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Systematic Notes on the Bird Family Cracidae. No. 3 *Ortalis guttata*, *Ortalis superciliaris*, and *Ortalis motmot*

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Ortalis guttata

Ortalis guttata is the most widely distributed species of the genus *Ortalis* and the most variable geographically. It ranges (figs. 1 and 2) from the states of Antioquia and Santander in Colombia south to central Bolivia and east in the Amazon Basin to the Guaporé and Mamoré rivers and the left bank of the Tapajoz. In Brazil, it is not found north of the Amazon except in the regions near Colombia on the upper Solimões and upper Rio Uaupes. The range mentioned appears to be more or less continuous, but two very isolated populations are found also in eastern Brazil, one ranging from the state of Pernambuco south to eastern Minas Gerais and Espírito Santo, and the other in the far south from extreme southeastern Mato Grosso to Santa Catarina and Rio Grande do Sul.

The geographical variation consists of differences in coloration and in the relative development of the whitish markings at the tip and along the outer margins of the feathers, especially those of the lower throat and breast. There are also differences in size which are given in table 1. The geographical variation is clear cut, and the isolated population from

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TABLE 1
MEASUREMENTS OF THE WING AND THE TAIL OF *Ortalis*
guttata, *Ortalis superciliaris*, AND *Ortalis motmot*

	Wing				Tail			
	<i>N</i>	Mean	Range	σ	<i>N</i>	Mean	Range	σ
<i>O. g. araucuan</i>								
Male	1	—	193	—	1	—	218	—
<i>O. g. squamata</i>								
Male	1	—	213	—	1	—	239	—
Female	1	—	215	—	1	—	205	—
<i>O. g. subaffinis</i>								
Males	12	204.2	192–218	7.50	12	211.7	196–230	9.32
Females	13	196.3	187–204	4.76	13	205.6	198–220	6.47
<i>O. g. guttata</i>								
Males	76	199.9	189–211	5.48	76	209.4	192–233	7.95
Females	61	192.1	181–208	6.37	62	206.9	189–240	12.72
<i>O. g. columbiana</i>								
Males	18	224.6	213–235	6.66	17	250.7	230–265	10.91
Females	10	219.5	213–230	5.55	11	240.2	225–258	10.83
<i>O. superciliaris</i>								
Males	14	177.6	171–184	3.53	14	190.6	184–208	5.91
Females	5	172.8	170–177	3.80	5	187.8	183–192	3.50
<i>O. m. motmot</i>								
Males	44	207.1	192–223	7.54	40	242.6	225–270	10.14
Females	32	196.5	185–209	5.47	31	232.7	215–253	8.94
<i>O. m. ruficeps</i>								
Males	20	181.1	170–190	4.69	20	195.9	183–208	7.42
Females	6	175.0	166–185	4.47	6	195.3	185–201	2.65

eastern Brazil ranging from Pernambuco to Espirito Santo is sharply differentiated.

GEOGRAPHICAL VARIATION

The population (*columbiana*) of the Magdalena and Cauca valleys and their surrounding slopes has the largest measurements and is rather dark olive-brown on the upper parts, with an ashy gray crown which becomes paler anteriorly to an individually variable extent. It is olive-brown on the breast but pale brownish gray below the breast, the individual feathers of the breast and throat being edged with white or cloudy white. These pale margins vary in width according to wear, but they are always well defined and, as they ascend far up around the sides, give the throat and breast a characteristic scalloped appearance.

In the Amazon Basin of Colombia, Ecuador, Peru, and Brazil, *columbiana* is replaced by populations (nominate *guttata*) with distinctly

TABLE 2
MEASUREMENTS OF THE TARSUS AND THE EXPOSED CULMEN OF *Ortalis guttata*, *Ortalis superciliaris*,
AND *Ortalis motmot*

	Tarsus				Exposed Culmen			
	N	Mean	Range	σ	N	Mean	Range	σ
<i>O. g. araucuan</i>								
Male	1	—	52	—	1	—	22	—
<i>O. g. squamata</i>								
Male	1	—	55	—	1	—	22.5	—
Female	1	—	51	—	1	—	22	—
<i>O. g. subaffinis</i>								
Males	12	52.1	48–60	3.04	12	21.8	20–25	1.33
Females	13	51.1	47–54	1.93	13	21.6	19–24	1.25
<i>O. g. guttata</i>								
Males	77	51.0	46–58	2.33	77	23.4	20–27	1.53
Females	62	49.0	41–55	2.61	62	22.7	20–26	1.20
<i>O. g. columbiana</i>								
Males	18	59.6	56–67	2.54	17	24.2	22–28	1.43
Females	13	57.6	54–63	2.32	13	23.5	22–27	1.38
<i>O. superciliaris</i>								
Males	14	46.1	42–52	2.41	14	20.6	18–22	1.36
Females	5	44.4	43–46	1.50	5	20.4	20–21	1.31
<i>O. m. motmot</i>								
Males	43	56.9	51–63	3.75	43	24.3	21–27	1.44
Females	32	54.1	48–60	2.53	32	23.8	20–26	1.36
<i>O. m. ruficeps</i>								
Males	20	46.7	44–50	1.50	20	21.8	19.5–24	1.06
Females	6	45.0	42–48	2.03	6	21.8	20–24	1.32

smaller measurements and weaker feet. These birds differ also from *columbiana* by being darker above, browner or more rufescent, less olive, and by having a darker crown which is more sooty gray or brownish and also more homogeneous in coloration. The color of their under parts varies individually, but, as a rule, it is paler below the breast than in *columbiana*, and the whitish markings are invariably more restricted. They are present only at the tip on the feathers of the throat and only along the distal edge on those of the breast, with the result that nominate *guttata* is more “spotted” in appearance than *columbiana*.

In the Amazon Basin of Bolivia, these spotted birds are replaced by another form (*subaffinis*) which bears some resemblance to the birds of the Magdalena and Cauca valleys, but *subaffinis* is smaller than *columbiana* and is paler on the throat and breast which have a more diffused pattern as the whitish edges of the feathers are less sharply defined. *Subaffinis* is also somewhat paler above than *columbiana*, and differs from

nominate *guttata* by being paler throughout, more olivaceous above, less brownish, and by having a more diffused, less sharply spotted pattern on the throat and breast. *Subaffinis* averages also slightly larger than nominate *guttata* and its feet are usually noticeably heavier and larger, although this difference is not well shown by the measurements in table 2.

