mune serum on this phenomenon. Rabbits infected with *B. lepisepticum* form agglutinins and precipitate rather poorly. The serum of such immunized rabbits fails to prevent necrosis as is shown in 198.

We have never succeeded in producing necrosis by injecting filtrate directly into the 24 hour skin test site. It is rather obscure why the filtrate diluted in the blood is more destructive to endothelium than the same filtrate concentrated locally.

Animals suffering from acute or chronic R. D. infections die very readily after receiving a potent filtrate intravenously. Blood cultures which have been proven sterile before the injection subsequently often become positive. An infected skin lesion seldom becomes larger as a result of the filtrate inoculation, but often assumes the purplish hemorrhagic hue shown by the skin tests. Closely related to this phenomenon is the observation that many rabbits after receiving filtrate intravenously develop a clear watery nasal discharge which often becomes purulent within a few days. Typical snuffles follows. It seems probable that these animals are suffering from a latent upper respiratory infection with *B. lepisepticum* and that such small foci react with increased intensity to the injection of antigen. This phenomenon is analogous to focal reactions induced by tuberculin injections in tuberculous individuals.

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Genetic Relations of Chocolate Brown Plumage Color in the Domestic Pigeon.

DEWEY G. STEELE. (Introduced by L. L. Woodruff.)

From the Osborn Zoological Laboratory, Yale University.

All of the numerous color modifications known in the domestic pigeon may be grouped under 3 basic types of pigmentation; black, chocolate, or red. Of these 3 types black and red are by far the best known. Their genetic relationships were fully studied by Cole.[1] Chocolate has long occurred in several varieties of pigeons but the breeder has commonly classed this color with dun (dilute black). It was first recognized as a distinct type of pigmentation by Metzelaar.[2] Three years later Christie and Wriedt[3] reported chocolate

[1] Cole, L. J., *Rh. Is. Agric. Exp. Sta. Bull.*, 1914, 158, 311.

[2] Metzelaar, J., *Am. Pigeon Keeper*, 1924, xxvi, 22.

[3] Christie, W., and Wriedt, C., *Z. f. ind. Abst. u. Vererb.*, 1927, xliii, 391.

TABLE I.*

Results of reciprocal P_1 crosses of chocolate x black and chocolate x red matings.

No. of matings	Type of mating	Results				Total
		Black		Choc.		
		♂	♀	♂	♀	
2	Black ♂ — E(E) B(B) Choc. ♀ — E(E) b—	8	4	0	0	12
3	Choc. ♂ — E(E) bb Black ♀ — E(E) B—	10	0	0	12	22
1	Red ♂ — ee B(B) Choc ♀ — E(E) b—	7	10	0	0	17
2	Choc. ♂ — E(E) bl Red ♀ — ee B—	1	0	0	5	6
		Total				57

* Combining data obtained at the University of Wisconsin and Yale University. About 15 F_1 birds have been omitted because the sex records have not been obtained for them. The results of the linkage studies between the B and I factors will also be presented later.

recessive and sex-linked in relation to black. The data here presented confirm their conclusion. The results of the chocolate x recessive red matings are also in general agreement with those just published by Metzelaar.[4] When the male parent is red and the female chocolate, blacks occur in both sexes in the F_1. These results demonstrate an interaction between a factor for black carried by the red parent with an extension factor from the chocolate. In the reciprocal matings the results are modified by the sex-linked relations of the B factor. The data are presented in Table I, and an inspection of the results will show that the genetic relationships of the 3 basic color types in pigeons may be interpreted upon the basis of a 2 factor hypothesis. The factors are:

B—factor for black, b—chocolate, sex-linked.

E—factor for extension of black or chocolate, e—non-extension.

The linkage relations between chocolate and the intensity factor are being studied, and present results (2 crossovers: 7 non-crossovers) indicate a rather loose linkage between these factors. The pigment obtained by chemical extraction from chocolate feathers greatly resembles black in its general appearance but in solubility tests it seems more like red.

[4] Metzelaar, J., *Occasional papers of the Museum of Zoology*, Univ. of Mich., 1928, 194, 1.