

THE RELATIONSHIPS AND DISTRIBUTION OF THE
WARBLERS OF THE GENUS *COMPSOTHLYPIS*: A
CONTRIBUTION TO THE STUDY OF THE
ORIGIN OF ANDEAN BIRD LIFE.¹

BY FRANK M. CHAPMAN

So many of the steps by which birds have acquired their existing distribution are lost in the recordless geologic past, that when the zoogeographer thinks he has discovered the region of origin and subsequent dispersal of a single species he should make his evidence and his interpretation of it available.

In the present instance I have little new evidence to offer but rather an explanation of the significance of existing data.

It was while engaged upon a monograph of the 'Birds of Ecuador' that an attempt to determine the geographic origin of the form of *Momotus momota* inhabiting the Tropical Zone of western Ecuador led to broader studies² of the genus *Momotus*. So in the present instance it was found that a proper understanding of the presence and distribution of *Compsothlypis* in Ecuador could not be gained without a study of the entire group. As indicated above the conclusions reached seem, in this case also, sufficiently important to warrant separate presentation.

Like most members of this family the Warblers of the genus *Compsothlypis* are wood-inhabiting, but unlike many they are not restricted in their choice of forest-growth. Our own *C. americana* is equally at home in the cypresses and 'hammocks' of Florida or, according to Thayer, the firs, spruces and red maples of Monadnock, and requires only *Tillandsia*, usnea, or a suitable substitute of which to build its nest.

Of the west Mexican *C. p. insularis* Nelson writes:³ "They frequent the thin forest of the lower slopes of the Tres Marias . . . many also come familiarly into the small trees and shrubbery about the houses at the settlement. . . . They were rather common in

¹ Read before the Pittsburgh Meeting of the A. O. U.

² Bull. Amer. Mus. Nat. Hist., XLVIII, 1923, pp. 27-59.

³ N. A. Fauna, 14, 1899, p. 55.

the scrubby growth of stunted trees on Isabel, and were very abundant in the tree tops of the heavy forest on the mainland between San Blas and Santiago."

Of *C. pitaiayumi speciosa* in Costa Rica Carriker says:¹ "It is found in the heavy forest as well as in scattering trees. . . ."

In western Ecuador *C. p. pacifica* inhabits the scattered growth of the arid coastal region; in eastern Ecuador *C. p. alarum* frequents the scarce broken forests of the mountain slopes.

Compare this wide variation in the character of haunts with that of a bird whose breeding home is confined to but a single type of growth and you have one of the reasons why *Compsothlypis* is distributed through a large part of two continents while *Dendroica kirtlandi* is restricted to but three counties. It seems evident then that to adaptability in habit *Compsothlypis* owes no small part of its success in acquiring territory. We must also recall this ready adaptability when we discover that it is either rare or absent in vast areas which, so far as haunts are concerned, are apparently suitable for its occupation.

The birds themselves belong in two groups as follows:

First, the *Compsothlypis americana* group which breeds from southeastern Texas northward, chiefly east of the Mississippi, to southern Canada.

Second, the *Compsothlypis pitaiayumi* group which breeds from the lower Rio Grande in Texas southward chiefly through the Sub-tropical Zone to La Plata in Argentina.

In their comparatively small size, bluish upperparts with a greenish yellow dorsal triangle, yellow underparts intensified on the breast, a striking similarity exists between all the members of both groups. Their differences are less pronounced. They consist chiefly of a blackish pectoral band and partially white eye-ring in *americana*, both lacking in *pitaiayumi*; and a largely or wholly yellow abdominal region in *pitaiayumi* which is white in *americana*. The pectoral band in *americana* is both geographically and individually variable. It is less pronounced in the southeastern United States but may be present or absent in specimens from the same locality, a fact to which I have already called attention in suggesting that it is a mutational character.¹

¹ Ann. Carn. Mus. VI, 1910, p. 815.

² Bull. Amer. Mus. Nat. Hist., XLVIII, 1923, p. 275.

The small white segment on the lower part of the eye-ring is an apparently insignificant but nevertheless remarkably constant character. I have never found it present in *pitiayumi*. The remaining differences between the two species are differences of degree, but I have yet to see a specimen of *americana* with as much yellow on the abdomen as the abdominally least yellow example in a very large series of *pitiayumi*.