Subaffinis and nominate *guttata* intergrade along the course of the middle Mamoré River, and probably also along the slopes and base of the Andes in the northwest, but I have not seen any specimen that is intermediate between nominate *guttata* and *columbiana*, which suggests that these last two forms probably do not come in contact and are separated by an ecological barrier consisting of the higher elevations of the Eastern Andes. The specimen of *columbiana* that seems to have been taken at the highest altitude in the Eastern Andes was collected at 5000 feet at "Andalucia" on June 6, 1912, by L. E. Miller and is in the collection of the American Museum of Natural History. The specimens in that collection labeled "Andalucia" were, however, taken on both the western and eastern slopes of the Eastern Andes, often well below Andalucia, and as de Schauensee stated (1948, p. 283), their labels often fail to mention on which slope they were taken. But as *columbiana* is not known from the eastern slope, and Chapman (1917, p. 641) remarked that most of the collection labeled Andalucia was made on the western slope, I believe the specimen was probably taken on the latter by Miller. The settlement of Andalucia is on the border of Huila and Caqueta at an elevation of 2310 meters (about 7620 feet), a short distance below and west of the pass on the road that leads east to Florencia at the base of the Andes.

The two isolated populations of eastern Brazil (*araucuan* in the north and *squamata* in the south) are clearly different from each other and from the other three forms that are compared above. *Araucuan* differs conspicuously from *columbiana*, nominate *guttata*, and *subaffinis* by being reddish brown on the crown, hind neck, malar stripe, and the feathered area on the face behind the bare patch, whereas all these regions are ashy or sooty gray or brown in the other three forms, although an occasional specimen of nominate *guttata* is also somewhat reddish brown on the feathers of the face. The under parts of *araucuan* are also much paler below the breast, the abdomen being pure white or whitish, and the "thighs" and under tail coverts much paler than in any other form. The throat and breast of *araucuan* are spotted as in nominate *guttata*, but the whitish markings are more blurred, less sharp. The feathers of the crown are narrower in *araucuan*, more attenuated and less rounded at

the tips, and also tend to be somewhat longer than in *columbiana* and *subaffinis*, but those of nominate *guttata* are about intermediate in shape and size between those of the last two forms and those of *araucuan*.

The birds of southeastern Brazil (*squamata*) are much more similar to nominate *guttata* than they are to *araucuan*. This similarity was emphasized by Hellmayr and Conover (1942, p. 163), but, in fact, *squamata* resembles *subaffinis* more closely than it does any other form. *Squamata* differs from *subaffinis* chiefly by having a rufous brown rather than gray crown, and by having better-defined whitish markings on the breast, although its general coloration is darker also, and the rump, upper and under tail coverts of *squamata* are more rufescent (being chestnut in some specimens) than in *subaffinis* or any other form. *Squamata* differs conspicuously from *araucuan* by having a brown rather than reddish crown and by being very much darker below. It is browner, less sooty, on the crown than nominate *guttata*, paler, more olive, less brown, on the back, and its whitish markings on the breast form shallow crescentic bars rather than spots. These markings and the general coloration of the under parts show much similarity to *columbiana*, but the markings are less scalloped in shape in *squamata* and are lacking or are obsolete on the upper throat which is more rufescent in *squamata* than in any other form. The feathers of the crown are broad and rounded in *squamata* and similar to those of *columbiana* and *subaffinis*.

The distribution of this species, with two of its populations isolated in eastern Brazil and from each other, is anomalous and Peters (1934) separated the two isolated populations as a distinct species (*araucuan*, with *squamata* as a subspecies), but, as implied above, the nearest relative of *squamata* is not *araucuan* but *subaffinis*, whereas *araucuan* appears to be more closely related to nominate *guttata*. Peters may have been influenced by zoogeographical considerations, but it is difficult to invoke such a consideration to justify his treatment of even *columbiana* as a separate species when it is clearly evident that *columbiana* is very closely related to nominate *guttata* and is merely its representative in the Magdalena and Cauca valleys. Peters' treatment "will not do," as Hellmayr and Conover (*loc. cit.*) expressed it, and I certainly agree with them that all the forms are conspecific. The fact that nominate *guttata* occupies a central position in the species, morphologically as well as geographically, makes it impossible, however, to arrange the subspecies in a satisfactory linear sequence. I have adopted the sequence of Hellmayr and Conover which is, perhaps, the least objectionable and which starts with *araucuan*, and is followed by *squamata*, *subaffinis*, nominate *guttata*, and *columbiana* in that order, but this has the disadvantage of implying that

araucuan is more closely related to *squamata* than it is to nominate *guttata*, whereas the reverse seems to be true.

The present distribution (figs. 1 and 2) implies that the separation of this species into three groups of isolated populations is probably ancient. The gaps between these groups are now inhabited to a greater or lesser extent by other species of *Ortalis*. In the north, where the gap between nominate *guttata* and *araucuan* is very broad, we find that it is partially occupied by a subspecies of *O. motmot* and by *O. superciliaris* which belong (see below) to the same species group as *O. guttata*. In the south, the gap between *subaffinis* and *squamata* is nearly closed by *O. canicollis* which, however, is not closely related to the species of the *guttata* group (*O. guttata*, *O. leucogastra*, *O. motmot*, and *O. superciliaris*) and appears to be the counterpart in the Chaco of *O. poliocephala* from western Mexico.

SUBSPECIES AND NOMENCLATURE

1. *Ortalis guttata araucuan* Spix, 1825, type locality, São Domingos near Minas Novas, northeastern Minas Gerais. This subspecies ranges from the state of Pernambuco south through eastern Bahia to eastern Minas Gerais and the Rio Doce in Espiritu Santo. Oliveira Pinto (1964) believes that the range probably extends somewhat farther north to the state of Paraíba which is quite possible.

