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UNUSUAL TYPES OF APPARENT GEOGRAPHIC VARIATION IN COLOR AND OF INDIVIDUAL VARIATION IN SIZE EXHIBITED BY OSTINOPS DECUMANUS.[1]

BY FRANK M. CHAPMAN.

The identification of specimens of *Ostinops decumanus* from the Urubamba region of Peru has led to the discovery that all the specimens of this species in our collection from Peru and Bolivia, and most of those from Matto Grosso, southwestern Brazil, present a color character shown by only one of the considerable number of specimens of this species which I have seen from north of the Amazon.

Incidentally it was learned that the marked difference in size shown by males of this species from the same locality, which is apparently attributable to age, involves a striking difference not alone in the length but in the shape of the wing. The results of my studies of these two problems are presented below. I have to thank Mr. W. E. Clyde Todd for the loan of six specimens from Bolivia.

Variation in Color.

In general tone of color *Ostinops decumanus* shows but little variation throughout its wide range. Specimens from west of the Andes in Colombia and from Panama average blacker than those from east of the Andes and the Colombian form has been described by Mr. W. E. Clyde Todd as *Ostinops decumanus melanterus* (Proc. Biol. Soc. Wash., XXX, 1917, p. 3). Possibly the race may be valid, but I have been unable satisfactorily to separate Colombian from Dutch Guiana specimens, as before remarked (Bull. A. M. N. H., XXXVI, 1917, p. 624).

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Specimens from Trinidad are said by Bangs and Penard to show an excess of chestnut edgings to the feathers, particularly posteriorly, and according to these authors (Bull. M. C. Z., LXIII, 1919, p. 38) should be referred to *Ostinops decumanus insularis* Dalmas, of Tobago. Paria Peninsula birds are also strongly margined with chestnut posteriorly, but a Tobago male is darker and has as little chestnut as a male from Paramaribo. (See also in this connection, Hellmayr, Nov. Zool., XIII, 1906, p. 19.)

Bolivian specimens are intermediate between those from Colombia and the Paria Peninsula and a series from Chapada, Matto Grosso, is of a browner tone than those from Bolivia. Possibly several races, distinguished by such differences of degree as I have here briefly referred to, may in time be recognized, but in the absence of adequate series from Tobago, Trinidad, and the Guianas, I am not in a position to deal with this phase of the subject.

The 108 specimens of *Ostinops decumanus* which I have examined, and of which 102 are contained in our Museum collections, do show, however, that in southern Peru, Bolivia, and southwestern Brazil, this species is subject to a variation of which a slight trace is shown by only one of our 44 specimens from the Amazon northward.

In brief, this variation consists of the presence in varying numbers and scattered more or less irregularly throughout the plumage of the body and wing-coverts, of feathers which are wholly or in part yellow and rarely white. Presented in a single individual, or even a number of individuals, such variation would be considered as pathological and termed albinistic or xanthochroic. Dr. Allen, for example, in commenting on its occurrence in a series of birds from Matto Grosso said: "It is evidently an abnormality analagous to albinism." When, however, it is exhibited by a large proportion of the birds from a wide area and by every bird in a large series from an extended area, it presumably cannot be considered as adventitious but is apparently the result of a cause or causes which are or have been operative over an extensive region. Whether this variation may be attributed to environmental influences, past or present, to atavism or to mutation, I am unable even to surmise; it is, however, clearly not individual, but apparently racial, and as such, in spite of its variability and unlikeness to those differentiations of degree which are so commonly associated with climate, the birds occupying the area in which it occurs should, in my opinion, be distinguished by name from those inhabiting a region in which this variation is practically unknown. Hence, as a means of giving a "handle to this fact," I suggest naming the form of *Ostinops decumanus* found in southern Peru, Bolivia and Matto Grosso, of southwestern Brazil,

Ostinops decumanus maculosus, new subspecies.

Subspecific characters.—Similar to *Ostinops decumanus decumanus* (Pall.), but averaging smaller and with a shorter bill, the general tone of coloration browner and with a variable number of feathers wholly or in part

yellow, less frequently yellowish white and rarely white, distributed irregularly through the plumage of the body and wing-coverts.