Doubtless these two birds represent each other and those systematists who are influenced by apparent rather than actual relationships would consider them forms of but one species.

The fact is, however, that although no evident barrier exists to prevent their geographic contact, *Compsothlypis pitiayumi nigrilora* of the Rio Grande Valley, the intergradation of which with South American forms can be demonstrated, is not known to intergrade with its geographically nearest neighbor *Compsothlypis americana usneæ* which breeds from at least the mouth of the Brazos, Texas, northward.

I can find no satisfactory explanation of the origin of this condition under existing circumstances and, beyond calling attention to the mutational character of the pectoral band, I must therefore leave the matter where I find it. Before, however, we turn our back upon *Compsothlypis americana* to face the field in which our main inquiry lies, it will be well to emphasize several facts in regard to

THE COMPSOTHTYPIS AMERICANA GROUP.

First, as we have seen, while closely related, *C. americana* is specifically distinct from *C. pitiayumi*.

Second, it has a wide range, breeding from Texas and Florida to the Gulf of St. Lawrence and the western border of the Mississippi Valley.

Third, it has occupied this area long enough to become differentiated into at least two forms.

Fourth, it is migratory, wintering as far south as in the West Indies and Nicaragua on the mainland.

Fifth, its absence from the West Indies while breeding, together with its distribution in the United States, indicates it is not of West Indian origin.

Sixth, in general habits, so far as known, it agrees with *C. pitiayumi*.

THE COMPSOTHYLPIS PITIAYUMI GROUP.

It will be convenient to place the eleven members of this group under geographical headings as follows:

1. The Middle American Forms.
 1. *C. p. nigrilora*. Northeastern Mexico.
 2. *C. p. pulchra*. Northwestern Mexico.
 3. *C. p. insularis*. Tres Marias Islands and adjoining mainland.
 4. *C. graysoni*. Socorro Island.
 5. *C. p. inornata*. Guatemala and Chiapas.
 6. *C. p. speciosa*. Nicaragua to Western Panama.
2. The South American Forms.
 7. *C. p. elegans*. Colombia, Venezuela, etc.
 8. *C. p. pacifica*. Western Ecuador; Northwestern Peru.
 9. *C. p. alarum*. Eastern Ecuador; Northeastern Peru.
 10. *C. p. melanogenys*. Eastern Peru to Eastern Bolivia.
 11. *C. p. pitiayumi*. Eastern Bolivia to Argentina, etc.

Avoiding unnecessary detail I present now the facts in regard to the distribution and relationships of these birds on which my conclusions are based. They may be considered in the order of the preceding list.

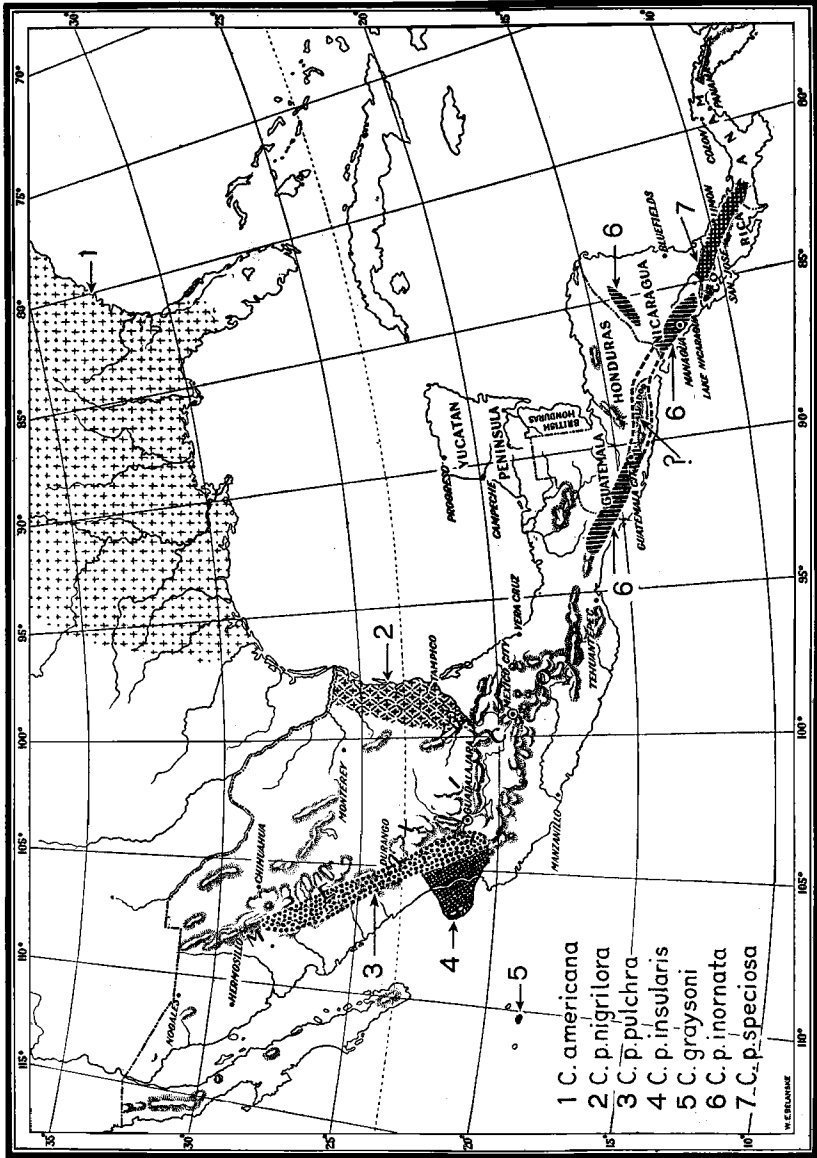
THE MIDDLE AMERICAN FORMS.

