sensitivity and "mode of life". In her opinion, the ritualized pointing posture originated from the animal's tendency to extend its neck to smell. Arkwright (1902) makes the intriguing suggestion that hunting by smell may select for "spreading nostrils", a diagnostic trait of New World monkeys.

Ewer also stresses that ritualized pointing in wolves is a silent posture that may occur in association with a "group ceremony", similar to the "greeting ceremony" seen in African hunting dogs. Glander (1975) has described the "greeting ceremony" in mantled howlers, and the "information centre" noted above may be similar in form and function to the wolf and hunting dog ceremonies discussed by Ewer. Such apparent similarities in behavior may represent convergent mammalian patterns.

Discussing pointing dogs, Scott and Fuller (1965) point out that the tendency to crouch is primitive in mammals and make the interesting suggestion that ritualized pointing represents "selection to restrain attack". This view may be generalized to the idea that ritualized pointing indicates a restraint on selfish behavior and the tendency to forage solitarily for maximum individual gain. Social foraging has been described in howlers (Milton, 1980; Glander, 1975; Jones, 1996), and howlers are noted for their communal and non-aggressive tendencies (e.g., Wilson, 1975).

The behavior described in this note is consistent with Milton's (1980) conclusion that foraging in howlers is "goal directed". The pattern of decision-making leading individuals to follow different pointers (both Type 1 and Type 2) to alternative feeding sources may explain patterns of subgrouping and differential assortment of group members. These patterns of behavior and the vocalizations accompanying them require systematic study in the future.

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Adaptation to Natural Food Resources by Semi-free Common Marmosets (*Callithrix jacchus*): Preliminary Results

Hartmut Rothe

In 1995, the colony of common marmosets of the Institute of Zoology and Anthropology, University of Göttingen, moved from an air-conditioned and artificially illuminated laboratory to a 6.3 ha outdoor enclosure in the vicinity of Göttingen, Lower Saxony (51°27´N, 10°03´E). A detailed description of the enclosure and the new buildings has been given elsewhere (Rothe, 1996; Rothe *et al.*, 1997). All our marmosets were born in captivity (5th to 8th filial generation). Before their removal to the open-air enclosure the animals had no contact with predators and were not forced to search for food.

From April to July 1995, the marmosets acclimatised to the new surroundings and to the Middle European climate (Köppen and Geiger, 1961). During this time each group was housed in a wooden hut (2.7 x 2.7 x 2.4 m) with roofed veranda 1.3 x 2.7 x, 2.4 m) and adjacent wire-mesh cage (1.3 x, 1.3 x 2.6 m). The animals were fed twice daily (details in Ahlborn and Rothe, in press). In July 1995 the marmosets were allowed access to the open-air enclosure. Each social group had a home-range of about 1.0 ha during the first year, and from 1996 it increased to *c.* 2 ha (details in Ahlborn and Rothe, 1997; Behet and Rothe, in review; Suchi and Rothe, 1999). The animals are fed regularly twice a day; the feeding sites are spread throughout the home-range, including the hut-cage-complex. Depending on the weather, the animals remain in the enclosure until mid-November. During the winter they are again confined to the hut-cage-complex. The data were taken *ad libitum* (Martin and Bateson, 1986).

Preying on Animals

During the first year in their new habitat the marmosets,

Table 1. List of prey items of semi-free common marmosets (*Callithrix jacchus*).

