

**STUDIES OF
INHERITANCE IN
GUINEA-PIGS AND RATS**

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Studies of inheritance in guinea-pigs and rats by W. E. Castle & Sewall Wright

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W. E. CASTLE & SEWALL WRIGHT

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BY

W. E. CASTLE AND SEWALL WRIGHT



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PART I

AN EXPEDITION TO THE HOME OF THE GUINEA-PIG
AND SOME BREEDING EXPERIMENTS WITH
MATERIAL THERE OBTAINED

By W. E. CASTLE



INTRODUCTION.

For several years I have been engaged in studies of heredity in guinea-pigs. In the course of these studies all the common varieties of guinea-pigs have been investigated by the method of experimental breeding and something has been learned concerning their inter-relationships and probable mode of origin. The actual origin of most of these varieties is, however, unknown, as is true also concerning most varieties of domesticated animals. One or two varieties have, however, been made synthetically in the laboratory and it is conceivable that, if we had the original wild stock to work with, from which the domesticated guinea-pig has arisen, some or all of the existing varieties might be synthesized anew and perhaps still others might be obtained, and that in this way something might be learned of the method by which new varieties arise. From considerations such as these I have for several years been seeking to obtain living specimens of the wild species which most closely resemble guinea-pigs. In 1903 I received from Campinas, Brazil, 3 wild-caught individuals referred at the time to the species *Cavia apera*, but since found to agree better with the description of *C. rufescens*. From two of these animals young were obtained, and crosses, the results of which have been described in detail by Dr. Detlefsen (1914), were made with domesticated guinea-pigs. It may be noted that all male F_1 hybrids were sterile, but that the F_1 females were fertile, and that upon repeated crossing of these with male guinea-pigs, a race of fertile hybrids was at last obtained, these being, in the language of breeders, about $\frac{7}{8}$ guinea-pig, $\frac{1}{8}$ *rufescens*. From this result it seems doubtful whether *C. rufescens* has any close genetic relationship to the domesticated guinea-pig, although by hybridization it has been found possible to produce races ($\frac{7}{8}$ or more guinea-pig) which have derived certain characters from a *rufescens* ancestor.

Cavia apera from Argentina has been crossed with the guinea-pig by Nehring (1893, 1894) in Berlin, with the production of fully fertile hybrids. This result indicates a closer relationship with the guinea-pig than *C. rufescens* manifests. Darwin (1876), however, did not regard *apera* as the ancestor of the guinea-pig, because he found it to be infested with a different species of louse. I have not myself been able as yet to obtain specimens of *C. apera*. Nehring (1889) has argued with much plausibility that *Cavia cutleri* of Peru is more probably the ancestor of the guinea-pig, for (1) it agrees closely with the guinea-pig in cranial characters and it occurs in a region where guinea-pigs have been for a long time kept in domestication, as is shown by the occurrence of mummified guinea-pigs which had been buried with the dead. Naturally I formed a strong desire to secure living specimens of *C. cutleri* for