1. *Compsothlypis pitiayumi nigrilora* (Coues).

Characters.—Two wing-bars; underparts of medium richness in tone; very near *pitiayumi pitiayumi* of Paraguay in general color but yellow of underparts less extended posteriorly, the lower abdomen, therefore, whiter; although geographically nearer to *americana* than to any race of *pitiayumi*, it differs more from that species than does *C. p. pulchra* of western Mexico.

Distribution.—Northeastern Mexico from sea-level at Tampico on Tamaulipas and the slopes of San Luis Potosi at least as high as Valle, north to the bottom-lands of the Rio Grande.

It will be observed that this race occupies an essentially subtropical range. The apparent absence of the species from the subtropical slopes of Vera Cruz is surprising. The present form is thus completely isolated, its range being separated, so far as our



information goes, from that of its closest ally as well as nearest neighbor, *C. p. inornata*, by nearly six hundred miles. Nevertheless, Ridgway¹ records intergrades between the two from the western end of the range of *C. p. inornata* on the Atlantic side of the Isthmus of Tehuantepec.

2. *Compsothlypis pitiayumi pulchra* Brewster.

Characters.—Size of *C. americana* from Texas; larger than *nigrilora* with more white on the wing-coverts and more evident traces of chestnut on the side. On the whole nearer to *americana* than is any other race of *pitiayumi*.

Distribution.—Pacific slopes of Mexico from southern Chihuahua to Jalisco. (The type was shot "just below the oak belt in a subtropical region."—Brewster.)

Although more closely resembling *C. p. nigrilora* of northeastern Mexico, *pulchra* finds its nearest geographical ally in *C. p. insularis*, a zonal representative inhabiting the coastal region below the more southern part of the range of *pulchra*, and the Tres Marias and Isabel Islands.

3. *Compsothlypis pitiayumi insularis* (Lawrence).

Characters.—Lores and orbital region grayish, more as in *americana* than as in the remaining races of *pitiayumi*; larger than *pulchra* the flanks grayer and more tinged with chestnut, the tail with less white; wing-bars as in *nigrilora*.

Distribution.—Western Mexico; mainland of the coastal region near San Blas; Isabel and Tres Marias Islands.

Nelson² and his co-authors have shown that the Tres Marias are of continental origin and this fact, in connection with the occurrence of *insularis* on the mainland, leads us to consider it a zonal rather than insular representative of *pulchra*. The latter, Nelson remarks (*loc. cit.*), was the only form found on the mainland back of "the low coast plain, on the tropical or subtropical slopes of the mountains." It should be noted therefore that in western Mexico one form occurs at sea-level, another above it on the mountain slopes, while in eastern Mexico only a sea-level form is known. In neither case, however, is there recorded any evidence of range extension south of lat. 20°.

¹ Bull. U. S. Nat. Mus., 50, II, p. 480.

