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Naturalistic Facilities for Animal Behavior Research: In Search of Accommodations

The monitoring and enforcement of animal care standards has increased significantly in recent years in response to advances in laboratory animal science (e.g., Driscoll, 1989; Mann et al., 1991; Orlans et al., 1987), increased awareness of animals' biological and psychological needs (e.g., Besch, 1990; Fox 1986; Moberg, 1985a; Novak and Suomi, 1988), ethical issues related to the use of animals in research (e.g., Remfry, 1987), and increased public awareness of abusive practices in animal research (e.g., Phillips and Sechzer, 1989). As a result, it has become increasingly important for researchers to understand the roles and responsibilities of all parties who become involved in the design, construction, certification, and operation of animal facilities. Naturalistic facilities, in particular, are facing difficult periods of adjustment to the current regulatory environment. In many cases research in these facilities will be temporarily suspended for redesign, changes in animal

care and use practices, and expenditure of funds not associated with specific scientific studies. Equally significant, it is becoming increasingly difficult for researchers to establish new naturalistic facilities because of their nonstandard design, and the attention they draw to animal research in captivity.

The central premise of this volume is that understanding the dimensions along which naturalistic animal facilities diverge from regulatory standards, and understanding the perspectives and concerns of responsible parties at the institutional and federal levels can help researchers to more effectively advocate and conduct animal behavior research (Richmond, 1991). Such an understanding will also help researchers to articulate their needs while being cognizant of the complications these requirements may present for others in authority. These topics have administrative, economic, interprofessional, and legal facets to which animal behavior researchers are not often attuned, especially early in their careers.

The collection of papers in this volume address theoretical and pragmatic issues concerning naturalistic environments that will help researchers to think more strategically about nonstandard features they may want to build into these facilities. The contributions provide insights into identifying physical environmental features that may not be in compliance with existing regulations, and may have a negative impact on the physical health and psychological well-being of the animals (see chapters by Besch and Killias, and Stoskopf and Gibbons, this volume). The early identification of such physical environmental features will enable researchers to seek cost-effective remedies in the design plan or to obtain waivers for the operation of facilities that are at variance with the published standards. Finally, this volume will encourage students interested in animal behavior research to establish working relationships with veterinary and regulatory personnel, and to acquire basic sophistication in laboratory animal science issues during their graduate and postdoctoral training.

THE NEED FOR NATURALISTIC HABITATS IN CAPTIVITY

Traditional animal research environments were designed to optimize the control of and access to the animal subjects. An objective of these facilities was to minimize the time and financial cost needed to conduct research, to maintain the facility, and to care for the animals. The control and standardization of the ani-

mals' physical and social environments was considered essential to the attainment of husbandry and research objectives.

The price tag for this kind of access and control, however, is too high if it is purchased at the expense of attention to the psychological well-being of the animals. Accordingly, an important consideration in the design, construction, and operation of modern naturalistic environments is the range and quality of the interactions between the physical environment and the animals' physiological, morphological, and behavioral functioning. Such a design orientation has cast naturalistic environments in pivotal methodological roles in contemporary animal behavior research. For example, Collier and Rovee-Collier (1981), Kummer (1982), Menzel and Juno (1985), Shettleworth (1984), Shettleworth et al. (1990), and Yoerg (1991) have employed naturalistic habitats in influential studies of animal cognition. Research on social biology and behavior related to reproductive success have also emphasized the methodological importance of naturalistic facilities (e.g., Beck and Power, 1988; Frederickson and Sackett, 1984; Holmes and Sherman, 1982; Melnick and Kidd, 1983; Reiter et al., 1981; Spencer-Booth, 1970; Widowski et al., 1990). The range of adaptive behavior under study in naturalistic facilities is rapidly expanding.