When Spix (1825) described *araucuan* he was not aware that his series was mixed and represented two species. The type of *araucuan* turned out to be a form of *O. guttata*, but another specimen represented the species that is now called *superciliaris* Gray, 1867. Hellmayr (1906) discussed this question in detail, but he made an error when he named the second species *spixi* on the ground that *superciliaris* was not applicable to it. He acknowledged this error later (in Hellmayr and Conover, 1942, p. 161) after he had examined the type of *superciliaris*, and *spixi* Hellmayr thereby became a synonym of *superciliaris* Gray. Unfortunately, this change added to the confusion in the literature, in which the names *araucuan*, *superciliaris*, *spixi* (as well as *albiventris* Wagler, 1830, which was based on the same specimen on which Spix had based his *araucuan*) have been repeatedly confused and often applied to the wrong species. Very little reliance can be placed on the literature which, ironically enough, was further confused by the catalogue of Hellmayr and Conover in which (1942, p. 162) the major block of references and records that pertain to *spixi* (i.e., *superciliaris*) are listed inadvertently under *araucuan* Spix and thereby "credited" to the wrong species.

2. *Ortalis guttata squamata* Lesson, 1829, type locality, "l'Amérique méridionale," the type being from Santa Catarina. Synonym: *Ortalis*

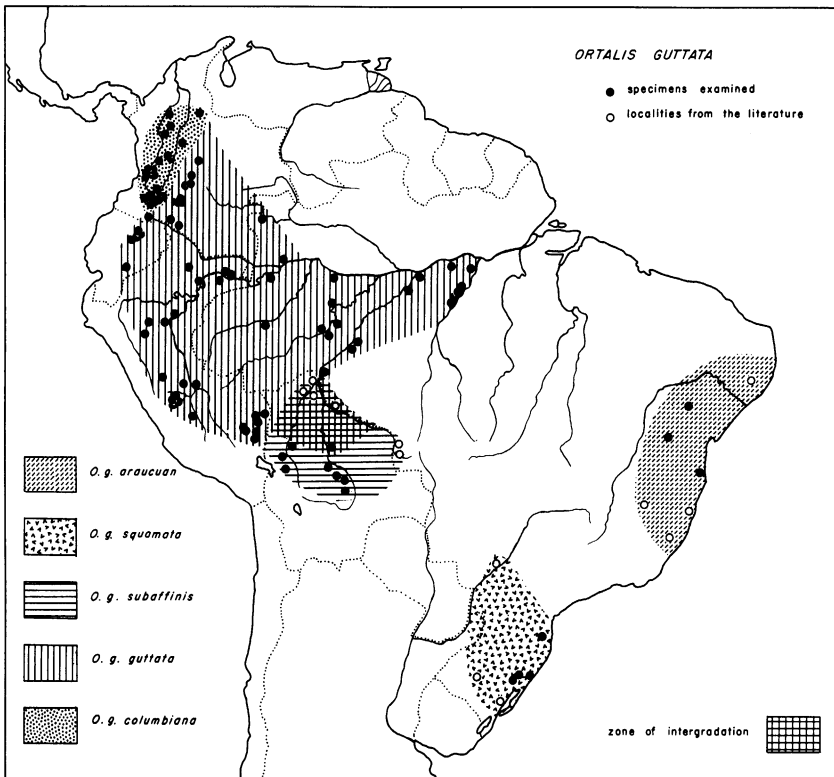


FIG. 1. Distribution of *Ortalis guttata*.

guttata remota Oliveira Pinto, 1964, type locality, "rio Pardo (porto do Sapé)," southeastern Mato Grosso. This subspecies ranges from the valley of the Parana River in extreme southeastern Mato Grosso south to the states of Santa Catarina and Rio Grande do Sul but, before the very recent description of *remota* was known, only from Santa Catarina and Rio Grande do Sul.

Oliveira Pinto (1964, p. 109) stated that *remota*, which is known only from a single unsexed specimen, is primarily ("*principalmente*") similar to nominate *guttata* but differs from it at first glance by being rufescent ("*arruivada*") on the crown, rather than dark gray, and also by being paler above, more olive, by having a much darker chestnut rump, and larger, but less sharply defined, white markings on the "neck" and breast. But the differences he enumerated are precisely those that distinguish *squamata* (which he does not mention) from nominate *guttata*. To be sure,

Oliveira Pinto did not mention the shape of the crown feathers, or the rufescent and unspotted band on the upper throat of *squamata*, but this band is not its most salient subspecific character, and the difference in the shape of the crown feathers, which was not noted by Oliveira Pinto in his descriptions of the various forms of Brazil, could easily escape attention. I believe, therefore, that *remota* must be very similar to *squamata*. But, as this record constitutes a considerable, though plausible, extension of the range of *squamata*, additional specimens should be collected along the lower Parana for their true identity to be determined. Until then it seems best to synonymize *remota* with *squamata*.

I have tried to find where Porto do Sapé is situated, because the record from this locality is the only one for the species in the eastern and southern parts of the Mato Grosso, but I have failed to do so with certainty. The specimen of *remota* was collected by J. L. Lima on some unspecified day in July, 1927, on the Rio Pardo, according to Oliveira Pinto, but in the only other two instances when Porto do Sapé was mentioned in the two volumes of Oliveira Pinto's "Catalogo das aves do Brazil" (1938, 1944), this locality was said to be on the Rio Parana, not the Rio Pardo. In both cases, the specimens mentioned were taken also by J. L. Lima during July, 1927, and I found also the records of two other birds that were taken by this collector during July, 1927, one on the Rio Parana and the other on the Rio Pardo, but without mention of a locality on the rivers. In no instances were dates mentioned during July, 1927. I believe, therefore, that Porto do Sapé is most likely on the Parana, probably at or not far from the mouth of the Rio Pardo which empties into the Parana at about latitude 21° 50' S., longitude 52° 07' W. The record from this locality is indicated on figure 1.

3. *Ortalis guttata subaffinis* Todd, 1932, type locality, Buenavista, Santa Cruz, Bolivia. The range of *subaffinis* requires further study but seems to consist of tropical eastern Bolivia south to about latitudes 18° or 19° S., but not of the more northern parts of the lowlands of Bolivia where the population is intermediate between *subaffinis* and nominate *guttata*.

Oliveira Pinto (*loc. cit.*) mentioned three localities from the Brazilian side of the Rio Guaporé (fig. 1) in the range of nominate *guttata*, but it is probable that the birds from the two more southern localities are *subaffinis*, and intermediate between the latter and nominate *guttata* at the more northern locality (Forte do Principe).