² N. A. Fauna, No. 14, 1899.

4. *Compsothlypis graysoni* Ridgway.

Characters.—Duller than any other form in the group; lores and orbital region grayish more or less marked with white or yellow; tail-spots much reduced and not sharply defined, sometimes absent; two white wing-bars.

Distribution.—Socorro Island, Revillagigedo group; 240 miles southwest of Cape St. Lucas, Lower California, and 350 miles west of the Mexican coast.

Socorro is volcanic and apparently oceanic. It is inhabited by nine species of landbirds, including two Doves, one Hawk, one Owl, a Paroquet, Towhee, Mocker, House Wren and Warbler. Since the island has presumably had no connection with other areas the ancestors of these birds have doubtless reached Socorro fortuitously and in a strict sense are insular forms.

As *Compsothlypis* is unknown in Lower California we can only assume that *graysoni* was derived from the Mexican mainland. Its characters, considered by Ridgway of specific value, have developed under isolation. According to A. W. Anthony¹ it is "abundant all over the island, but especially so in the trees on the north side." "The greater part of the island," this author writes, (*loc. cit.*), "is covered by a very dense growth of underbrush. . . ."

5. *Compsothlypis pitlayumi inornata* (Baird).

Characters.—No white on middle wing-coverts; that on greater coverts much reduced, sometimes absent; general color below as in *nigrilora* but yellow more extended, reaching backward to crissum and covering the lower abdomen.

Range.—Mountains (chiefly Subtropical Zone) from Chiapas, Mexico, to Nicaragua; unrecorded from Honduras and Salvador.

In its full development this race lacks wing-bars and is the only one so distinguished. Nevertheless, Ridgway² records specimens from the Atlantic side of the Isthmus of Tehuantepec, at the extreme western end of its known range, which have wing-bars so well developed that he considers them as intergrades between *inornata* and *nigrilora*.

Aside from variation in the amount of white on the greater wing-coverts six specimens from Nicaragua agree with one another. I lack a Guatemalan series for comparison but the Nicaraguan

¹ The Auk, 1898, p. 317.

² Bull. U. S. Nat. Mus., 50, II, p. 480; footnote.

series is paler both above and below than topotypes of *speciosa*. Doubtless the two intergrade on or near the Nicaraguan-Costa Rican border. The extension of the range of *inornata* from Guatemala to Nicaragua makes its occurrence in the intervening area probable when we should have the single wing-bar *speciosa-ornata* group ranging from western Panama to Tehuantepec. As a rule it is confined to the Subtropical Zone and only rarely is found below an elevation of a thousand feet. In Costa Rica, Carriker writes,¹ it is found only on the Caribbean water-shed where its zone of greatest abundance is between 1500 and 2000 feet.

6. *Compsothlypis pitiayumi speciosa* Ridgway.

Characters.—This form agrees with *C. p. inornata* in having no white tips on the median wing-coverts; greater coverts always with small white tips; color, both above and below, richer than that of *inornata*.

Distribution.—Chiefly Subtropical Zone, in western Panama and Costa Rica.

This is a richly colored form of *inornata* with always some white on the greater wing-coverts. The two forms probably intergrade, as said above, on the Costa Rican-Nicaraguan border, and, where altitude offers a suitable habitat, range from western Panama to Tehuantepec.

SUMMARY OF DATA CONCERNING MIDDLE AMERICAN FORMS.

Five intergrading representative forms of *Compsothlypis pitiayumi* are found in Middle America, and one non-intergrading, but closely allied form, on Socorro Island.

The mainland forms are confined chiefly to subtropical altitudes or latitudes and are lacking at sea-level in the Tropical Zone.

The ranges of the two Central American races are doubtless as nearly continuous as the topography of the region permits and they apparently intergrade by contact. Two races are found in north-western Mexico and one in northeastern Mexico; the range of the former being divided from that of the latter by some 600 miles of the intervening higher mountain slopes and tableland. All three northern Mexican races are separated from the nearest known part of the range of the Central American races by some 500 miles.

¹ Ann. Carn. Mus., VI, 1910, p. 815.

Specimens of the latter from this region (Tehuantepec) intergrade with at least one north Mexican race by individual variation.

Existing conditions afford no obvious explanation of the absence of the species from subtropical altitudes between Tehuantepec and San Luis Potosi on the east and Jalisco on the west.

