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Introduction

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Biology of Desert Rodents

INTRODUCTION

O. J. Reichman¹ and James H. Brown

Studies of desert rodents, especially the heteromyid species of southwestern North America, have a long and illustrious history. These investigations have not only revealed many fascinating aspects of the biology of the rodents themselves, but they have also contributed importantly to our general understanding of such diverse disciplines as functional anatomy, comparative and environmental physiology, population and community ecology, and systematics and evolutionary biology. The great early biologists C. Hart Merriam, Joseph Grinnell, and Lee R. Dice were profoundly influenced by their field experiences with small mammals in the southwestern United States. Subsequently, many leading figures of American mammalogy have contributed to the knowledge of desert rodents. The works of these, and many other scientists, are cited in the papers of this symposium.

Until the last 25 years, most of this work was primarily descriptive and was largely performed by mammalogists interested in taxonomy, classification, and geographic distribution. Important systematic and biogeographic work has continued, and by the late 1950s sufficient basic information was available to allow investigators to delve into the challenging relationships between form, function, distribution, and evolutionary history. The pioneering studies of Schmidt-Nielsen and Bartholomew and his students on

physiological adaptations, by Eisenberg on comparative behavior, and by the Websters on functional morphology of the ear have been followed by investigations in such diverse disciplines as cytogenetics, community ecology, and sociobiology.

The majority of research on desert rodents has focused on representatives of the Heteromyidae that inhabit arid regions of southwestern North America. Although this symposium has concentrated on heteromyids, it is obvious that vast areas of the globe are covered by deserts and inhabited by other rodents as significant biologically as heteromyids. A glimpse of these is obtained in the paper by Mike Mares, but much more is missing—either because these proceedings were limited in time and publication space, or because so many other desert rodents are poorly known. Even within the North American deserts there are other important groups of rodents (e.g., cricetids and ground squirrels), but we have chosen to concentrate on the heteromyids because of their specialized adaptations to desert environments. Perhaps more is known about the comparative anatomy, physiology, behavior, ecology, and evolution of these rodents than is known about any comparable group of related organisms, with the possible exceptions of Hawaiian *Drosophila*, Galapagos finches, and West Indian *Anolis*. In a very important sense, heteromyids provide an empirical model of the

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patterns and processes involved in the adaptive radiation of a monophyletic group to exploit diverse ecological opportunities within a limited geographic range. This system is being used as a model to answer general questions and to test theoretical predictions about relationships between form and function, the adaptive nature of evolutionary change, and the organization of ecological communities.

In organizing the symposium and arranging for its publication we had two major goals: (1) to present in one place a review and synthesis of much of what has been learned about diverse aspects of desert rodent biology, and (2) to stimulate continued and

additional research by calling attention to both unanswered questions and recent advances. If the published versions of the papers generate as much interest, enthusiasm, and critical discussion as did the original symposium, our goals and expectations will have been exceeded.

Condensed versions of these papers were presented at the 62nd Annual Meeting of the American Society of Mammalogists at Snowbird, Utah, on 22 June 1982. We thank J. Mary Taylor, H. Duane Smith, the American Society of Mammalogists Program Committee and Local Committee, the speakers, and an exceptionally attentive and interactive audience for the success of the symposium.