

Environmental Enrichment for Common Marmosets (*Callithrix jacchus jacchus*) at Mysore Zoo

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Introduction

Marmosets are small, South American primates belonging to the family Callitrichidae, genus *Callithrix*. They are arboreal, diurnal New World primates found in the tropical Amazonian rainforests of north-east and central Brazil. The common marmoset prefers secondary or disturbed forests and edge habitats, wherever they are found, their home range will typically include a variety of habitat types and will have two features *viz.*, enough trees that produce exudates (saps and gums) for food and sufficient hiding places for cover from predators, such as raptors and snakes. They live in small groups, are quick moving, with claws on all digits except the big toes, which help them scamper along the branches in a squirrel-like fashion.

The common marmoset is an adaptable species with high fecundity and a complex behavioural repertoire. The adult body weight ranges between 350-450gm with non-pregnant females weighing slightly more than males. Marmosets reach adult size at about 12 months of age and full sexual maturity between 18-24 months and having a life span of 10-15 years.

Marmosets at the Mysore Zoo

Most primate species live in complex social systems and these social interactions contribute to the physical as well as psychological well-being of the individuals. The enclosure for marmosets at the Mysore zoo has been constructed using chain-link mesh on all the sides and soil and some planted shrubs was used as ground covering.

The enclosure measures 18 ft (wide) × 18 ft (length) × 10 ft (height) in which three marmosets are being housed currently; two females and a male, all aged around 5 years (Photo 1). As a consequence of a larger eye-gap in the mesh used, rodents entering the enclosure, their feeding on the marmoset's diet and defecation in the feeding trays had increased. To reduce the number of rodents entering the marmoset enclosure, the mesh walls were lined with wired mosquito mesh. Although the enclosure was quite spacious, prevalence of empty space within the enclosure with limited access to vertical dimension made most of the enclosure space unusable to this arboreal species. In the absence of aerial pathways to access the upper reaches of the enclosure, the marmosets would spend majority of the time clinging to the mesh walls and other reinforcements in the enclosure. The marmosets had previously bred four times but the survivability of the litter was low. Lack of proper housing and shelter for the marmosets was one of the factors that could

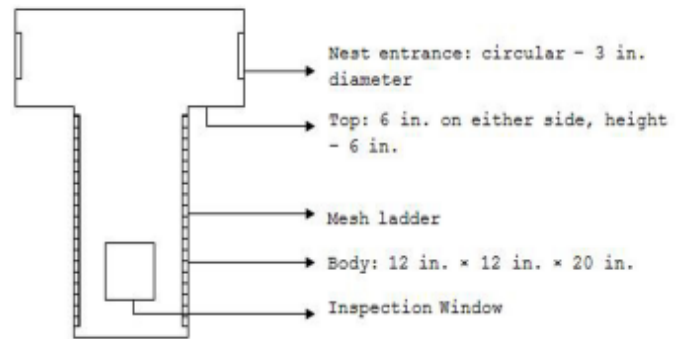


Figure1. Nest box design

have contributed to the low survival rates of the litter. Dietary supplements like sufficient proteins and vitamins were lacking and the feeding regime which involved presenting the food on a food-stand was improper. In the wild, marmosets lead busy and varied lives. They are adapted to living in a complex environment and elaborate solitary foraging bouts involving the selection of seasonally variable food and hunting insect prey. Although creating a rainforest in captive conditions is unfeasible, a bare and predictable enclosed environment is clearly inadequate and would significantly hinder the animal's behavioural needs. With an objective to meet the animal's behavioural requirements, environmental enrichment for marmosets was planned.

Enrichment design for Marmosets

Physical Enrichment: Environmental enrichment describes various activities which aim to increase the animal's well-being by increasing exercise, fulfilling behavioural needs and optimizing the level of stimulation that the animals receive and even attempts to reduce abnormal behaviours displayed. Physical enrichment refers to the modification in the captive animal's environment, appropriate for that species, and is achieved by adding to a captive animal's environment or by modifying the furnishings within it. Physical enrichment can provide adequate complexity and variety, and mimic the natural environment. A naturalistic enclosure such as this will provide the captive marmosets opportunities to manipulate or control their environment.

The first step towards enriching the marmoset enclosure included the removal of shrubs from

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inside the enclosure, which served as a harbor for mosquitoes and also provided a hide-out for rodents who burrowed into the enclosure. A small concrete room inside the enclosure, which was the only shelter available to the animals during rainy season, was modified by providing an extension made out of mesh, which presently serves both as a shelter as well as a holding room.