The identity of the Tres Marias bird with that of the adjoining mainland and the continental nature of the Tres Marias group readily explains the presence of *insularis* on those islands.

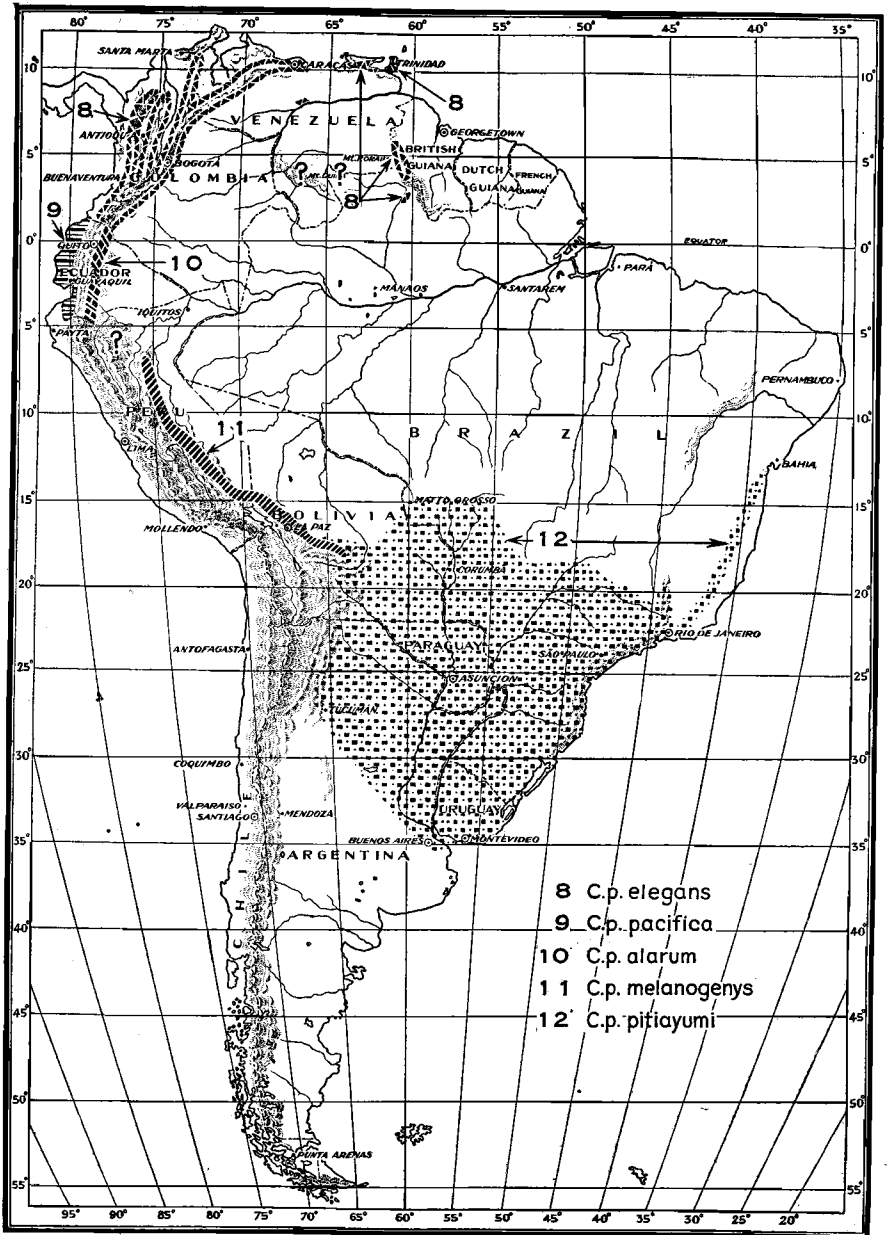
The occurrence of *Compsothlypis*, in Socorro, however, cannot be so readily explained and the evidence here points only to the conclusion that the ancestors of *Compsothlypis graysoni* reached Socorro by chance and have found there the isolation so essential to the perpetuation of specific characters. One can only speculate, perhaps idly, on the relative ages of the *americana* and *pitiayumi* groups, but the relationships between the various members of the latter group, even when one inhabits the Rio Grande Valley, the other the shores of La Plata, are so much closer than those which exist between the groups themselves, one concludes that *pitiayumi* is more likely to have originated from *americana* than the reverse. That is, we can more readily conceive of *pitiayumi nigrilora* springing from an Austroriparian *americana* with subsequent dispersal southward through the Subtropical Zone, than we can conceive of the *pitiayumi* type giving rise, from a Central American base, to a form so slightly differentiated as *nigrilora*, while from the latter would arise so distinct a species as *americana*; nor can we believe that *nigrilora* would continue so closely to resemble the *pitiayumi* stock during the time required for *americana* to acquire its present range and racial variations.