The two races intergrade at about latitude 15° S. on the Rio Mamoré, as shown by four specimens that I have seen in the collection of the Chicago Natural History Museum that were collected by Steinbach on this river in February, 1944. The labels mention only that they were

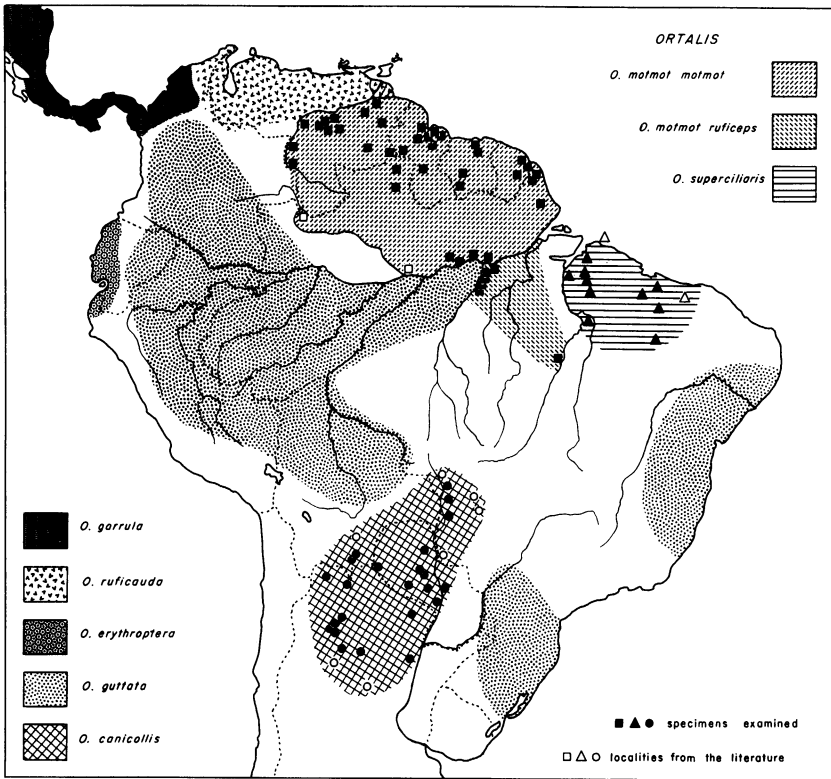


FIG. 2. Distribution of the genus *Ortalis* in South America.

taken on the Mamoré in the province of Marban. This province does not appear on some modern maps, but it is or was a small political division of the southern part of the Department of Beni. On a large-scale map published under the auspices of the Bolivian Government in 1947, the western border of the province of Marban is shown as extending to the Rio Mamoré and Rio Securé between about latitudes 15° and $15^{\circ} 50' S.$, with Loreto as its capital.

Gyldenstolpe (1945, p. 62) stated that a series of 21 specimens, which were collected by the Olallas in 1937 and 1938 from the confluence of the Rio Beni and Rio Mamoré, south to about latitude $14^{\circ} 30' S.$ on the Rio Beni, "corresponds rather well with the description of *O. g. subaffinis*" given by Todd, but these specimens are probably intermediate between *subaffinis* and nominate *guttata*. I have no knowledge of the extent of the zone of intergradation, although I have seen one specimen in the collec-

tion of the British Museum that had been collected by Natterer on September 28 [1829] at about latitude 10° S. on the Rio Madeira, or only a little farther north of the confluence of the Beni and Mamoré, but, as I was not aware at the time that the two races intergraded, I identified it as nominate *guttata*.

Twelve other specimens reported by Gyldenstolpe in the same account, but taken in Yungas de la Paz, appear also to me to be intermediate. Gyldenstolpe was not certain about their identity but referred them to *adpersa* Tschudi, based on material from Peru. Gyldenstolpe remarked, however, that he had not seen specimens from eastern Peru and was not certain that *adpersa* was valid.

4. *Ortalis guttata guttata* Spix, 1825, type locality, Rio Solimões, Brazil, restricted to Coari by Gyldenstolpe (1951, p. 48). Synonyms: *Penelope adpersa* Tschudi, 1843, type locality, Peru; and *Ortalis guttata caquetae* Chapman, 1923, type locality, La Morelia, Caqueta, Colombia. The range of this subspecies consists of Amazonian Colombia, Ecuador, Peru, and Brazil east to the left bank of the Tapajoz and south along the Rio Madeira to about the confluence of the Rio Beni and Rio Mamoré where it probably intergrades with *subaffinis*.

The very large series that I have seen from the Amazon Basin shows considerable individual variation but no evidence of geographical variation. The individual variation of the birds of the Amazon Basin is worth comment, as it has not been sufficiently appreciated by some authors. It is perhaps best exhibited in the material that I have seen by a series of three males and three females that were said to have been collected at the mouth of the Rio Urubamba, Peru, from September 11 to October 13, 1937, by the Olallas, which vary widely in coloration. They vary from rufescent to olive-brown on the back, and the anterior part of the crown is much more ashy gray and much paler in some individuals than others, the color of the posterior part of the crown varying also in the degree of saturation. On the under parts, the whitish markings are more or less extensive and sharply defined, and, below the breast, the coloration varies from relatively pale or dark brownish gray to cinnamon gray or ferruginous ochre.

This individual variation was not appreciated by Chapman when he described the birds of Colombia as *caquetae* with a restricted amount of material. But, as Blake (1955, p. 19) has shown, the characters "credited to *caquetae* [are] but a manifestation of individual variation." I had reached the same conclusion before I had read Blake after comparing Chapman's material with a larger series that had been collected subsequently in Caqueta, which included topotypes of "*caquetae*," and in

Amazonian Colombia.

Hellmayr and Conover (1942, pp. 165–166) were also quite correct in stating that *adspersa* was not valid. I have seen a much larger series than they had, and I agree with them that the birds of Ecuador and Peru “are in no way distinguishable from Amazonian specimens picked at random” from Brazil. Zimmer (1930, p. 250) could not confirm the validity of *adspersa*, but Chapman (1921, p. 44; 1926, p. 155) thought it was probably valid, an opinion that was based, however, on only two specimens from Peru, taken on the Rio Cosireni.

I have examined one of these two specimens, and I find that it matches perfectly many specimens from Brazil. I presume the other bird from the Rio Cosireni is similar to the one I saw, because Chapman did not state otherwise. On the basis of this second specimen alone, Friedmann and Deignan (1942, p. 49) concluded that *adspersa* was valid, after comparing it with one of Tschudi’s original specimens which found its way into the collection of the United States National Museum. They considered that this specimen was the type of *adspersa*, but I have found another of Tschudi’s original specimens in the collection of the British Museum, where it is also regarded as the type of *adspersa*. This second “type” came to the attention of Deignan subsequently, and in his catalogue of the types in the United States National Museum (1961, p. 55), the specimen in Washington is demoted to a “cotype,” but Deignan, making no reference to the opinion of Hellmayr and Conover and other authors, still considers that *adspersa* is valid.

