüita; Valley Head; Savanna Hills; Central Camp; Desfiladero; 15♂, 11♀.

RANGE.—Mts. Roraima, Twek-qey and Duida.

Apparently a representative of *Tangara cyanoptera* of the Sub-tropical Zone in northern Venezuela, from Bermudez to Mérida, and in the Santa Marta group of Colombia.

**Tangara cayana** Linnæus

*Tangara cayana* LINNÆUS, 'Syst. Nat.,' I, 1766, p. 385 (Cayenne); CHUBB, 'Bds. British Guiana,' II, 1921, p. 508 (Cayenne).

Roraima: Rio Weiling, 3000 ft., 1 ♀; Paulo, 2 ♂, 3 ♀; Arabupu, 3 ♂, 3 ♀; Philipp Camp, 1 ♂.

A Tropical Zone species found throughout the greater part of northern South America.

**Tangara gyrola gyrola** (Linnæus)

*Fringilla gyrola* LINNÆUS, 'Syst. Nat.,' I, 1758, p. 181 (America = Surinam).

*Tangara gyrola*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 510 (Roraima; tropical localities).

Roraima: Paulo, 1 ♀; Arabupu, 1 ♂.

Resembling birds from the lowlands of Guiana but slightly larger (♂, wing, 76 mm.). A member of a Tropical Zone group ranging from Bolivia to Costa Rica.

**Thraupis episcopus episcopus** (Linnæus)

*Tanagra episcopus* LINNÆUS, 'Syst. Nat.,' I, 1766, p. 316 (Brazil).

*Thraupis episcopus*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 514 (Roraima; tropical localities).

Roraima: Arabupu, 1 ♀.

A widely distributed species of the Tropical Zone; the present race is found in the Guianas and northeastern Brazil.

**Ramphocelus carbo carbo** (Pallas)

*Lanius carbo* PALLAS, 'Cat. Rais. Adum.,' 1764, p. 2 (Surinam).

*Ramphocelus carbo*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 519 (Roraima; tropical localities).

Roraima: Paulo, 1 ♂, 2 ♀; Arabupu, 1 ♂, 2 ♀.

The species is distributed throughout the greater part of tropical South America; the race occurs from the Guianas to northeastern Peru.

**Piranga flava hæmalea** Salvin and Godman

*Piranga hæmalea* SALVIN AND GODMAN, Ibis, 1883, p. 205 (Roraima); CHUBB, 'Bds. British Guiana,' II, 1921, p. 523 (Mt. Roraima).

Mt. Duida: Agüita, 2 ♀, 1 ♂ im.

RANGE.—The race, Roraima, 3500 ft.; Tropical Zone at Quonga, British Guiana and Pacaraima Mts. near passage of Rio Cotinga; (?) Mt. Duida. The

species (according to J. T. Zimmer, Field Mus. Pub. 269, 1929, pp. 169-219), Buenos Aires, Argentina, to southern Arizona and New Mexico.

Two females and a male in plumage resembling that of the female are provisionally referred to this species of which I have seen no authentic specimens. Its relations to other members of the group and particularly to *macconnelli*, which has also been taken at Quonga, are discussed by Mr. Zimmer in the paper above referred to.

***Piranga leucoptera ardens* (Tschudi)**

*Phænisoma ardens* TSCHUDI, Archiv. für Naturg., 1844, I, p. 287 (Peru).

*Piranga ardens*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 525 (Roraima).

Roraima: Arabupu, 1 ♂ im.

The species is found from southeastern Peru to northeastern Venezuela, Roraima, and Mexico, and while often occurring at low levels appears to be restricted to the mountains. The race occupies the South American part of the area.

***Tachyphonus phæniceus* Swainson**

*Tachyphonus phæniceus* SWAINSON, 'Anim. in Menag.,' III, 1837, p. 311 (*loc. ignot.* Berlepsch proposes Cayenne); CHUBB, 'Bds. British Guiana,' II, 1921, p. 533 (Mt. Roraima, 3500-5000 ft., Merumé Mts., Abary River, British Guiana).

Mt. Duida: Savanna Grande; Valle de los Monos; Savanna Hills; 1st Peak, 4700 ft.; 6 ♂, 8 ♀.

RANGE.—Tropical Zone from Cayenne southward and westward to Matto Grosso and northeastern Peru; ascending to the Subtropical Zone in British Guiana and on Mt. Duida.

Evidently a non-plastic species which shows no variation throughout its wide range, either with latitude or altitude.

***Mitrospingus oleagineus* (Salvin)**

*Eucometis oleaginea* SALVIN, Ibis, 1886, p. 500 (Twek-quey Mt.).