Prey/Year	1995	1996	1997	1998
Gastropoda	Pulmonata (Arionidae)	Pulmonata (Arionidae)	Pulmonata (Arionidae)	Pulmonata (Arionidae)
Clitellata		Lumbricida (*Lumbricus*)	Lumbricida (*Lumbricus*)	Lumbricida (*Lumbricus*)
Arachnida			Opiliones	Opiliones, Araneae
Insecta	Hymenoptera (*Apis*, *Vespa*, *Bombus*)[3]	Isopoda (*Porcellio*)	Isopoda (*Porcellio*)	Isopoda (*Porcellio*)
		Hemiptera (*Philaenus*[2])	Chilopoda[1] (*Geophilus*)	Chilopoda[1] (*Geophilus*)
	Lepidoptera (Satyridae; imagines and caterpillars)	Hymenoptera (*Apis*[3], *Vespa*[3], *Bombus*[3]; Formicidae	Hemiptera (*Philaenus*[2])	Hemiptera (*Philaenus*[2])
	Diptera (Muscidae)	(Pupae))	Dermaptera (*Forficula*[2])	Dermaptera (*Forficula*[2])
		Coleoptera (Carabidae, Coccinellidae)	Saltatoria (*Tettigonia*, *Gryllus*)	Saltatoria (*Tettigonia*, *Gryllus*)
		Lepidoptera (imagines and caterpillars: Totricidae, Pyralidae, Pieridae, Nymphalidae, Geometridae, Satyridae, Lycaenidae)	Planipennia (*Chrysopa*) Hymenoptera (*Apis*[3], *Vespa*[3], *Bombus*[3]; Formicidae (Pupae), Cynipidae, Ichneumonidae)	Planipennia (*Chrysopa*) Hymenoptera (*Apis*[3], *Vespa*[3], *Bombus*[3], *Polistes*; Formicidae (Pupae), Cynipidae, Ichneumonidae)
		Diptera (Culicidae, Scatopsidae, Bombylidae, Dolichopodidae, Syrphidae, Muscidae)	Coleoptera (Carabidae, Phalacridae, Coccinellidae, Elateridae, Cerambycidae, Chrysomelidae, Curculionidae)	Coleoptera (Carabidae, Phalacridae, Coccinellidae, Elateridae, Cerambycidae, Chrysomelidae, Curculionidae)
			Lepidoptera (imagines and caterpillars:Totricidae, Pyralidae, Pterophoridae, Lasiocampidae, Noctuida, Arctiidae, Notodontidae (only caterpillars), Pieridae, Nymphalidae, Geometridae, Satyridae, Lycaenidae)	Lepidoptera (imagines and caterpillars:Totricidae, Pyralidae, Pterophoridae, Lasiocampidae, Noctuida e Arctiidae, Notodontidae (only caterpillars), Pieridae, Nymphalidae, Geometridae, Satyridae, Lycaenidae)
			Diptera (Culicidae, Scatopsidae, Tabanidae, Bombylidae, Dolichopodidae, Syrphidae, Muscidae)	Diptera (Culicidae, Scatopsidae, Tabanidae, Bombylidae, Dolichopodidae, Syrphidae, Muscidae)
Aves			Oscines (*Emberiza*, *Motacilla*, *Erithacus*)	Oscines (*Emberiza*, *Motacilla*, *Erithacus*)
Mammalia	Rodentia (*Arvicola*)	Rodentia (*Arvicola*)	Rodentia (*Arvicola*)	Rodentia (*Arvicola*)

[1] Caught but not eaten.
[2] Caught and manipulated but seldom eaten.
[3] Chased, seldom caught, never eaten.

especially the alpha-animals, seldom tried to catch insects, spiders or snails (*c.* 0.4-0.5% of their daily activity), and only every fourth attempt of the animals to catch animal prey was successful. Furthermore, the behaviour was evidently rather more playful or exploratory than aimed at getting food. Since 1996, however, the marmosets have increased substantially the amount and the variety of their prey. Prey-catching was no longer playful, but obviously goal-oriented and quite effective. The marmosets were "hunting" very successfully, even during slight rain or cool weather, when prey would be resting, immobile on the underside of the branches or leaves or on the grass blades and other herbs from where they were skilfully grabbed and eaten. Very often the marmosets would systematically turn over the leaves of linden, maple and alder trees, and were seen to eat the caterpillars of a number of species of Lepidoptera. Several animals have 'specialised' in searching on the ground in the tall grass by "combing" the tussocks, whereas others have been observed stripping the prey with one or both hands from flowers (e.g., the umbels of tansy) or from grass blades.

Figure 1. Remains of *Erithacus* caught and partially eaten by the marmosets

Figure 2. Linden tree with sap-holes cut by the marmosets

The majority of the animal prey are insects, but they have frequently been seen to eat spiders, young snails (*Arion*), and worms (*Lumbricus terrestris*), and sometimes small voles (*Arvicola*), and birds (especially *Erithacus*) (Fig. 1, Table 1). Unfortunately, we have not seen how they catch the birds and the voles. Since 1997, animal prey, most especially Gastropoda, Diptera and Lepidoptera (mostly imagines and caterpillars of *Vanessa urticae*, *Inachis io*, and *Gonopteryx rhamni*) has come to comprise a substantial portion of the daily food of the marmosets when they have access to the outdoor enclosure (May to November).

Exudate-feeding

Exudate-feeding was not observed during the first season (1995), but since 1996 all marmosets except for the infants have been seen to spend much time each day gnawing and licking on the trunk and twigs of linden and maple trees (Fig. 2). Lime trees are preferred, maple trees are gouged less often, and birch trees are generally avoided. The marks were regularly checked and deepened during the entire season. Very often these holes were besieged by insects, especially by flies and hover flies, which were then caught by the marmosets.

Foraging on Plants (Flowers, Leaves, Buds)

In 1995 and 1996 the marmosets were not seen to gnaw at, or forage on, plants, i.e. flowers, buds, leaves, twigs. Since the Summer of 1997, however, they regularly and very intensively suckle and chew on the blossoms of trefoil, vetch, deadnettle, rape, willow-herb, linden and maple trees; they also chew the leaves of linden, robinia and alder trees, of trefoil, dandelion, orach, tansy, speed well, camomile, different kinds of knotgrass and grass, fresh fruits of linden and maple trees, and shepherd's purse as well as the infructescences of grass, plantain, linden and maple trees. Apparently the animals do not really eat these items but only chew and crush the material. It is quite possible, however, that they swallow some particles or the exudates of the plants. Since the marmosets do not chew on all plants which are growing in their home range, it may be assumed that they select the plants for such as their taste or nutritive value.