Type.—No. 138547, Am. Mus. Nat. Hist., ♂ ad., Yungas (alt. 3600 ft.), Prov. Cochabamba, June 3, 1915; Miller and Boyle.

CONSIDERATION OF MATERIAL EXAMINED.

Bolivia.—Yungas, alt. 3600 ft., Prov. Cochabamba, 5 ♂♂, 5 ♀♀; Locotal, alt. 5800 ft., Prov. Cochabamba, 2 ♀♀; Todos Santos, alt. 1300 ft., Prov. Cochabamba, 2 ♂♂; Mission San Antonio, Rio Chimoré, Prov. Cochabamba, 1 ♂; Tres. Arroyas, Rio Espiritu Santo, 1 ♂; Beni River, 1 ♂; Buenavista, Prov. Sara, 2 ♂♂; Santa Cruz de la Sierra, 1 ♂; Puerto Suarez, Brazilian boundary, 3 ♀♀.

The singular character which, chiefly, distinguishes this proposed race, is evidently most highly developed in the territory at the base of the Andes in Bolivia (Yungas, Locotal, Todos Santos, Buenavista, Santa Cruz). Every one of twenty-one specimens (13 males, 8 females) from this region is more or less conspicuously marked with feathers in whole or part yellow, yellowish white, or rarely white. The specimen selected as type, for example, has yellow or yellow-tipped feathers in the nape, scapulars, interscapulars, greater coverts of the left wing, rump, throat, breast and abdomen. In all there are some sixty feathers of this character.

In a varying degree all the remaining twenty-one specimens in this series exhibit similar characters, which are apparently more highly developed in the male than in the female. Of thirteen males, twelve have yellow or partly yellow feathers in the scapulars or inner tertials on both sides. There is here, therefore, a degree of symmetry in this marking which does not, however, obtain in connection with the yellow feathers of the body plumage.

Three females from Puerto Suarez, some 350 miles east of Santa Cruz de la Sierra, on the Brazilian boundary, exhibit the browner tone of coloration which appears to characterize the Matto Grosso birds, but a single yellow-tipped feather on the breast of one is the only evidence shown of the type of marking which forms the subject of this paper.

Peru.—(Rio Cosireni, 3000 ft., lower Urubamba region, 1 ♂; Chauillay, Urubamba Cañon, 1 ♂.) The Rio Cosireni specimen has yellow or yellow-tipped feathers in the nape, back, scapulars, rump, throat, breast, flanks, and tibiæ. In the Chauillay bird they appear only in the lower breast and abdomen. These two birds, unfortunately the only ones available from Peru, indicate the disappearance of the "pied" character as one advances northward. Toward the east, from what appears to be its center of highest development, Yungas, Bolivia, it persists more strongly, as shown by a large series from Matto Grosso.

Southwestern Brazil.—Chapada, Matto Grosso, 16 ♂♂, 13 ♀♀; Urucum, near Corumbá, Matto Grosso, 2 ♂♂; 2 ♀♀.) This series of thirty-three specimens exhibits as a whole a certain brownish tone which distinguishes it from all our remaining specimens of the species. Possibly

the color may be in part attributable to the age of a large part of our specimens (collected at Chapada, in 1882–85), though it is exhibited in a degree by specimens collected at Puerto Suarez in 1908, and at Urucum in 1913. However, I should prefer seeing a large series of freshly collected birds before commenting further on their general colorations. These birds further differ from our other specimens in being smaller, with shorter bills, presenting, indeed, in these respects, the minimum measurements of our entire series.

We are, however, here concerned chiefly with the extent to which this series of birds shows the "pied" character which distinguishes our series from Bolivia. Thus, seventeen of eighteen males, and nine of the fifteen females are marked with feathers in whole or in part yellow. The feathers are never as numerous as they are in our birds from the Andean region of Bolivia, and it is evident that the pied character is disappearing. This, it seems to me, is less surprising than that it should be present in so large a percentage of the specimens in a region over four hundred miles from what appears to be the region of its greatest development.