The collection of the American Museum of Natural History contains an old and badly worn specimen of nominate *guttata* labeled “Ambato, Ecuador,” taken at some unspecified date by “M. A. Vascomez,” but this locality is probably incorrect. This specimen was not mentioned by Chapman in his report on the birds of Ecuador (1926), no doubt because Ambato, which lies in an arid intermontane basin at an elevation of 2577 meters, seems implausible for *Ortalis*. In the gazetteer that accompanies his report, Chapman wrote (p. 703) that the specimens from Ambato in the collection of the American Museum of Natural History are “native-made skins purchased by the American Museum from a commission merchant in New York City [which] proved to be from the eastern slopes of the Andes.” Brown (1941, p. 816), who has published a gazetteer of entomological collecting stations in Ecuador, found also that Ambato was “the base for many expeditions into the Oriente via the valley of the Rio Pastaza [and] because of this much material in early collections labelled ‘Ambato’ is of a tropical or sub-tropical nature.”

5. *Ortalis guttata columbiana* Hellmayr, 1906, type locality, Colombia;

Bogota has been suggested as a restricted type locality by Hellmayr and Conover (1942, p. 167). Synonym: *Ortalis columbiana caucae* Chapman, 1914, type locality, Guengüe, 20 miles south[east] of Cali, Cauca Valley. This subspecies inhabits the valleys of the Magdalena and Cauca rivers and their surrounding slopes north to the region south of Valdivia and the region of El Tambor which is situated about 30 kilometers northwest of Bucaramanga, or, respectively, to about latitudes $7^{\circ} 08'$ and $7^{\circ} 20'$ N.

Ortalis guttata is replaced farther north by *O. garrula* (fig. 2). The latter is found along the Rio Nechi according to de Schauensee (1952, p. 1157) but he did not mention a locality. The southernmost specimen of *garrula* seen by me was taken at Cuturu on the Rio Nechi at latitude $7^{\circ} 45'$ N. in Antioquia, and the northernmost specimens of *guttata* were from Valdivia, 4 kilometers south of Valdivia, and El Tambor. It seems, therefore, that the ranges of the two species approach each other, and they may very well come in contact, although the only records I know of in this region are those mentioned here.

Chapman (1914) divided the birds of the Cauca Valley from those of the Magdalena Valley, naming them *caucae*, because the four specimens he had from the Cauca region differed, in his opinion, from his other specimens from Colombia by being less gray on the forehead, more rufous on the lower back, rump, flanks, crissum, and under tail coverts, and by having the "feet" horn color instead of red, but in two of these four specimens the "legs" were said to be gray.

The only difference that I can confirm, however, is that the crissum and under tail coverts are more rufous in his four specimens of *caucae* than in his specimens of *columbiana*, but a very much larger series that I have examined shows that this difference is only an instance of individual variation. As my material fails to reveal any evidence of geographical variation, I synonymize *caucae* with *columbiana*.

The difference in the color of the legs and feet is probably correlated with the physiological condition of the individual, because the collectors noted on the labels of birds taken in Tolima and Huila that the legs or feet had been red, reddish, or purple in some birds but gray or brownish gray in others.

After my study of *O. guttata* had been completed, Vuilleumier (1965) published a tentative list of the species of *Ortalis* in which *columbiana* is "considered a full species, on the authority of Miller (1947, 1952), and not a subspecies of *guttata*."

Miller (1947) stated that he doubted that *columbiana* was conspecific with *guttata* because "it contrasts strikingly in shape and markings of breast feathers and in size with an example of *O. guttata* at hand from

Peru." In 1952, he mentioned "striking" differences in the "color pattern of the head and neck and the lanceolate and wedge-shaped feathers of these areas . . . [which] suggest that the two kinds [*columbiana* and nominate *guttata*] may be so different as to be incapable of interbreeding in nature." Miller's opinion was apparently based on the comparison of only one specimen of *columbiana* and nominate *guttata* in 1947, and, in 1952, on three specimens of *columbiana* (one of which was "a half-grown young") and one of *guttata* which he identified as *Ortalis guttata caquetae*.

The comparison of only a few specimens might lead to the conclusion reached by Miller, but the examination of a large series of all the related forms shows that the basic shape of the feathers is the same in all, although the shape of their markings differs. But the variations in the shapes of the markings, color pattern, or measurements are merely of subspecific importance, in my opinion, and are not really "striking."

Whether or not the various forms would interbreed "in nature" cannot be tested, as all the subspecies, with the exception of nominate *guttata* and *subaffinis*, are isolated from one another by an ecological barrier (in the case of *columbiana* and nominate *guttata*) or by the very broad gaps in distribution mentioned above. It seems more constructive, nevertheless, to consider that they are all conspecific as Hellmayr and Conover (1942) have done. The latter have emphasized quite correctly that *columbiana* is only the geographical representative of nominate *guttata*.

Miller probably did not investigate the validity of *caquetae*, but as my study and that of Blake (1955) have shown, *caquetae* is very clearly invalid.

SPECIES GROUPS

Ortalis guttata seems to belong to a group of species composed of *O. motmot* and *O. superciliaris* of southern Venezuela, the Guianas, and northeastern Brazil, and of *O. leucogastra* which inhabits the coastal districts of the Pacific from Chiapas south to Nicaragua. In these four species, the feathers of the mantle, throat, and breast are more integrated in structure, more compact and rounded, less decomposed and "hairy," than are those in the other six species of the genus *Ortalis*, and their margins are pale, not concolorous with the rest of the feather, as are those in the other species. The pale margins are more evident on the throat and breast and vary from pale gray to buff, white, or buffy white and are best developed in *guttata*, in which this character varies subspecifically, as described above. They are faint in the other three species, but the color pattern and structure of the feathers vary only in degree in this group of four species.