The marmosets should be provided with an opportunity to express their locomotory skills and to communicate their social status. New additions inside the enclosure included dried branches of coffee plants, tree branches and liana (Photo 2). An earlier study indicated that these animals prefer to spend more time on branches when they cover a wider area of the enclosure, and move between them when the branches cover a wide area but are narrowly spaced. Keeping the above results in mind, the stumps, climbers and the branches were placed in a way so that they cover up most of the empty spaces, cover a wider area and are narrowly spaced. Providing a wooden nest box would allow family members to sleep in close contact with each other. The smell of the family members is imbued in the nest box, which helps confirm each individual's sense of belonging. A special nest box (Photo 3) was made for this purpose and one was placed inside the holding room, and another was placed outside at a height of six feet from the ground using a stand (Figure 1). The floors of both nest boxes were covered with wood shavings approximately 2-3 inches deep. Vertical trapezes made out of bamboo were hung from the ceilings. Marmosets tend to use the upper reaches of the enclosure preferentially avoiding the lower parts probably to avoid predators. Taking this important fact into account, enclosure furniture was only administered in the enclosure areas used by the animals (Figure 2).

Feeding Enrichment: In nature, monkeys spend a good amount of time searching for and processing food, which also helps them exercise their cognitive abilities. Thus feeding enrichment in captivity becomes vital. Studies indicate that monkeys in captivity prefer working for their food rather than readily obtaining it and consuming it. Currently at Mysore Zoo, food is being scattered on the cage floor which provides them with an opportunity to forage and spend more time foraging and feeding.

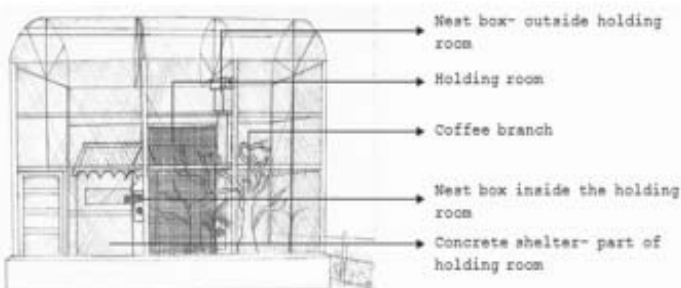


Figure 2. Sketch of the marmoset enclosure

Crickets and termites are being given to the captive marmosets so as to supplement their diet with a good proportion of protein. Culturing crickets and other insects is also being initiated at the zoo so that they can be provided to the marmosets on regular basis.

Discussion

Prior to the administration of environmental enrichment, it was observed that the animals spent less time in foraging and time spent displaying social interactions was reduced considerably. Majority of the time was spent either on the iron reinforcements or by clinging on to the mesh walls pre-enrichment. After the introduction of the physical enrichment devices like climbers, coffee branches, trapezes and tree branches, we observed a significant change with respect to the animals' activity budget. Use of enclosure furniture by the marmosets was high which was remarkable.

With regard to the use of enclosure space, the inclusion of the enclosure furniture provided an access to areas of the enclosure that were previously unused which they now use and explore. There has also been an increase in the degree of social interactions. A decrease in the display of abnormal behaviours like coprophagy, which is known to be associated with protein deficiency, has also been noted. The installation of the nest box has served the objective to a greater degree, marmosets were found to be using it to stay warm on cold nights. Recently, one of the marmosets gave birth to two young ones, and it has been observed that both the parents are spending a substantial amount of time inside the box. The foraging activity also increased soon after the new feeding regime of scattering food on the enclosure floor was initiated. The feeding of live food has served as a dietary supplement and also provided the animals with appropriate environmental stimuli mimicking their natural habitat and thus, motivating them to exhibit natural foraging and feeding behaviours.

Our observations suggest that the introduction of environmental enrichment played an important role in the modulation of behavioral repertoires. It can also be showed that the animals' behavioural needs have been met if the animals show a rich behavioural repertoire and there is an absence of abnormal behaviours. Maintaining a satisfactory balance between welfare requirements and the need for reliable, high quality data is clearly not an easy task, hence systematic observations are being carried out to validate the observations and to fill in the paucity of scientific justifications in this article.

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Photo 1: Marmoset at Mysore Zoo

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Photo 2: Coffee branches and liana inside the enclosure



Photo 3: Nest-box positioned in the enclosure

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