ARTICLE XXI.—*On the Color-Pattern of the Upper Tail-Coverts in Colaptes auratus.* By FRANK M. CHAPMAN.

Several years ago my attention was attracted by the wide range of variation shown in the color-pattern or *pictura* of the upper tail-coverts of *Colaptes auratus.* Until the present time material to study this variation has not been available. Dr. Allen now places at my disposal the fine series of *Colaptes* which, through the assistance of fellow-naturalists, he has brought together for use in another connection. The variation in question occurs in all of the upper tail-coverts, and its nature may be understood by reference to the accompanying plate (p. 314) in which are figured the middle coverts alone. Figs. 1 and 2 represent the first stages in a series of patterns which terminate in Fig. 15. With few exceptions birds in first plumage agree with Figs. 1 or 2, which represent the amount of variation at one stage. Subsequent changes are apparently accomplished by the moult, and one moult may carry a bird through one or all of the stages figured. For example: No. 103,072 of the U. S. Nat. Mus. Collection (Warren Creek, Col., ♀, Dec. 26, F. Ball) has nearly completed its adult plumage, but there remains of the first plumage one of the long upper tail-coverts intermediate in pattern between Figs. 1 and 2, while the corresponding feather of the new plumage agrees very nearly with Fig. 12. Other examples in a similar stage of plumage show, as has been said, that the change from a barred to a longitudinally-marked feather is accomplished by one or more moults. The large proportion, however,—one-third—of adult birds agreeing with Figs. 1 or 2, and the frequency of intermediate phases, indicate a more or less regular advance by successive moults to the final stage. While in transition the smaller and more anterior coverts are as a rule slightly in advance of the ones posterior to them. The longest and most posterior feather, therefore, is the last to be affected, and the final result has not been achieved until this feather agrees with the ones before it; for this reason it has been selected to represent the upper tail-coverts as a whole. The lower tail-coverts pass through a somewhat similar series of changes, which to a certain extent correlate with those presented by the upper tail-coverts.

Individual variation at the same stage of marking is well shown by No. 44,212 of the Am. Mus. Collection (Hoboken, N. J., ♂, Ward) in which the feather at the right side of the tail agrees with Fig. 1, while the corresponding feather on the left side exactly resembles Fig. 2. Asymetry in marking not infrequently occurs, and is excellently illustrated by No. 4961 of Mr. Brewster's Collection (Elmore Co., Ala., ♂ ad.). In this specimen the feather at the right of the tail agrees with Fig. 4, while that at the left side is intermediate between Figs. 10 and 11.

All these changes have no evident connection with sex or locality, and apparently depend on age alone. If we attempt to determine their significance we must examine the pattern of the same parts in other members of the genus. There is, apparently, no doubt that in *auratus* the barred feather is the first in a series of changes which at present terminate in the white-edged black feather, and which we may consider an as yet unestablished character.

If we assume that the phases just observed epitomize a transition which is occurring in *auratus*, and if we further assume that *auratus* is the most recent off-shoot of the Neotropical genus *Colaptes*, we should expect the more southern and older species to exhibit only the earlier stages of a color-pattern which in *auratus* has reached its highest degree of development.

Unfortunately very large series of the extralimital species are wanting; so far as my specimens go, however, they seem to support the theory advanced.

*Chrysoptilus* shows its relationships to *Colaptes* in having the tail-coverts similarly barred. Lack of sufficient material, however, will not permit me to determine the extent of variation in the pattern of the tail-coverts of this genus. Twelve of fifteen specimens examined have these feathers barred, the remaining three are very nearly like Fig. 8.

The appended table is designed to illustrate the development of the pattern of the tail-coverts in the species it includes. The accompanying figures were made from specimens of *Colaptes auratus*, but they answer quite as well to represent a given stage in any of the other species except *campestris*. This species resembles Fig. 2, but the bars are finer and more numerous.

In all the species mentioned examples in first plumage have, with few exceptions, the tail-coverts barred.