The characters mentioned seem to be of greater phylogenetic impor-

tance than other characters that are more conspicuous such as the color of the head, tail, and abdomen, which varies from reddish to white intraspecifically. To be sure, *O. erythroptera* and *O. garrula*, the ranges of which are shown in figure 2, differ from all other species of *Ortalis* by having reddish rather than brown primaries, but the significance of this character is uncertain because the nearest relatives of *garrula* appear to be *O. vetula* and *O. ruficauda*, not *erythroptera*. One can, in fact, treat *vetula*, *garrula*, and *ruficauda* as one Caribbean superspecies, as they replace one another along the Gulf of Mexico and the Caribbean with the exception of a very slight overlap in the ranges of *vetula* and *garrula* in Nicaragua, *vetula* reaching the Pacific coast at only two narrow points (one in Guanacaste in Costa Rica and the other in north central Chiapas) and being restricted only to the east coast of Mexico north of the Isthmus of Tehuantepec. A detailed study of the species of Mexico has been published by me (1965).

The three *Ortalis* of northeastern Brazil replace one another geographically (fig. 2) but are too sharply differentiated morphologically to be conspecific. *Ortalis superciliaris*, which is replaced in the west by *O. motmot* and by *O. guttata araucuan* in the east, is the smallest and the most nondescript of all *Ortalis*, but, nevertheless, is very distinct from the other two. It is characterized by having a buffy superciliary streak which distinguishes it from all the subspecies of *guttata* and *motmot* (and from all the other forms of the genus as well), and it is brownish gray on the crown, whereas the crown is reddish brown in *araucuan* and reddish chestnut in *motmot*, being brighter red in the subspecies (*ruficeps*) of *motmot* found south of the Amazon and nearer the range of *superciliaris*.

Nominate *motmot*, which replaces nominate *guttata* north of the Amazon, and *O. motmot ruficeps*, which replaces nominate *guttata* on the right bank of the Tapajoz (fig. 2), can be distinguished at a glance from all the subspecies of *guttata* and from *O. superciliaris* by a broad band of dull orange-red which encircles the base of the throat and is confluent with the red pigment on the sides of the face and on the crown, whereas the throat is not banded in nominate *guttata*, *araucuan*, and *superciliaris*, and the brown ground color of its feathers. Moreover, the white markings on the lower throat and breast are conspicuous in all the races of *guttata* but are faint in *O. motmot* and *O. superciliaris*. Other differences can be noted, such as the shape of the crown feathers which are prolonged and attenuated at the tip in *araucuan*, short and rounded in *O. superciliaris* and *O. motmot*, and in the color of the under parts. *Araucuan* is very much whiter on the abdomen than are the other two, and the olive-brown plastron is darker and much more extensive in *superciliaris* than that in *motmot*.

In other words, the three forms that replace one another in north-eastern Brazil are as clearly different as we would expect them to be if they were separate species. Behavioral differences probably exist also, notably in vocalizations, although no recordings of their cries have been made to my knowledge. We do know, however, that the vocalizations of the species that replace one another in Mexico are very different (Vaurie, 1965). Such a difference seems to exist also in the region where the ranges of *O. guttata* and *O. canicollis* approach and may meet, according to Niethammer (1953, p. 266).

Ortalis superciliaris

The type of *O. superciliaris* Gray, 1867, is in the collection of the British Museum where I have examined it. It is an aviary bird from South America which died in the gardens of the Zoological Society of London, but the locality where it had been captured is unknown. Oliveira Pinto (1964, p. 108) has suggested Belem, Para, as a restricted type locality.

The range of this species is relatively restricted (fig. 2) but seems to extend from the eastern estuary of the Amazon and the right bank of the lower Tocantins River eastward through eastern Para and the State of Maranhão to the Parnaíba River in Piauí, and south to extreme northern Goyaz, whence I have seen a specimen taken at Santo Antonio on the left bank of the Tocantins which seems to constitute the southernmost record of the species in Goyaz.

Hellmayr and Conover have remarked (1942, p. 162) that the center of the abdomen averages "slightly lighter, more whitish (less grayish or buffy)" in specimens from Maranhão and Piauí, but I believe the difference they noted is not geographical but an instance of individual variation, as the series that I have examined shows no evidence of geographical variation, and Oliveira Pinto (*loc. cit.*) mentioned none. The individual variation in the superciliary streak was noted by Hellmayr and Conover. My examination shows that it is well indicated and buffy in the large majority of the specimens, but it is more conspicuous in some birds than others, and in a few, which are probably not fully adult, it is not very distinct. In some cases it is also more whitish than buffy.

The superciliary streak is not very distinct in the two specimens of *superciliaris* that were in the collection of the British Museum when Ogilvie Grant (1893, p. 506) reviewed the Cracidae for the "Catalogue of the Birds in the British Museum," and, although difficult to understand, he identified them as "*Ortalis araucuan*," apparently believing that *araucuan* and *albiventris* were distinct species. These two names were based, however, on the same specimen, as stated above, and the two British Museum

specimens from Para, which I have examined, differ in no respect from *superciliaris* other than in the fact that their superciliary streak is rather faint. This unfortunate misidentification in such an important and influential publication (which gave the impression that three, rather than two, species were involved) caused much of the confusion in the identity of *superciliaris* and *araucuan*.

Ortalis motmot

This species, which is the type of the genus *Ortalis*, is characterized by a reddish chestnut head, the reddish pigment being prolonged as a broad band of reddish orange which encircles the base of the throat. It replaces (fig. 2) *O. ruficauda*, to which it is not closely related, south of the Orinoco, and *O. guttata* north of the Amazon to the level of the mouth of the Tapajoz River, and also replaces the latter south of the Amazon east of the lower Tapajoz.

Ortalis motmot varies geographically and consists of two subspecies which differ very markedly in size (tables 1 and 2). These are nominate *motmot* Linnaeus, 1766, which was based chiefly on material from Cayenne, French Guiana; and *ruficeps* Wagler, 1830, type locality, Brazil, but the type of which probably came from Santarem, Para. *Ruficeps* is smaller than nominate *motmot*, and the reddish pigment of its head, throat, and tail is paler and brighter. In *ruficeps*, the base of the outer tail feathers is also somewhat more invaded with olive-brown, especially on the outer web, but this difference is usually slight and on an average only. *Ruficeps* replaces nominate *motmot* south of the Amazon and east of the lower Tapajoz, but the limits of its range in the east are uncertain, although in the southeast it reaches the left bank of the Araguaia River, whence I have seen one specimen taken at Conceição do Araguaia (fig. 2) which also constitutes the southernmost and easternmost record of the species.