Conclusion

It was evident from the *ad libitum* observations that the laboratory-born marmosets were still learning about the natural food sources available to them through the first one or two summer seasons after their release to the new habitat. We believe that an increase in the diversity of their home range would be accompanied by a corresponding increase in the use of natural food resources due to (1) greater locomotor activity and energy demands and (2) an expanded knowledge of the edible animal and plant foods available to them.

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News

The Scientific Names of the Howling Monkeys, *Alouatta*, from the Guianas and the Atlantic Forest

An article published recently by Rylands and Brandon-Jones (1998) examined the correct scientific name for the red howling monkey occurring in the northeastern Amazon in Brazil, Venezuela and the Guianas, as well as that of the brown howling monkey from the Atlantic forest in Brazil and northern Argentina. The investigation arose from confusion over the identity of the red howlers either side of the Rio Trombetas, north of the Rio Amazonas in Brazil. Lima *et al.* (1990), Lima and Seuánez (1989, 1991) and Bonvicino *et al.* (1995) had concluded that the howlers either side of this river were distinct and indicated that *A. seniculus stramineus* occurred to the west, whereas *A. s. macconnelli*, a form described by Elliot (1910) from the coast of Guyana, occurred on the east side. Vassart *et al.* (1996) subsequently referred to the red howler in French Guiana as *A. s. macconnelli*. This information contradicted the long-standing recognition of the subspecific name of *stramineus* (meaning 'straw-coloured') as the howler occurring in the Guianas (see Husson, 1957, 1978). Meanwhile, Sampaio *et al.* (1996) and Figueiredo *et al.* (1998) had argued that the two forms either side of the Rio Trombetas were *not* separable even at the subspecific level.

This confusion, along with a contradictory type locality ascribed to *Simia straminea* Humboldt, 1812 by Hill (1962), which combined localities in Pará, Brazil with the Río Orinoco in Venezuela, led us to investigate the nomenclatural history of the howling monkeys of the region. To our surprise, we discovered that the type specimen of *straminea* in the Museum National d'Histoire Naturelle, Paris, had been reclassified as a female of the sexually dichromatic species *A. caraya* by Isidore Saint Hilaire in 1851. Elliott (1913) had likewise described the holotype as a female specimen of *A. caraya*. Cabrera (1957), in his classic catalogue of the South American mammals, and Carvalho (1965), who listed the mammals collected by Alexandre Rodrigues Ferreira and taken by Geoffroy Saint Hilaire from the Lisbon Museum in 1808 following Napolean's conquest of Portugal, were both aware that Isidore Saint Hilaire (1851; Rode, 1938) and Elliot (1913) had identified the holotype as a female *A. caraya*, but discarded it as improbable! At our request, Drs. Laurent Granjon and Michel Tranier, mammalogists at the Museum National d'Histoire Naturelle, kindly examined the type, and Dr. Colin P. Groves, Professor at The Australian National University, Canberra, later photographed it. Although in poor condition, the mounted holotype is undoubtedly a female *A. caraya*. This renders the name *straminea* a junior synonym of *caraya*, and therefore not available for the red howlers. Further research into the systematics of the red howlers from northern South America is necessary to establish the true name for those in the northeastern Amazon and Venezuela. A number of names will need to be considered, including such as *Mycetes auratus* Gray, 1845 and *M. laniger* Gray, 1845.

Turning to the brown howlers of the Atlantic forest, the controversy lies in the validity of two names given in the same year: *Simia guariba* Humboldt, 1812 and *Stentor fuscus* Geoffroy Saint Hilaire, 1812. When discussing *Simia straminea* Humboldt 1812, Carvalho (1965) doubted Isidore Saint Hilaire's identification of the holotype as a female *A. caraya* and indicated that the specimen might be an *A. fusca*! It is not, but this led us to check on the history of the nomenclature of this species as well. It was Hershkovitz (1963, p.397) who claimed that, although predating *Stentor fuscus* Saint-Hilaire, 1812 by two months (as related by Thomas, 1913), *Simia guariba* Humboldt, 1812 is a primary homonym of Saint-Hilaire's (1806) *guariba*, which Hershkovitz (1963), therefore, regarded as a junior objective synonym of *Alouatta belzebul* (Linnaeus, 1766). However, unlike "*simia belzebuth*" and "*simia seniculus*", the name guariba is not mentioned binominally by Saint-Hilaire (1806), who was evidently proposing it only as a vernacular name with which to distinguish the howler, *Alouatta belzebul*, from the spider monkey, *Ateles belzebuth*. We concluded, therefore, that *Simia guariba* Humboldt, 1812 does *not* have an available senior homonym, and Hill (1962) and Hirsch *et al.* (1991), following Cabrera (1957), were correct in employing it as the species name for the Atlantic forest brown howling monkey. *Stentor fuscus* Saint-Hilaire, 1812 is a junior synonym. The correct name for the Atlantic forest brown howling monkey is *Alouatta guariba* (Humboldt, 1812).