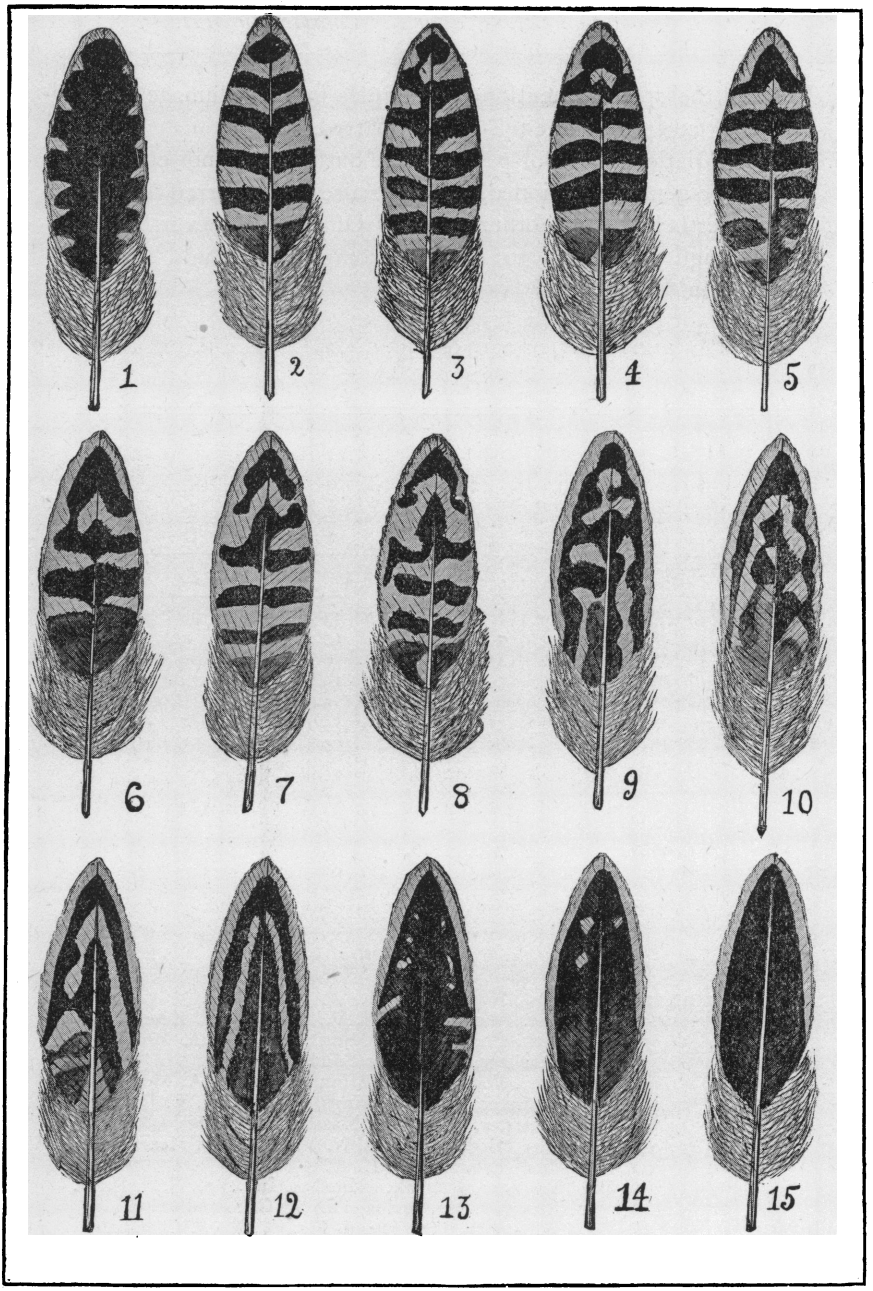
The variations in color-pattern here outlined are not confined to the two genera mentioned, but occur also in the barred feathers of species belonging to other genera. Of these, however, I have not enough specimens to make a comparative study in this connection.

TABLE SHOWING DEVELOPMENT OF THE COLOR-PATTERN IN CERTAIN SPECIES OF *Colaptes*.

| | Auratus. | Cafer. | Saturation. | Chrysoides. | Mexicanoides. | Campestris. |
|---|---|---|---|---|---|---|
| Number of Specimens | 150 | 156 | 20 | 79 | 10 | 16 |
| Percentage agreeing with Figs. 1–2 | 33 | 43 | 60 | 66 | 70 | 100 |
| " " " 3 | 10 | 11 | 5 | 9 | 20 | |
| " " " 4 | 8 | 5 | .... | 9 | | |
| " " " 5 | 19 | 9 | 5 | 14 | | |
| " " " 6 | 5 | 5 | 5 | | | |
| " " " 7 | 5 | 5 | .... | 1 | | |
| " " " 8 | 5 | 5 | 5 | 5 | 10 | |
| " " " 9 | 1 | 2 | | | | |
| " " " 10 | 3 | 3 | 5 | | | |
| " " " 11 | 2 | 4 | 10 | 1 | | |
| " " " 12 | 6 | 2 | 5 | | | |
| " " " 13 | .07 | | | | | |
| " " " 14 | 07 | | | | | |
| " " " 15 | .07 | | | | | |

*Explanation of the Figures.*

Fig. 1, No. 44,212, Am. Mus., Hoboken, N. J., ♂, J. F. Ward.
" 2, " 25,798, Am. Mus., Westchester, N. Y., ♂ ad., L. A. Zerega.
" 3, " 51,951, Am. Mus., Fort Snelling, Minn., ♂ ad., E. A. Mearns.
" 4, " 8,307, Wm. Brewster, Ann Arbor, Mich., ♂.
" 5, " 51,946, Am. Mus., Fort Snelling, Minn., ♀ ad., E. A. Mearns.
" 6, " 29,092, Wm. Brewster, Tarpon Springs, Fla., ♂, W. E. D. Scott.
" 7, " 14,359, Wm. Brewster, Grantville, Mass., ♂, Wm. Brewster.
" 8, " 51,943, Am. Mus., Highland Falls, N. Y., ♂, E. A. Mearns.
" 9, " 27,341, Am. Mus., Paterson, N. J., ♂.
" 10, " 12,816, Wm. Brewster, Kankakee Marshes, Ind., ♀, W. S. Perry.
" 11, " 14,088, Wm. Brewster, Mandeville, La., ♂, C. S. Galbraith.
" 12, " 1,238, F. M. Chapman, Pine Island, Fla., ♀, F. M. Chapman.
" 13, " 50,145, Am. Mus., Tarpon Springs, Fla., ♀, W. E. D. Scott.
" 14, " 51,945, Am. Mus., Fort Snelling, Minn., ♂ ad., E. A. Mearns.
" 15, " 84,344, U. S. Nat. Mus., Wabash Co., Ill., ♀ ad., R. Ridgway.




Color-Pattern in Upper Tail-Coverts of *Colaptes auratus.*

(*About four-fifths natural size.*)