The importance of naturalistic facilities is also being pushed to the forefront by recent efforts in several problem areas of applied animal behavior research. Some of the most pressing of these is related to the preservation of endangered species, which are increasingly having to be propagated in captivity (e.g., Gibbons et al., 1994). Compared to the advances in modern fertility research, efforts to reintroduce captive-bred animals into the wild have met with very limited success. One of the primary reasons for this is undoubtedly related to the inadequacy of standard captive-rearing environments for the development of normal foraging, social, and predator avoidance skills (Gittleman and Conover, 1994; Hutchins et al., 1994; Kleiman, 1989; Konstant and Mittermeier, 1982). Recent advances in interspecies embryo transfer techniques also pose challenges, which, as applied to endangered species, can only be addressed in naturalistic environments (Durrant and Benirschke, 1981; Gibbons and Durrant, 1987). In sum, naturalistic facilities will play an important role in research on the effects that rearing conditions have on subsequent behavioral adaptation. In addition, they may come to play essential roles as transitional habitats for diagnostic, remedial, and research purposes prior to the release of animals into the wild (see chapter by Beck

and Castro, this volume), and in the advancement of behavioral medicine for both animals and humans (e.g., Gibbons et al., 1992).

ADMINISTRATIVE AND REGULATORY CONSIDERATIONS

In view of the importance of naturalistic environments in the advancement of theoretical and applied animal behavior research, it is unfortunate that rapid changes in regulatory standards, financial support for research, and social currents are making it difficult to establish and maintain these valued facilities. On the regulatory side, it is clear that published standards are intended to accommodate research requirements where this does not compromise the research animals' needs and security. At the same time, many more animals are used in industrial and biomedical contexts than in behavioral research, and standards are naturally addressed specifically to the types of housing employed in these settings. Conceptualization of nonstandard facilities and procedures for waivers and certification have received little attention, particularly in the published standards themselves.

Because violation of animal care regulations can result in serious repercussions within an institution, administrators are not eager to encourage development or expansion of naturalistic facilities, except in the few instances where behavioral research more than "pays its own way." More importantly, naturalistic facilities tend to require significant amounts of space, are expensive to operate, and often present security problems not encountered in conventional facilities. Thus, in order to generate administrative support for naturalistic research in captivity, researchers need to understand the concerns and responsibilities related to these demands. Further, it is critical that researchers consider how the methodologies proposed for research may conflict with administrative and regulatory policies, and to seek solutions that will yield valid scientific information and will not infringe on the physical health and psychological well-being of the animals.

Each year any number of individual papers on specific aspects of animal housing appears at professional meetings and in journals devoted to laboratory animal science and animal behavior research (e.g., Coe, 1989; Nicholson and McGlone, 1991; Novak and Bayne, 1991; O'Neill and Price, 1991). Many of these contributions address the limitations of current standards, the scientific rationale for nonstandard housing in specific applications, or novel

solutions to housing problems. As more papers appear on the effects that environmental variables such as lighting, sound, temperature, space, or substrate have on animal behavior and health, one can easily determine that housing standards for a given species are inherently complex to write. Any useful set of standards will be controversial and in some cases restrictive relative to the researchers' needs. What is not easily gleaned from these papers is an overall framework within which to comprehend the situation as it applies to naturalistic facilities in captivity. Moreover, these technical papers generally do not address the practical and political issues that make it difficult to establish and operate naturalistic facilities in the current regulatory environment.

CONCLUSION

The following set of interdisciplinary papers will promote the identification and conceptualization of major technical, regulatory, and practical difficulties associated with the design, construction, and real-time operation of naturalistic animal facilities in captivity. Further, they will help administrators, regulatory personnel, and scientists to address the question: What constitutes a naturalistic environment for animals (see, for example, chapters by Dewsbury, Glickman and Caldwell; and Novak et al., this volume)? Discussion on this and similar topics is presented in the concluding chapter of the volume. This chapter is a product of a synthesis statement developed by the participants of the 1987 conference. The synthesis statement also considers the operational philosophies and educational benefits of naturalistic habitats, and provides a protocol for the resolution of conflicts regarding the regulation of naturalistic environments in captivity.

It is also intended that the following contributions will enable investigators to address their research needs to the full array of responsible parties in a timely manner. The papers will also help scientists interested in animal behavior processes to determine the most strategic avenues along which to design and advocate research requiring naturalistic facilities. The contributions might also warn off scientists who would undertake such research in complete innocence of the administrative, regulatory, and technical obstacles. It is also hoped that the volume will encourage students in animal behavior research to develop working relationships with veterinary and regulatory personnel, and to

acquire basic sophistication in matters related to laboratory animal medicine and husbandry during their graduate and postdoctoral training. This experience is increasingly necessary if young investigators are to retain the initiative in designing their research, obtaining external support, and providing the best care for their animals.

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