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An ethological approach to housing requirements of golden hamsters, Mongolian gerbils and fat sand rats in the laboratory—A review

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Abstract

When housing hamsters and gerbils little has been done to identify the preferences of these species. The solitary nature of fat sand rats and hamsters is often discordant with housing practices in animal laboratories. This article provides a comparison of the behaviour of wild-living animals with that of laboratory housed conspecifics, focusing on possible problems related to social structure and enrichment. More studies are needed to reveal the impact of group-housing on hamsters and fat sand rats, just as preference studies on possible enriching resources needs to be undertaken in order to optimise the housing conditions of laboratory hamsters, gerbils and fat sand rats.

Keywords: Gerbil; *Meriones unguiculatus*; Hamster; *Mesocricetus auratus*; Fat sand rat; *Psammomys obesus*; Housing

1. Introduction

Hamsters (family Muridae, subfamily Cricetinae) and gerbils (family Muridae, subfamily Gerbillinae) have been in our care for more than 50 years, but compared to other

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rodents like mice and rats, the use of hamsters and gerbils in biomedical research is far more limited. Although from the same family of Muridae, hamsters and gerbils deviate physiologically, anatomically and behaviourally from mice and rats (subfamily Murinae). However, traditional housing is inspired by the way the more widely used laboratory mice and rats are housed, and few studies have been focusing on the housing preferences of gerbils and hamsters. Conclusions on the more suitable environment have primarily been based on prior experience and anecdotes. Although generations of domestication have created laboratory animals, which to some extent may differ from their wild ancestors in behaviour and physiology (Smith et al., 1994), original behavioural and physiological characteristics can still be found in these animals (Weinert et al., 2001). In this paper, the behaviour of the wild ancestors of laboratory hamsters, gerbils and fat sand rats will be reviewed in order to provide a starting point for a discussion of the importance of the social as well as the housing environment on the behaviour of these animals. This approach—combining the results reported from preference tests, knowledge on environmental-related physiology and basic ethological principles—hopefully provide information of which environmental features may enhance the welfare of laboratory hamsters and gerbils.

2. Assessing welfare

Welfare can be defined in many ways (Sørensen, 2004). Providing animals with possibilities to perform a variety of natural behaviours by adding complexity to their environment is a commonly accepted principle of welfare-enhancement. If such a complexity is to increase animal welfare—and thus being enriching to the animal—the desired behaviours need to be identified and the benefits of being allowed to perform these behaviour must be explained (Newberry, 1995). Studying the full behavioural repertoire of wild-living ancestors will help to identify behaviours that may prove important to animals in captivity and thus increase welfare, if the relevant resources and stimuli are provided.

3. The nature of hamsters and gerbils

3.1. The golden hamster

The golden or Syrian hamster (*Mesocricetus auratus*) is the most commonly used species of the subfamily Cricetinae in biomedical research and is often referred to as the laboratory hamster. The Chinese hamster or grey Chinese hamster (*Cricetulus griseus*), the European hamster (*Cricetus cricetus*), the Armenian hamster (*Cricetulus migratorius*) as well as the Djungarian hamster (*Phodopus sungorus*) are used to a lesser extent. In this paper the emphasis will be on the more widely used golden hamster.

The golden hamster originates from southeast Europe and the Middle East, and probably all domesticated golden hamsters have originated from one male and two females surviving from a 10-pup litter captured in the region of Aleppo in Syria on an expedition led by the zoologist Israel Aharoni in 1930 (Murphy, 1985). Compared to rats and mice the use of hamsters in biomedical research is rather small (Havenaar et al., 2001), primarily being