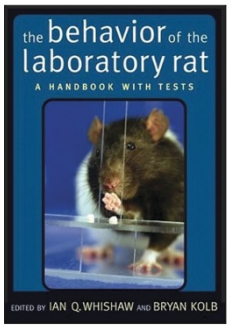
Revealing the rat's behavioral repertoire



The Behavior of the Laboratory Rat: A Handbook with Tests

edited by Ian Q Whishaw and Bryan Kolb

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Reviewed by John P Aggleton

Aside from humans, the laboratory rat (*Rattus norvegicus*) must be the most studied organism on the planet. According to the ISI Web of Science, over 100,000 publications since the year 2000 refer to 'rat' or 'rats' in the title. This total outstrips all other laboratory species (it is, for example, 40% higher than the equivalent number for 'mouse' or 'mice') and corresponds to around 2% of all science publications in the database. Given the immense impact of this one species on fields such as biology, physiology and psychology, you might suppose that a comprehensive user guide to its behavior already exists. Such a guide would ideally fill those gaps in our knowledge about the behavioral repertoire of the rat that could affect the outcome of our studies. At present, many researchers know little outside their areas of expertise and are ill equipped to appreciate whether their research could be compromised by these blind spots. Ian Whishaw and Bryan Kolb have done an admirable job in trying to correct this problem.

Over a total of 44 chapters, an extraordinarily diverse array of information is presented about the rat. In spite of the number of chapters, there is little repetition, ensuring that space is well used. These numerous chapters have been grouped into eight logical themes: natural history, sensory systems, motor systems, regulatory systems, development, defense and social behavior, cognition and models and tests. Within each theme, there are between three and seven chapters. Although almost all of the chapters are written by different authors, the editors have managed to create a uniform style and approach. A key feature is the conciseness of the chapters. As the editors note in the preface, their hardest task was in ensuring that the authors' contributions were short enough so that all 44 chapters could fit into a single volume. Although this inevitably results in some superficiality in the text, the compensation is that within its 500 pages, the book achieves essentially what it set out to do—provide a comprehensive description of the behavior of the laboratory rat. For this same reason, if you judge this book simply by looking at those chapters that refer to your own areas of expertise, you may be disappointed by their lack of depth. This, of course, is not how the book should be judged, as its goal is to introduce scientists to the topics that they do not know. It should be added that the term 'behavior' is used in the most general sense, as this book includes considerable information on topics that have been extensively studied through behavior, though the behavior itself is not the prime goal of the research. Examples include much of the information on sensory systems as well the chapters on rat cognition. Although the book does not include specific chapters on anatomy, it does deal with relevant aspects of physiology (such as thermoregulation, stress, eating, drinking, immune responses and circadian rhythms).

For the neuroscientist, this book has much to offer. Although this volume is not a cookbook that describes in a step-by-step process exactly how to analyze behavior (in spite of its title), the final chapter does present a useful battery of behavioral tests. In fact, the strength of this book lies elsewhere, as it opens your eyes to the alarmingly wide variety of factors that could influence your specific experiment. (Perhaps it's better to remain ignorant!) At the same time, the conciseness of the individual chapters means that they are not intended to provide definitive reviews of that specific topic; rather, the reader gets a succinct description of the main issues and is then much better placed to follow up that information. For this reason, you may not find the answer to your specific experimental question (for instance, should I test in the light or dark phase? or, should I use male or female rats?), but you will be alerted to the potential significance of these issues. Given the large number of chapters, it is invidious to single out any particular one, especially because the list of experts who have provided chapters is impressive.

Given the goal of providing a comprehensive handbook, it is inevitable that some topics receive less coverage than the reader might wish. This will depend on the reader's own interests, but personally, I would have wished to see more about housing conditions and the impact of environmental enrichment on rat development and behavior. Little is said about gender differences in cognition, and the chapter on rat strains does not explain the origins of the most popular strains and does not really provide an answer to the key question, am I using the most appropriate strain for the question I am asking? In their defense, the editors acknowledge that the book attempts to be comprehensive but not exhaustive.

In judging this book, there really is only one critical test: will it help me to do better experiments? The answer is yes, but it carries a caveat. The information in this book will not help the experimenter who is reliant on automated tests in which the rat's behavior cannot be properly observed. This book highlights the richness of rat behavior and how it could interact with the desired nature of the study. The trick is how best to take advantage of what the rat naturally does well, and then to turn it to the experimenter's advantage. The chapters on olfaction and dead reckoning are good examples of this principle in action. This is a first-rate reference book, and neuroscience laboratories would be well advised to have a copy. One minor complaint is that the index is very limited and fails to cite many examples of the topics to which it says it is referring. This shortcoming is a shame, given the practical value of such a book, but it is counteracted by the fact that all of the chapters have multiple, clear subheadings, making the book easy to navigate. My other complaint is that I now feel alarmed by the multitude of hidden factors that could compromise my experiments. ■

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