THE SOUTH AMERICAN FORMS.

7. *Compsothlypis pitiauyumi elegans* Todd.

Characters.—Closely resembles *C. p. pitiauyumi* of southern Brazil to La Plata but somewhat more richly colored; less richly colored than *C. p. pacifica* of western Ecuador; two wing-bars instead of one as in *C. p. alarum* of eastern Ecuador.

Range.—Chiefly Subtropical Zone of Colombia and western Venezuela, descending to the Tropical Zone in eastern Venezuela, Trinidad; and the Guianas; Mt. Roraima.



Like many other subtropical species common to Chiriqui and Colombia, *Compsothlypis* is unknown from the intervening area. Of sixteen Colombian specimens taken at eleven localities, one from Caldas (2560 ft.) west of Cali and one from Rio Frio (3500 ft.) in the Cauca Valley are the only ones taken below the Subtropical Zone. In the Santa Marta group Todd and Carriker state that it ranges up to 4000 feet and is rarely seen below 1000 feet.

With the decreasing elevation of the Andes in eastern Venezuela, species of the Subtropical Zone are brought to a lower elevation, and *Compsothlypis* has here become established in the Tropical Zone. From the Orinoco region von Berlepsch and Hartert¹ record only two specimens though they speak of others from the Guianas. From British Guiana, however, Chubb² mentions this bird only from Roraima and T. E. Penard writes me that it has never been taken in either Dutch or French Guiana. von Pelzeln³ refers to a specimen secured by Natterer on the Rio Branco, but the species is not included by Sneath⁴ in her comprehensive 'Birds of the Amazons.' In short, *Compsothlypis* is practically wanting in the great tropical Orinoco and Amazon basins.

8. *Compsothlypis pitiayumi pacifica* Berl.

Characters.—Similar in general color and size to *C. p. speciosa* of the Subtropical Zone of western Panama and Costa Rica, but with two wing-bars instead of one.

Range.—Tropical Zone of western Ecuador and southwestern Colombia.

Just as we may explain the close resemblance between specimens from La Plata and the Rio Grande by parallelism, so I would attribute to parallelism the agreement between Ecuador and Costa Rica birds. The appearance of the species at sea-level and its absence from the altitudes usually occupied by the Subtropical Zone is a not infrequent phenomenon in bird distribution in western Ecuador. Primarily it is due to the influence of the cold Humboldt Current which materially affects the climate of southwestern Ecuador, lowering the mean annual temperature and with it the altitudinal boundaries of faunal zones. The birds, therefore, do not desert their zone but follow it.

¹ Nov. Zool., IX, 1902, p. 10.

² Birds British Guiana, II, 1921, p. 402.

³ Orn. Bras., 1868, p. 71.

This influence is far more apparent in southwestern than in northwestern Ecuador, and although *Compsothlypis* now occurs at sea-level in northwestern Ecuador, it seems more likely to have first reached the coastal region in southwestern Ecuador and consequently to belong in the large group of birds which have come to western Ecuador from the Marañon. However, this may be, the fact remains that *Compsothlypis* is a common bird in western Ecuador from sea-level to 5000 feet, above which it is unknown. In eastern Ecuador, as we shall see, it is found only in the Subtropical Zone.

9. *Compsothlypis pitiayumi alarum* Chapman.

Characters.—Closely resembling *C. p. elegans* of the Subtropical Zone of Colombia and Venezuela, but with only one instead of two wing-bars.

Range.—Subtropical Zone of northern Peru and eastern Ecuador.

The Colombian and central Peruvian forms of *Compsothlypis* (*elegans* and *melanogenys*) resemble one another so closely that it is difficult to distinguish them. It is therefore surprising to find that their ranges are separated by that of a race quite distinct from them both, which occupies the Subtropical Zone of eastern Ecuador and of Peru north of the Marañon.

