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Using Scents to Improve Welfare and Encourage Breeding of Lemurs

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Introduction

- Some animals use scents to communicate[1]. Scents from mammals can provide social and reproductive information[1].
- Zoos play an important role in species' conservation through breeding programmes[2].
- Zoos use environmental enrichment (objects and activities) to create stimulating environments to improve both psychological and physiological well-being of animals[2].
- Enrichment can involve feeding, noises, toys and puzzles, but scents have received less focus[2].
- Currently the link between enrichment and breeding success is poorly understood, but there is some promising evidence[3].
- Lemurs, found only in Madagascar, are a conservation priority and show extensive use of scent communication[4,5].

Plate 1: Male (left) and female (right) red-ruffed lemurs

Aims

- Understand scent-marking and sniffing behaviours of red-ruffed lemurs (*Varecia rubra*)
- Develop a novel scent enrichment based on fertile female scent.
- Assess enrichment effects on welfare and breeding.

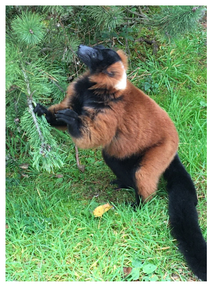

Plate 3: Female red-ruffed lemur sniffing

Methods

- Scan sampling of behaviour– recorded every 30 seconds over 1 hour periods[6].
- *Ad libitum* sampling for scent-marking[6].
- Scents were collected during routine veterinary checks (in breeding and non-breeding season).
- Gas-Chromatography-Mass-Spectrometry was used to identify chemical compounds in scents.

Results

- Males scent-marked more than females, but frequency of sniffing behaviours were similar (Fig 1a and Fig 1b).

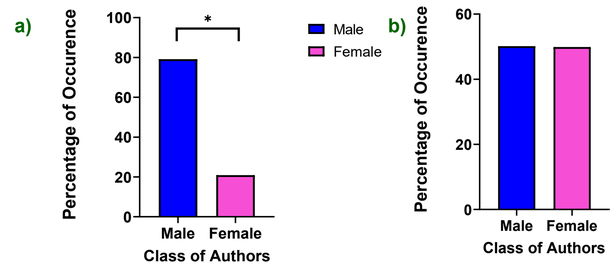

Figure 1: a) Percentage of total scent-marks deposited by the sexes. b) Percentage of total sniffing behaviours exhibited by the sexes * indicates significant difference.

Plate 3: Male red-ruffed lemur

- Female fertile scent had a different chemical profile to non-fertile scent and a number of compound types were found (Fig 2 and Table 1).

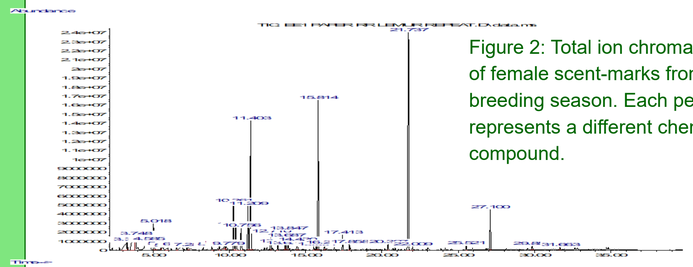

Figure 2: Total ion chromatogram of female scent-marks from breeding season. Each peak represents a different chemical compound.

Compound Name	Chemical Class
Benzaldehyde	Aldehyde
Linalool	Alcohol
1-Hexanol, 2-ethyl-	Alcohol
Ethanol, 2-phenoxy-	Ether
Butanoic Acid	Fatty Acid

Table 1: Example compounds identified in fertile female scent-marks.

Discussion

- Behavioural results are typical of other lemur species[7,8].
- Scent-marking behaviours observed make species a suitable target for the new enrichment.
- Difference in compounds during seasons suggests a role in signaling female fertility[9].
- Using key fertile key compounds could have a positive effect on breeding.

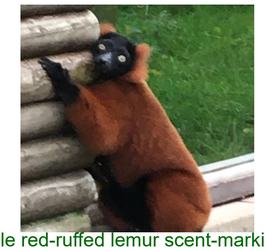

Plate 4: Male red-ruffed lemur scent-marking

Next Steps

- Identify and verify key compounds from fertile scents.
- Blend key compounds in lab to create a novel scent enrichment.
- Present scent to lemur species in zoos.
- Assess effects on welfare and breeding behaviours.

Plate 5: Male red-ruffed lemur

Plate 6: a) Female black-and-white-ruffed lemur (*Varecia variegata*). b) Female crowned lemur (*Eulemur coronatus*). c) Male ring-tailed lemur (*Lemur catta*).

References

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