It is impossible to confuse the two subspecies short of carelessness, and I was disturbed, therefore, to find that some of the specimens I examined contradicted the ranges mentioned above which have been attested to by all authors. All the dubious specimens were obtained from A. M. Olalla and consist of two of *ruficeps* labeled Lago Cuipeva, June 10, 1933, and three of *ruficeps* labeled Pinhel, June 10, 1933 (the date on which other specimens were allegedly collected at Lago Cuipeva, and June 14, 1933). But Lago Cuipeva (or Cuipeua, as the name is spelled on some maps) is about 30 kilometers north of the main channel of the Amazon (or within the range of nominate *motmot*), 16 kilometers east of Curua at about latitude 1° 53' S., longitude 54° 55' W., and Pinhel is on the "wrong" bank

of the Tapajoz (on its left not right bank) and therefore west of the lower Tapajoz. Furthermore, as Pinhel is far removed from Lago Cuipeva, being 80 kilometers south of the Amazon and nearly 120 from Lago Cuipeva, I can scarcely credit the authenticity of these specimens of *ruficeps*.

A. M. Olalla supplied also five specimens of nominate *motmot* labeled Lago Cuipeva and dated April 6, 11, and 28, 1933, May 13, 1933, and June 5, 1933. The locality of these five specimens is within the range of nominate *motmot* and may be authentic, but the specimens of *ruficeps* must be rejected as they contradict all the information available on the range of this subspecies. They are not included in the list of specimens below. I may add that other ornithologists, and mammalogists also, have questioned the authenticity of some material collected by the members of the Olalla family.

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SPECIMENS EXAMINED

Ortalis guttata araucuan

BRAZIL: *Bahia*: Bahia, 1 ♂, 6 unsexed; Lamarão, 1 unsexed; Macaco Secco, near Andarahy, 1 ♂.

Ortalis guttata squamata

BRAZIL: *Santa Catarina*: Blumenau, 1 unsexed. *Rio Grande do Sul*: Coastal lagoon near São Pedro, 1 ♂; Taquara do Mundo Novo, 1 unsexed; Rolante, 1 ♀.

Ortalis guttata subaffinis

BOLIVIA: *Santa Cruz*: Buenavista, 9 ♂ (including type of *subaffinis*), 10 ♀; Rio Yapacani, 1 ♀, 1 unsexed; Nueva Moka, 1 ♂; Camp Wood, Provincia de Sara, 1 ♂, 1 ♀. *Cochabamba*: Mouth of the Rio Chaparé, 1 ♂, 1 ♀. *Yungas de la Paz*: Sandillani, 1 ♀; Tilotilo, 2 unsexed. *La Paz*: Chiniri, Rio Kaka, 1 ♀. *Beni*: Chatarona, 1 ♂; Provincia de Marban on the Rio Mamoré, 4 ♂ (intermediates between *subaffinis* and nominate *guttata*). Bolivia, no locality, 2 unsexed.

Ortalis guttata guttata

BRAZIL: Igarapé Bravo, Rio Tapajoz, 2 ♀. Arara, Rio Tapajoz, 4 ♂, 5 ♀, 3 unsexed. Apahy, Rio Tapajoz, 2 ♂, 1 ♀. Villa Braga, Rio Tapajoz, 1 ♂. Itaituba, Rio Tapajoz, 1 ♂. Avara, Rio Madeira, 1 ♂, 1 ♀. Rosarinho, Lago Sampaio, Rio Madeira, 1 ♂, 3 ♀. Calama, Rio Madeira, 1 ♂. Jamarysinho, confluence of the Rio Madeira and Rio Machados, 1 ♂. About latitude 10° S. on the Rio Madeira, 1 ♂. Canutama, Rio Purus, 4 ♂, 3 ♀. Labrea, Rio Purus, 2 ♂, 1 ♀. Hyutanahã, Rio Purus, 1 ♂, 2 ♀. Nova Olinda, Rio Purus, 1 ♂. João Pessoa, Rio Jurua, 1 ♂, 1 ♀. Villa Bella Imperatriz, Boca do Rio Andira, Rio Amazonas, 3 ♂. Boca do lago, Tefé, Rio Solimões, 1 ♂. São Paulo de Olivença, Rio Solimões, 1 ♀. Tonantins, Rio Solimões, 1 ♀. Tahuapunto, Rio Uaupes, 1 ♀.

PERU: Garrita del Sol, Vitoc, 1 ♂. Rio Cosireni, 1 ♂. Chanchamayo, 1 ♂, 1 ♀. Guayabamba, 3 ♀. Tocache, 1 unsexed. Apayacu, Rio Amazonas, 1 ♂. Sarayacu, Rio Ucayali, 2 ♂, 2 ♀, 1 unsexed. Boca del Rio Curaray, 4 ♂, 4 ♀. Boca del Rio Urubamba, 3 ♂, 3 ♀. Puerto Indiana, 2 ♂, 1 ♀. Orosa, Rio Amazonas, 1 ♀. Chinchao, Huanuco, 1 ♂. Vista Alegre, Huanuco, 1 ♀. Iquitos, 1 ♂. Rio Ucayali, Loreto, 1 ♂. Alto Quimire, Tarma, Rio Chanchamayo, 1 ♂, 2 ♀. San Ramon, Tarma, Junin, 2 ♂, 1 ♀. Perené, Junin, 2 ♀. Puerto Yessup, Junin, 1 ♂. San Martin, Moyobamba, 4 ♂. Huacamayo, Sandia, 1 unsexed. Hacienda Cadena, Marcapata, 1 ♂. Hacienda Villa Carmen, Cuzco, 1 ♂, 2 ♀. Boca del Rio Inambari, Madre de Dios, 1 ♂. Junction of the Rio Piedras and Rio Inambari, 1 immature specimen. La Oroya, Rio Inambari, 1 ♂, 2 ♀. Boca del Rio Piedras, 1 ♂, 1 ♀. Collpa, Rio Tambopata, Madre de Dios, 2 ♂, Peru, no locality, 1 unsexed (type or cotype of *adspersa*).

ECUADOR: Rio Suno, 1 ♂, Rio Suno above Avila, 2 ♂, 2 ♀. San José Abajo, 1 ♂, 1 ♀. Cerro Guataraco, 1 ♂. Ouca Yaco, 1 ♂. Rio Catapino, 1 ♀. Concepcion 5 ♂, 1 ♀. Macas region, 1 unsexed. Loreto, 1 ♂, 1 ♀.