*Mitrospingus oleagineus*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 539 (Twek-quey Mt.).

RANGE.—Roraima: Arabupu, 1. Roraima and Twek-quey, British Guiana.

The genus *Mitrospingus* contains two species, the present and *M. cassini* of the humid Tropical Zone of western Ecuador, western Colombia, and northward to Costa Rica. The Guianan bird is larger (wing 95 instead of 85 mm.) and has the back, inner wing-quills and coverts yellowish or citrine-green instead of grayish olive, sometimes tinged or washed with green. There are other but minor differences, nevertheless the resemblances between the two species, connected with the fact that they are the sole members of their genus, are sufficiently strong to warrant



the belief that they are mutually representative. If this be true they present an unusual case in distribution. The far distant representatives of Roraiman and Duidan birds are usually inhabitants of the Subtropical or Temperate Zone, but in this instance the assumed representative of the Guianan species is found in the Tropical Zone.

**Schistochlamys atra atra** (Gmelin)

*Tanagra atra* GMELIN, 'Syst. Nat.,' I, 1789, p. 898 (Guiana).

*Schistochlamys atra*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 547 (Roraima; tropical localities).

Roraima: Paulo, 1 ♂.

A species of the Tropical Zone ranging from southern Brazil to the Caribbean. The northern part of this area is occupied by the present form.

FAMILY ICTERIDÆ. ORIOLES, CASSIQUES, ETC.

***Sturnella magna monticola*** Chubb

*Sturnella magna monticola* CHUBB, Ann. and Mag. Nat. Hist., 1921, p. 444 (Roraima); 'Bds. British Guiana,' II, 1921, p. 573 (Roraima).

The status of the meadowlarks of northern South America has never been satisfactorily determined. Their racial variations are elusive and, so far as general coloration is concerned, so obscured by seasonal variations that to distinguish the characters and ranges of the existing races calls for large, comparable series. Such series are not in my possession, but since the identification of the Roraiman birds called for the examination of all our remaining South American specimens I present the results for what they may be worth. I distinguish four races, as follows:

1. *Sturnella magna meridionalis* Selater.—(Type-locality, Bogotá Savanna.) Inhabits the Temperate Zone of the East Andes of Colombia from the Bogotá Savanna north to the Mérida region of western Venezuela. This is a large, dark bird with a longer bill and tail than in any other form. The general coloration of the upperparts is due to the comparatively large size of the black markings on the tertials and back; the black bars on the central rectrices are usually fused along the shaft and the margin of the inner web of the third rectrix, from without, almost to the tip, is usually dark gray sharply barred with black.

2. *Sturnella magna paralius* Bangs.—(Type-locality, San Sebastian, 6600 ft., Santa Marta Mts., Colombia.) It is my belief that this race is restricted to the upper life-zones of the Santa Marta group, though it is possible that a male recorded from the Subtropical Zone in the Cumbre de Valencia by Hellmayr and Seilern<sup>1</sup> may belong here. It is obviously too large to belong to the lowland race, *praticola*. The three specimens I have seen (from 6700 to 9000 ft.) which typically represent the race are

<sup>1</sup>Archiv. für Naturg., 1912, p. 70.

smaller than *meridionalis*, with a noticeably shorter bill and have the dark markings narrower and the inner web of the third rectrix from without wholly or almost wholly white. If this last-named character is constant it definitely distinguishes *paralios* from the Tropical Zone forms. Moreover, not one of our Tropical Zone specimens equals typical *paralios* in size.

3. *Sturnella magna praticola* Chubb.—(Type-locality, Abary River, British Guiana.) In default of specimens from the lowlands of northern British Guiana I have been forced to use a series from Maripa on the lower Orinoco. The region, however, is Guianan in its faunal affinities, and it is more than probable that meadow-larks from this region are not separable from the north Guianan form. A series from as far up the Orinoco as Maipures and Ayacucho agree with the Maripa birds and this race doubtless occupies the savannas of Orinocan drainage generally. We did not find *Sturnella* about Duida. In size this race is appreciably smaller than *meridionalis* or *paralios*. In color it is nearer the latter but the inner margin of the inner web of the third rectrix from without is usually gray, barred with black on at least its basal half. This character is, therefore, not so well developed as in *meridionalis*. If it does extend over more than half the length of the feather the gray is paler and the bars fainter than in *meridionalis*.

A specimen from Cocallar, 2600 ft., northeastern Venezuela, measures: wing, 103; culmen 33 mm., and the gray on the inner vane of the third rectrix is more pronounced than in lowland specimens. It should be compared with the Cumbre de Valencia specimen above mentioned.