Amazon River (Solimoës, near Manaos, 1 ♂; Santarem, 3 ♂♂; Rio Tocantins, 1 ♀; Marajo, 1 ♂).—These specimens are obvious intergrades between what may be loosely called the northern and southern forms. In general black tone of color they are nearer the former, in size they are fairly intermediate, while four of the six birds exhibit traces of the pied markings found in most of our southern specimens. The Solimoës bird has a single breast-feather broadly tipped with yellow, and of the three Santarem birds, one has three breast-feathers, the other, one narrowly fringed with yellow. The Marajo bird has one yellow feather and one broadly tipped with yellow on the breast. On the whole, these Amazon birds are to be referred to *decumanus* rather than to *maculosus*.

North of the Amazon (Dutch Guiana, 3 ♂♂; British Guiana, 1 ♂, 1 ♀; Tobago, 1 ♂; Venezuela, 6 ♂♂; Ecuador, 1 ♂, 1 ♀; Colombia, 6 ♂♂, 11 ♀♀; Panama, 10 ♂♂, 3 ♀♀).—As before stated, lack of adequate topotypical material prohibits a report on the variation of these specimens *inter se* and I consider them here only with regard to the pied marking which characterizes the southern form.

Of the forty-four specimens here listed only one shows any evidence of this marking, a male from Cristobal Colon, Paria Peninsula, Venezuela, having one breast-feather lightly fringed and one almost imperceptibly margined with paler yellow. It is therefore the practical absence of these yellow feathers north of the Amazon as well as their presence south of the Amazon, which indicates that they constitute a character of racial value.

Variation in Size.

Examination of the measurements of a considerable number of specimens, shows that while females from the same locality present a comparatively small range of variation in size, the males vary widely. Fur-

ther study indicates that the variation in size in the male is apparently attributable primarily to age, and that this fact must be given due consideration in selecting material to determine the geographical variations of the species in size.

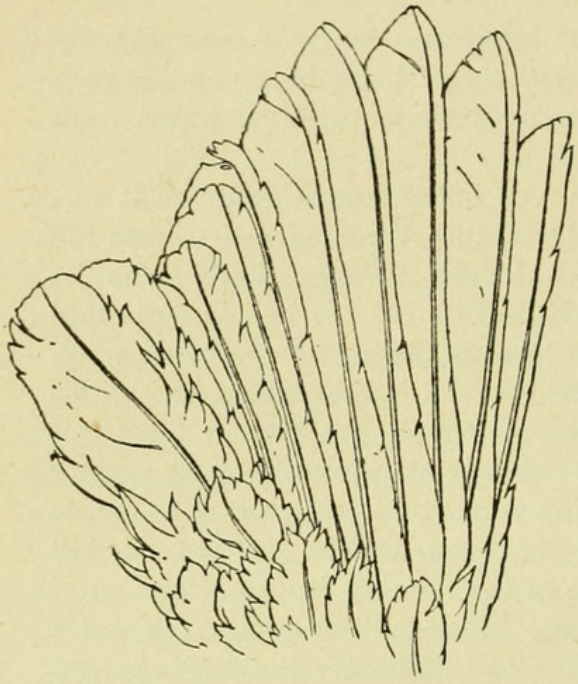
Variation with age.—In a series of seven males from Colombia, it was found that in birds which appeared to be mature, the wing varied from 199 to 249, the tail from 167 to 210 mm. in length. Twelve Bolivian males showed a corresponding variation of 199 to 245 and 157 to 193 mm., and in eleven males from Chapada, Matto Grosso, these measurements were, respectively, 195 to 239 and 156 to 188 mm. It appears that the variations in the length of the wing are due chiefly to the greater length of the primaries, while those in the tail are mainly attributable to the greater length of the yellow feathers. The wing variation is of a nature to create a decided difference in the shape of the wing, the longer wings being "pointed" with considerable difference in the relative length of the outer primaries, the shorter wings being more "rounded" and with the outer primaries more nearly equal in length. The difference between the two types of wings would commonly be called generic in character.

Although it is not usual to find such a pronounced variation between first winter birds and those fully adult, it seems probable that the birds with comparatively short wings and tail are first winter birds, those having longer, pointed wings being mature birds. Furthermore, the fact that both wings and tail in *Ostinops* are to some extent secondary sexual characters, being used in the remarkable display which this bird makes in the breeding season, may make them in a measure subject to such variation in development as is shown by crests, ruffs, spurs and other secondary sexual characters.