In having no white tips on the lesser wing-coverts this east Ecuador bird agrees with the Central American races *speciosa* and *inornata*. This is obviously an instance of parallelism rather than an indication of close relationship, a fact lending some support to the theory that the resemblance of the west Ecuadorean *pacifica* to the Costa Rican *speciosa* is also the result of parallel development.

10. *Compsothlypis pitiayumi melanogenys* Todd.

Characters.—Similar to *C. p. pitiayumi* but more richly colored both above and below. Very near *C. p. elegans* but averaging slightly deeper below and with more white in the tail. Differs from *C. p. alarum* in having two, instead of one wing-bar.

Range.—Subtropical Zone from central Peru (perhaps from the south side of the Marañon) south to Bolivia.

In Peru, as in Colombia and eastern Ecuador, *Compsothlypis* is known only from the Subtropical Zone, the range of the present

form extending to the end of this zone on the Amazonian slopes of the Bolivian Andes.

11. *Compsothlypis pitiayumi pitiayumi* (Vieillot).

Characters.—Paler, both above and below than any other South American race; upperparts differing more therefore from those of *melanogenys*, its nearest neighbor, in which these parts are darker than in any other South American race.

Range.—Tropical Zone from the base of the Bolivian Andes east to Matto Grosso and Rio Janeiro south over the semi-arid eastern end of the Bolivian tableland through Argentina and Paraguay to La Plata.

It seems apparent that *Compsothlypis* crosses the entire width of the Amazon valley on a subtropical bridge extending from Colombia to Bolivia. When it has reached approximately south latitude 15° it descends to the Tropical Zone.

This change in zone has been followed by sufficient change in character to produce the pale race known as *pitiayumi*, which so far as we know is alike throughout the wide area it inhabits in southern Brazil, Argentina, Paraguay and Uruguay. In Bolivia two well-marked races, *melanogenys* and *pitiayumi*, occur almost side by side. We have specimens of the former from an elevation of 3600 feet, of the latter from 1300 feet. The environmental differences between these two localities is far greater than the distances separating them would lead one to suppose and is, in effect, zonal in its influence.

SUMMARY OF DATA CONCERNING SOUTH AMERICAN FORMS.

Five closely related, more or less continuously distributed, intergrading forms of *Compsothlypis pitiayumi* are found in South America. Generally speaking, they are subtropical in distribution. They are practically absent from the Amazon and Orinoco Valley, but descend to sea-level regularly on the coast of Ecuador and in subtropical latitudes of Brazil, Argentina, Paraguay, and Uruguay. Although separated from the Central American forms by the Panama 'fault' or gap in the Subtropical Zone extending from western Panama to northwestern Colombia, the Central and South American races resemble each other closely enough to intergrade by individual variation.

The characters common to *pacifica* of western Ecuador and *speciosa* of Costa Rica and to the last-named and *alarum* of eastern Ecuador seem to have been developed by parallelism.

GENERAL SUMMARY AND CONCLUSIONS.

The genus *Compsothlypis* ranges from eastern Canada to Argentina. It contains two distinct species (1) *C. americana*, breeding from eastern Texas to Canada. (2) *C. pitiaiyumi*, breeding from the Rio Grande to La Plata.

The former contains two forms, both North American. The latter embraces eleven forms of which six, including one distinct insular species, are found in Middle America, and five in South America. The ranges of four of the Middle American forms are widely separated; those of the South American are essentially connected. Consideration of the evidence thus supplied by the extent of the area covered, character of distribution exhibited (whether continuous or broken) and degree of differentiation shown lead inevitably to the conclusion that *Compsothlypis* has occupied Middle and North America for a far longer period than it has South America. Consequently it follows that it has entered the southern continent from the north. I have ventured above to suggest that of the two, *Compsothlypis americana* is older than *C. pitiaiyumi*. This, however, is a subject which must remain in the realm of speculation. Nor are we on much firmer ground when we attempt to explain the discontinuous distribution of *Compsothlypis* in Middle America. Interesting as are these questions, an answer to them is not essential to the success of our inquiry concerning the origin of *Compsothlypis* in South America. This we have learned with some degree of certainty was from the north. We have also reason to believe that the bird's entrance into South America was made through that portion of the Subtropical Zone connecting western Panama with Colombia, which has since largely disappeared.

