

Short communication

## A note on enrichment for captive lion-tailed macaques (*Macaca silenus*)

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### Abstract

Two enrichment techniques were devised with the aim of reducing stress and improving welfare for captive lion-tailed macaques in an Indian zoo. In Study A, a log, cotton ropes and a feeding basket were added to the enclosures in different combinations to provide structural and feeding enrichment and were subsequently removed, while in Study B, singly-housed individuals were transferred to a large open-moated enclosure in which they were group-housed. The effects of these two enrichment techniques (social and physical) appeared to significantly improve the welfare of the study individuals by stimulating them to exhibit higher levels of natural behaviours along with the suppression of several abnormal behaviours.

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### 1. Introduction

Primate enclosures can be improved by structurally enriching the physical space by providing enclosure furnishings (Hebert and Bard, 2000) or by shifting the animals into a new enclosure (Little and Sommer, 2002). The addition of certain enclosure furnishings (for example aerial pathways) can be used to stimulate the captive animals to exhibit certain species-specific behaviours (Young, 2003; for example Ludes-Fraulob and Anderson, 1999). In a previous study

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(Mallapur et al., 2005), it was found that confiscated lion-tailed macaques exhibited a greater diversity and higher levels of abnormal behaviour than wild-caught, zoo born and captive-reared individuals. Levels of abnormal behaviour exhibited were found to be influenced by enclosure complexity. The structural enrichment study in this paper was thus designed to examine whether provision of structural enrichment (elevated logs, ropes and feeding baskets) could stimulate the confiscated lion-tailed macaques to exhibit higher levels natural behaviours such as climbing, swinging and foraging. The social enrichment study in this paper was in turn designed to examine whether the provision of conspecifics stimulated the previously singly-housed confiscated lion-tailed macaques to display higher levels of natural social behaviours.

## 2. Methods

### 2.1. Housing and husbandry

Studies A and B were conducted on two different sets of captive lion-tailed macaques housed singly in cages of approximately 20–25 m<sup>2</sup> in size at Thiruvananthapuram Zoo. In Study A, all six individuals observed were males and were confiscated from small, unrecognised zoos and circuses. In Study B, the behaviour of the six study individuals was first recorded when they were housed singly and then when they were grouped together in an open-moated enclosure of approximately >300 m<sup>2</sup> in size containing several trees, bushes and a water body.

### 2.2. Study design

*Study A.* Each individual was observed during five phases: (1) 'The control': this was the first phase of the study when no furnishings were administered; (2) 'Cage + log and ropes': enrichment was provided in the form of a horizontal log placed at 3 m above the ground from which two cotton ropes were suspended; (3) 'Cage + logs and ropes + feeding basket': in this phase, a feeding basket was suspended 1 m off the ground attached to the end of the ropes. The feeding basket was made of iron bands with gaps of four to 6 cm; (4) 'Cage + logs and ropes (feeding basket removed)': as in Phase 2; (5) 'Logs and ropes removed': as in Phase 1. Animals were fed by scattering food on the cage floor during Phases 1, 2, 4 and 5 of the study.

*Study B.* (1) Singly-housed: at the start of the study, all six lion-tailed macaques were housed singly. Individuals were housed in neighbouring cages and hence, could interact with one another. (2) Group-housed: fifteen days after the end of the first phase, all six individuals were released into the same enclosure.

### 2.3. Behavioural sampling

In Study A, each lion-tailed macaque was observed for a continuous period of 3 h during the day between 11:30 h and 17:30 h. The behaviour of each individual was recorded during each of the five phases of the behavioural study. In Study B, lion-tailed macaques were observed for a continuous period of 5 h during the day between 08:30 h and 17:30 h. During the second phase of Study B when the animals were grouped together, the six individuals were observed in pre-determined order for 1 h per animal per day over a period of 5 days. Both studies (A and B) were conducted between February and October 2003. During the study, each sampling period was initiated with an instantaneous scan, and was followed by a focal animal sample of one of the individuals in the group for a duration of 15 min. The behaviour of each individual was only recorded when visitors were present and not on zoo holidays.

### 2.4. Data analyses

Behaviour for each individual was pooled at the end of the observation period to obtain averages for each study animal, which were used for data analyses. The Friedman's test was used to analyse differences in

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