

# Behavioral Genetics of the Mouse Volume I

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## Genetics of Behavioral Phenotypes

The first volume in the new **Cambridge Handbooks in Behavioral Genetics**, *Behavioral Genetics of the Mouse* provides baseline information on normal behaviors, essential in both the design of experiments using genetically modified or pharmacologically treated animals, and in the interpretation and analyses of the results obtained. Offering a comprehensive overview of the genetics of naturally occurring variation in mouse behavior; from perception and spontaneous behaviors, such as exploration, aggression, social interactions, and motor behaviors, to reinforced behaviors such as the different types of learning. Also included are numerous examples of potential experimental problems, which will aid and guide researchers trying to troubleshoot their own studies. A lasting reference, the thorough and comprehensive reviews offer an easy entrance into the extensive literature in this field, and will prove invaluable to students and specialists alike.

**Wim E. Crusio** is a Research Director at the Centre National de la Recherche Scientifique (CNRS). With over 35 years' experience in mouse behavioral neurogenetics and the analysis of mouse behavior, his recent interests cover mouse models of depression, autism, and Fragile X syndrome.

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# Cambridge Handbooks in Behavioral Genetics

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**Dedications**

*To my mother, Annie Crusio-Jordans*  
Wim E. Crusio

*To my son Sam*  
Frans Sluyter

*I would like to thank Julia, my wife, and Flora and Mark, my children, who supported me throughout this book project with their love and happiness.*  
Robert T. Gerlai

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## Preface

From the earliest beginnings at the start of the twentieth century, behavior geneticists have been interested in explaining individual differences in behavior: why do not all individuals within a given species display the same levels of aggressiveness, intelligence, curiosity, and such? The answer, of course, is that not all individuals share the same environment and that there can be quite large genetic differences between them. Together, these environmental and genetic variations, and their interplay, cause individuals to differ from each other.

Of this genetic variation, only little is directly due to *de novo* mutations (which in most cases lead to pathological variation). Hence, if one is interested in the causation of *naturally-occurring* variation in behavior (i.e., which has not been weeded out by natural selection and hence represents adaptively acceptable phenotypical characteristics), one should concentrate on the genetic variation that already exists in populations. Induced mutations may be more useful in uncovering the physiological regulation of behavior and may allow the construction of valuable animal models of human neuropsychiatric disorders. Of course, in some species, such as humans and great apes,

ethical and practical considerations prevent the study of mutations other than spontaneous ones.

The present Handbook is intended to give an overview of the current state-of-the-art in behavior genetics of the mouse. It consists of three volumes and is part of a larger series of *Cambridge Handbooks in Behavior Genetics*. This first volume covers our current knowledge about the genetic underpinnings of naturally-occurring, non-pathological individual differences in behavior. Mouse models for human neuropsychiatric disorders, including those based on induced mutations, will be the subject of the next volume in this series. The third volume will present detailed protocols for the different tests of mouse behavior described in the first two volumes.

While editing this book, we were aided by many colleagues who acted as anonymous reviewers of one or more of the chapters. We extend our warmest thanks to them. For manifold reasons, the gestation time of this book has been much longer than originally foreseen. We therefore thank the many authors not only for their excellent contributions, but also for their patience and continued faith in us and this project.