This belief does not rest upon the case of *Compsothlypis* alone, but upon nearly seventy similar cases which, combined, seem to prove beyond question the continuity of the higher altitudes of western Panama with those of eastern Panama and northwestern Colombia.

A detailed consideration of this subject is presented in my 'Distribution of Colombian Bird-Life'¹ and need not be repeated here.

So far as I am aware, geologists have given us no definite information in regard to the causes which occasioned what I have termed this Panama 'zoological fault' or the period in which it occurred. They are, however, agreed in considering the Andes of late Tertiary age, and we are safe therefore in saying that *Compsothlypis*, a mountain-inhabiting form, did not enter South America earlier than the latter part of the Tertiary Period. Once arrived it followed the mountains both southward and eastward.

In Colombia and western Venezuela *Compsothlypis* does not descend to sea-level. In eastern Venezuela and Trinidad, however, possibly influenced by the subsidence which separated the last-named area from the mainland and greatly lowered the altitudinal range of numbers of other subtropical species in northeastern Venezuela, *Compsothlypis* is now found in the Tropical Zone. Apparently, therefore, we have here an exception to the rule that birds originate in a zone lower than the one in which they are found.

Southward from Colombia, where it entered South America, *Compsothlypis* has extended its range into Ecuador. In eastern Ecuador, as in Colombia, it occupies the Subtropical Zone, but appears with one wing-bar instead of two. In western Ecuador, where a form occurs similar to that of Costa Rica but with two wing-bars instead of one, it again violates the law of the relation between altitude and origin and descends to sea-level. This is an exception, however, which tends to prove the rule. Zonal boundaries are lowered on the Pacific coast, not as a result of subsidence but in response to the influence of the Humboldt Current which in decreasing the temperature of the air decreases also the altitudinal boundaries of the life zones of the West Andean slopes. In Peru many Temperate Zone species are found at sea-level. In Ecuador, where the current is less pronounced, many subtropic species occur in the coastal region. *Compsothlypis* is here, therefore, only responding to the influence of temperature, everywhere the most important factor in controlling its zonal distribution.

As an arboreal species *Compsothlypis* is absent from western

¹ Bull. Amer. Mus. Nat. Hist., XXXVI, 1917, p. 151.

Peru. In eastern Peru, where it again acquires two wing-bars and closely resembles the Colombian form, it occupies, as in eastern Ecuador, the Subtropical Zone, and continues in this zone to its end on the northeastern slope of the Bolivian Andes.

Having now crossed the Tropical Zone, as it were, on a subtropical bridge and reached a latitude where it might lower the altitude of its range and still find a congenial environment, *Compsothlypis* has spread southward into subtropical Argentina and up the coast range into subtropical eastern Brazil.

If in this outline I have rightly, even if roughly, interpreted the facts presented by the distribution and relationships of *Compsothlypis*, it is obvious that no one key will unlock for us the history of Andean bird-life.

Almost limitless time and innumerable influences, known and unknown, have produced an endless variety of results. Some birds have come from the North Temperate Zone, some from the South Temperate, others from the Tropics. Some evidently arrived in the remote past, others appear to have come recently, and the explanation which accounts for the range and characters of one may be totally inapplicable to another.

I can find, for example, no other case similar to that of *Compsothlypis*. In the Subtropical Zone that of *Xanthoura* is nearest to it—as far as it goes—for *Xanthoura* also occurs at sea-level in the lower Rio Grande and extends through the Andean subtropics to Venezuela in the east and Bolivia in the south. In neither East nor South, however, does it descend to the basal zone as does *Compsothlypis*. Possibly *Pygochelidon* parallels the distribution of *Compsothlypis* in South America for it appears to have reached the South Temperate through the Andes by way of the subtropics.

In the Temperate and Paramo Zones *Fulica*, *Asio accipitrinus* and *Cistothorus* all appear to have used these upper life-zones as a bridge between the North Temperate and South Temperate Zones.

It is clear then that each species must be considered in the light of the evidence its distribution and relationships afford and, in the absence of a fossil record, we can hope for success only with those presumably more recent cases where sufficient evidence still exists to permit us to reach satisfactory conclusions. *Compsothlypis* seems to be a case of this kind.

*American Museum of Natural History,
New York City.*