

INTRODUCTION.

By the beginning of the present century most of the recognised breeds of poultry had been established and a wide variety of body form, size and colour existed. This was accomplished by early breeders without any knowledge of the laws of inheritance and it is fortunate that such variability was retained, for it has been the basis of the tremendous advances that have since been made in poultry breeding. In this early stage of breed improvements breeders based their selection on phenotype and show records. This method is quite unreliable for there is no correlation between the outward physical appearance of the bird and its genetic complement and its ability to transmit any high production factors it may possess. A more reliable measure of the breeding value of the bird is, therefore, required.

It was only in 1900 that Mendel's work on the laws of inheritance received the attention it deserved but it aroused considerable interest in the subject Bateson (1902), Punnett (1905, 1906), Hurst (1905) and Davenport (1906) followed up Mendel's work in its application to poultry. In 1923, Punnett published his book on "Heredity in Poultry" and was followed by many workers, among them Hutt, Jull, Hays and Mann.

The results of these workers show that the inheritance of desirable qualities is of a highly complicated nature. Mann states that "neither blood nor indeed the characters of an animal are in fact inherited; it is the genes that are transmitted from one generation to another and the characters follow as a result." He goes on to say that frequently the characters result from interplay - sometimes simple but often complex - between the genes and their environment and even between themselves. Hays and Kellin concluded that the characters associated with egg production were highly involved, with sex linked

genes, recessive genes, and dominant genes interacting. Goodale and Hays enumerated five characters that operate together to influence egg production and showed that eight genes were involved as follows:-

CHARACTER	DOMINANT PAIR	RECESSIVE PAIR.
Early Maturity	(EE (E' E')	(ee (e' e')
Intensity	(II (I' I')	(ii (i' i')
Broodiness	(AA (CC	(aa (cc
Winter pause	MM	m m
Persistency	PP	p p.

In addition to this complicated situation, both in respect of the number of genes and their interaction affecting one single character, heritability figures for the commercial qualities have been shown by many workers to be extremely low. Hays and Sanborn returned a figure of 0.16 for hatchability; for persistency of egg production Hays (1949d) found a figure of 0.01, and the same worker obtained a figure of 0.05 for high intensity. Other factors show similarly low heritability figures, and, therefore, the chances of improving them are very limited and rigid selection must be practised to make progress.