COLOMBIA: *Caqueta*: La Morelia, 4 ♂, 7 ♀ (including type of *caquetae*); Belen, 2 ♀; Florencia, 1 ♂; Puerto Venecia, 15 kilometers southeast of Florencia, 1 ♂. *Putumayo*: Rio Mecaya, 1 ♂, 2 ♀; Puerto Umbria, 3 ♂, 1 ♀. *Amazonas*: Tres Troncos, La Tagua, 1 ♂. *Meta*: Rio Duda, Macarena, 1 ♂, 2 ♀; Los Micos, San Juan de Arama, 1 ♂, 3 ♀; Rio Guayapa, Macarena, 1 ♂, 2 ♀; Villavicencio, 1 unsexed.

Ortalis guttata columbiana

COLOMBIA: *Santander*: El Tambor, 1 ♂. *Antioquia*: 4 kilometers south of Valdivia, 1 ♂; La Ceja, 1 unsexed; Valdivia, 1 unsexed; above the Rio Porce, 4 kilometers northeast of Bellavista, 1 ♂, 1 ♀. *Cundinamarca*: El Alto de la Paz, above de Tena, 1 ♂, 1 ♀. *Tolima*: Chicoral, Coello River, 1 ♂; Toche, 3 ♂. *Cauca*: Guengue, 1 unsexed (type of *cauae*); La Paila, 2 ♀. *Valle*: Primavera, 1 ♂, 1 ♀; San Antonio, 2 ♂; near Jimenez, 1 ♀; El Asumbro, Jamundi Valley, 1 ♀; Yumbo, 1 ♂, 1 ♀. *Huila*: La Candela, 3 ♂, 1 ♀; San Agustin, 1 ♂, 1 ♀; Belen, 45 kilometers southwest of La Plata, 1 ♂, 1 ♀; Andalucia, 1 ♀ (collected at 5000 feet, apparently southwest of Andalucia, see above); Moscopan, 1 ♂, 1 ♀; El Isno, 1 ♂, 1 ♀; El Crucero, San Agustin, Rio Magdalena, 1 ♂.

Ortalis superciliaris

BRAZIL: *Para*: Buenos Aires, Rio Acara, 2 ♂; Serraria Cabral, Rio Acara, 1 ♂; Ipomonga, Rio Capim, 1 ♂; Ressaca, Rio Capim, 1 ♂, 1 ♀; Benevides, 3 ♂, 2

♀; Mocajuba, Rio Tocantins, 1 ♂, 1 ♀; no locality, 2 ♂, 1 unsexed. *Maranhão*: Boa Vista, 4 ♂, 1 ♀; Tabocas, 1 ♂; Codo Cocos, near Caxias, 1 ♀; Miritiba, 2 ♀. *Goyaz*: Santo Antonio, Rio Tocantins, 1 ♀. No locality: 1 unsexed (type of *O. supercilialis*).

Ortalis motmot motmot

VENEZUELA: Piacoa, Delta Amacuro, 1 ♂, 1 ♀; San German de Upata, 1 ♀; El Callao, 1 ♀; La Union, Rio Caura, 1 ♂; Suapure, Rio Caura, 1 ♂; Maripa, Rio Caura, 1 ♂; La Prision, Rio Caura, 1 ♀; Rio Mocho, Rio Caura, 1 ♂; Puerto Ayacucho, Orinoco, 1 ♂; Nericagua, Orinoco, 1 ♂; La Cascabel, Rio San Feliz, Orinoco, 1 unsexed; Auyan Tepui, 3 ♂, 2 ♀; Arabupu, Roraima, 1 ♀.

BRITISH GUIANA: Takutu River, 1 unsexed; upper Takutu Mountains, 1 unsexed; Bartica, 1 unsexed; Bartica Grove, 1 ♂; Warimia River, 2 unsexed; Makauria River, 1 unsexed; Bonasika River, 1 unsexed; Demerara River, 1 ♂, 1 unsexed; Demerara, 3 unsexed; Roraima, 2 ♂; Supenaam River, 1 unsexed; Kamakabra River, 1 unsexed; Great Savannas, 1 unsexed; Mahaicony Creek, 1 ♂, 1 ♀, 1 unsexed; Rockstone, Essequibo River, 4 ♂, 4 ♀; Itabu Creek, Courantyne River, 1 ♀; Oko Mountains, Essequibo River, 1 ♂; Kartabo, 1 ♂, 2 ♀; Abary River, 2 ♀; Annai, 1 ♂, 2 ♀; Quonga, 1 ♀.

SURINAM: Lower Para River, 1 unsexed, Wanica, 1 unsexed; Paramaribo and near Paramaribo, 2 ♂, 2 ♀; Wilhelmina Mountains, 1 ♂, 1 ♀; Kaiserberg airstrip, Zuid River, 2 ♀; interior of Surinam, no locality, 1 ♀.

FRENCH GUIANA: Ipoucin, 1 ♂; Approuague, 1 ♂; Cayenne, 1 ♂.

BRAZIL: *Amapá*: Upper Rio Uaçá, 1 ♂; upper Rio Rocaua, Rio Uaçá, 2 ♂. *Rio Branco*: Limão, Rio Cotinga, 1 ♂; Serra da Lua near Boa Vista, 3 ♂, 1 ♀. *Para*: Lago Cuiveva, 3 ♂, 2 ♀; Jacuara, 1 ♀; Obidos, 5 ♂, 1 ♀; mouth of Igarapé Piaba, 1 ♂, 1 ♀; Faro, 2 ♂, 1 ♀; mouth of Rio Paracutu, Faro, 1 ♀, Serra do Espelho, Faro, 2 ♂, 1 ♀.

Ortalis motmot ruficeps

BRAZIL: *Para*: Tauary, Rio Tapajoz, 4 ♂, 1 ♀; Aramanai, Rio Tapajoz, 1 ♂, 1 ♀; Fordlandia, Rio Tapajoz, 1 ♂, 1 unsexed; Mirituba, Rio Tapajoz, 1 ♂; Caxiricatuba, 2 ♂, 1 ♀; Santarem, 8 ♂, 2 ♀, 1 unsexed; Conceição do Araguaia, 1 ♀. Other specimens, 4 ♂, 1 ♀.

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