4. *Sturnella magna monticola* CHUBB.—(Type-locality, Mt. Roraima.) This is the race of the savannas at the southern base of Roraima and thence southward to the Rio Surumu in Brazil where we are at or near the southern limits of the genus. Its range is evidently separated from that of *praticola* by the forested area north of Roraima.

It is apparently a little larger than *praticola*, and in color it is appreciably blacker, being indeed so near *meridionalis* in coloration that specimens of the two races can be distinguished only by size. Roraiman birds possibly average browner and the nape is less gray, but these differences may be seasonal. Both agree in the markings of the third rectrix.

The appended measurements are for the greater part of specimens in unworn breeding plumage.

#### SPECIMENS EXAMINED<sup>1</sup>

*Sturnella magna meridionalis*.—COLOMBIA: On and near Bogotá Savanna, 25; Quetame, 4800 ft., 1. VENEZUELA: Mérida region, 7.

*Sturnella magna paralios*.—COLOMBIA: San Sebastian, 1; El Mamon, 2. (Kindly loaned by the Museum of Comparative Zoölogy.)

*Sturnella magna praticola*.—VENEZUELA: Maripa, 10; Caicara, 4; Maipures, 7; Ayacucho, 5. ? San Antonia Bermudez, 3; ? Cocallar, 1.

*Sturnella magna monticola*.—RORAIMA: Paulo, 1; Arabupu, 4; Philipp Camp, 3; Glycon Swamp, 6500 ft., 2. BRAZIL: Limao, Rio Cotinga, 4; Frechal, Rio Surumu, 7.

<sup>1</sup>Total, 87.

## Measurements of Males

No.	WING	TAIL	TARSUS	CULMEN
5 <sup>1</sup>	111-116(114)	75-77(75.4)	41-43(42)	35-38(36.3)
2 <sup>2</sup>	106, 110	75	42	38
1 <sup>3</sup>	113	70	42	34
1 <sup>4</sup>	109	69	40	34
1 <sup>5</sup>	109	70	40.5	32.5
5 <sup>6</sup>	97-102(100.4)	63-66(64.6)	38-39(38.5)	32-33(32.5)
4 <sup>7</sup>	99-101(100)	62-65(64)	37-40(38)	31-32(31.5)
5 <sup>8</sup>	103-106(104)	63-65(64)	38.41(39.4)	32-35(34)
4 <sup>9</sup>	102-104(103)	65-68(67)	39-40.5(40)	34-35(34.5)

***Macroagelaius imthurni* (Sclater)**

*Agelæus imthurni* SCLATER, P. Z. S., 1881, p. 213 (Kaieteur Falls, British Guiana).

*Pseudoagelæus imthurni*, CHUBB, 'Bds. British Guiana,' II, 1921, p. 567, Pl. x (Kaieteur Falls, Mt. Roraima, Merumé Mts.).

Mt. Roraima: Arabupu; Philipp Camp; 6. Mt. Duida: Provisional Camp; Laterite Valley; Savanna Hills; Valley Head; 34.

RANGE.—Kaieteur Falls, Mt. Roraima and Merumé Mts., British Guiana; Mt. Duida.

The occurrence of this species at as low an altitude as 1400 ft. at the Kaieteur Falls, where its discoverer, im Thurn, saw a flock of forty birds and whence we have a specimen collected by Dr. F. E. Lutz, brings it into the Tropical Zone and suggests that it occurs at least at intervals in the mountains between Roraima and Duida.

My colleague, Mr. John T. Zimmer, calls my attention to the close relationship existing between this species and *Macroagelaius subalaris* (Boissoneau), of the eastern Andes of Colombia. The two birds agree structurally, and the possession by each of strikingly colored axillaries further emphasizes their resemblance. In *subalaris* these axillars are chestnut-bay, in *imthurni* Sanford's brown or tawny, terminally light cadmium. In other respects both birds agree in color, being black throughout, but *subalaris* has somewhat longer wings and tail and a shorter bill. It seems obvious, therefore, that these two forms are not only generically inseparable but are so nearly alike that they may with reason be considered as mutually representative.

<sup>1</sup>Bogotá, Savanna, Colombia.

<sup>2</sup>Mérida, Venezuela.

<sup>3</sup>San Sebastian, 6600 ft., Sta. Marta.

<sup>4</sup>El Mamon, 8000 ft., Sta. Marta.

<sup>5</sup>El Mamon, 9000 ft., Sta. Marta.

<sup>6</sup>Maripa, lower Orinoco, Venezuela.

<sup>7</sup>Ayscucho, upper Orinoco, Venezuela.

<sup>8</sup>Roraima, Venezuela.

<sup>9</sup>Frechal, Rio Surumu, Brazil.