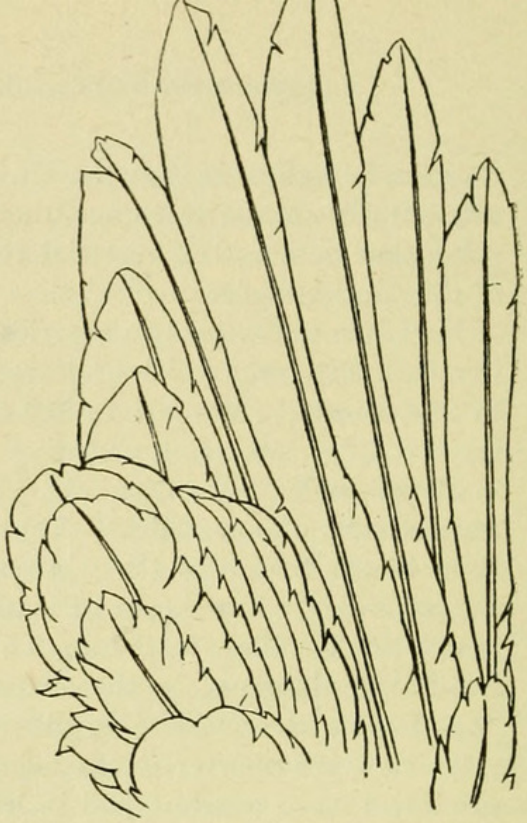
The accompanying figures, illustrating the wings of birds from both Colombia and Matto Grosso, make a detailed description of this variation unnecessary, but attention may be called to the marked difference in the width and outline of the outer web of the third and, especially, fourth primaries (from without).

Geographical Variation.—Using only material which appears to be comparable as regards age, our series indicates that maximum size in *Ostinops decumanus*, especially in the bill, is reached in the Paria Peninsula, of Venezuela; minimum size in the Province of Matto Grosso, Brazil, where the culmen in seven birds averages 56.1 mm., as compared with 71 mm. in three birds from the Paria Peninsula. Colombia birds agree in length of wing and tail with those from the Paria Peninsula, but specimens from Chiriqui, at the northern limit of the bird's range, are somewhat smaller.

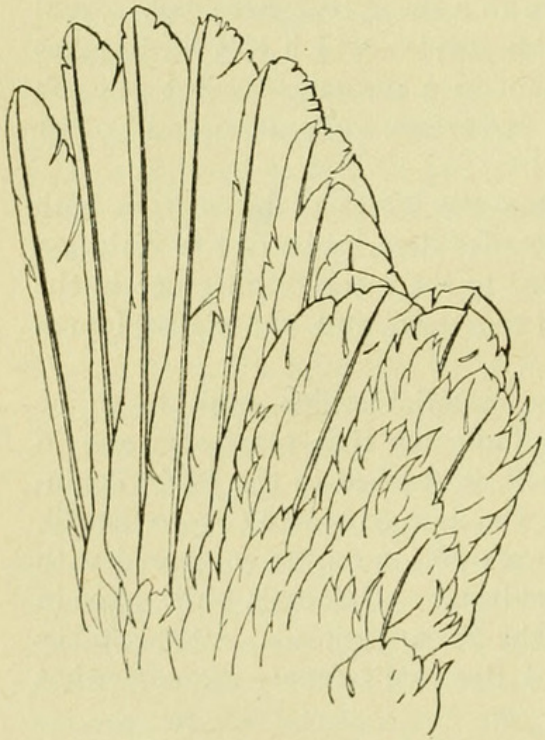
Males seem to show greater geographic, as well as greater individual variation than females. The results of the study of our material may be briefly summarized in the following:



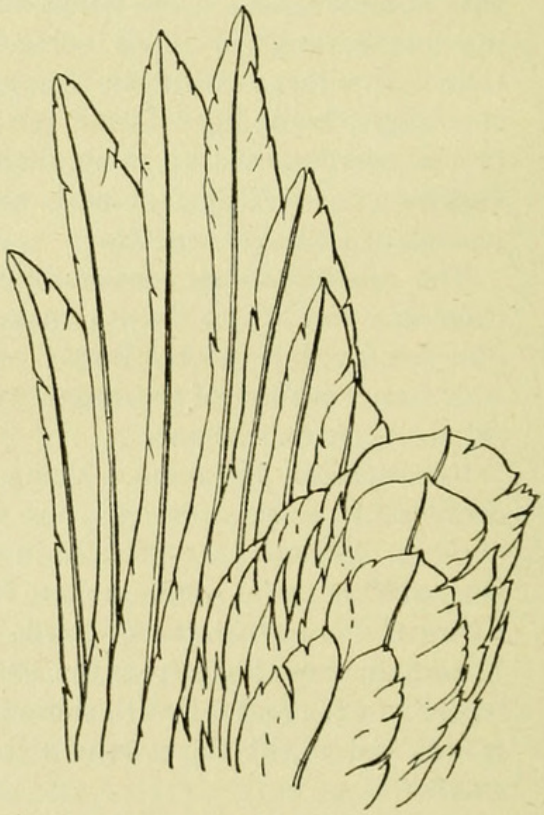
Wing of first winter bird. No. 32807, A. M. N. H., ♂, Chapada, Matto Grosso, Brazil, Feb. 26, 1885; H. H. Smith.



Wing of adult bird. No. 32814, A. M. N. H., ♂, Chapada, Matto Grosso, Brazil, Aug. 14, 1882; H. H. Smith.



Wing of first winter bird. No. 134528, A. M. N. H., ♂, Peque, Antioquia, Colombia, Feb. 4, 1915; Miller and Boyle.



Wing of adult bird. No. 113186, A. M. N. H., ♂, Rio Frio, Cauca, Colombia, Nov. 24, 1911; A. A. Allen and Leo E. Miller.

WINGS OF MALE OSTINOPS DECUMANUS, TO SHOW OUTER PRIMARIS.
(Reduced.)

Note short outer primaries and "rounded" wings of birds in first winter plumage and long outer primaries and pointed wing of adult birds.

Conclusions.

First.—Practically all male, and most female specimens of *Ostinops decumanus* from south of the Amazon exhibit a varying number of feathers which in whole or part are yellow, yellowish and rarely white. The presence of these feathers produces a pied appearance which in an individual specimen would be considered abnormal, but which in the present instance seems to be of racial significance.

Second.—This pied character is practically absent north of the Amazon.

Third.—*Ostinops decumanus* reaches its maximum size in northern South America from northeastern Venezuela to Colombia; its minimum size at the southern limit of its range. Specimens from the northern limit of the bird's range are intermediate in size but nearer those from Colombia.

Fourth.—Males are more variable in size, both individually and geographically, than females.

Fifth.—The wings and tail in adult males vary markedly both in size and shape from those of less mature birds, the difference being in part due to age, in part to sexual causes.

Sixth.—The species may be further divided into geographic forms based upon degrees of difference in general coloration, but the material at hand does not warrant definite expression of opinion in this connection.

Measurements of Adult Males.

Locality.	*Wing.*	*Tail.*	*Culmen.*
Chiriqui, Pan....(5)	218–231; av. 229	184–200; av. 192	60–64; av. 62.2
Colombia.....(5)	228–249; av. 237	188–210; av. 195	63–66; av. 64.7
Paria Pen., Ven..(3)	231–241; av. 234	195–198; av. 196	70.5–71; av. 71.0
Tobago.....(1)	201	186	65
British Guiana...(1)	201	177	61.5
Dutch Guiana....(1)	233	183	64
Marajo, Brazil...(1)	218	167	60
Santarem, Brazil.(1)	224	173	58
Solimoës, Brazil..(1)	228	182	58
Napo, Ecuador....(1)	247	212	65
Bolivia.....(9)	222–245; av. 230	156–193; av. 180	56.5–62; av. 59.4
Chapada, Brazil..(7)	205–239; av. 220	165–181; av. 173	54–59.5; av. 56.1