# Foraging ecology and time-activity budget of the Arunachal macaque *Macaca munzala* – A preliminary study

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**The Arunachal macaque *Macaca munzala* was discovered in 2003 from the high altitudes of western Arunachal Pradesh, and described as a new species in 2005. Virtually nothing is yet known of this new macaque species. In order to generate scientific knowledge on this primate, a field study was conducted to collect information on its ranging patterns, diet and behaviour. Two multimale multifemale troops were observed for a period of 112 h in Zemithang valley, Tawang District. The two troops, consisting of 22 and 13 individuals respectively, spent on an average, 48% of the observed time in moving and foraging, 36% in sitting and resting, and 16% in social interactions. Foraging alone accounted for 29% of the time-activity budget and was the major activity of the macaques throughout the study. The troops had home ranges of 28 ha and 16 ha respectively, much smaller than those of other macaque species studied in similar environments elsewhere. The macaques ranged largely in the secondary scrub habitat in the study area, where they were observed to feed mainly on *Elaeagnus parvifolia* and *Erythrina arborescens*. Although fruits of the former species constituted more than 65.8% of the overall diet, this largely frugivorous diet is likely to be seasonal. Our preliminary results suggest the ranging and foraging behaviour of the Arunachal macaque to be largely in response to food resource availability. The species also appears to be a typical member of the *sinica* species-group of the genus in exhibiting a matrifocal society with tolerant social relationships.**

**Keywords:** Arunachal macaque, diet, foraging ecology, home range, *Macaca munzala*, time-activity budget.

THE Arunachal macaque *Macaca munzala*, discovered from Tawang and West Kameng districts of western Arunachal Pradesh is a species of the high altitudes of the Eastern Himalaya, occurring largely between 1800 and 3000 m, and reported[1] up to 3500 m, the highest altitude for the occurrence of any macaque in the Indian subcontinent[2]. Belonging to the *sinica* species-group, the Arunachal macaque shares morphological characteristics with the Tibetan macaque *M. thibetana*, and the Assamese macaque *M. assamensis* in external morphology[1]. It is also believed to be sympatric with the Assamese macaque, a species distributed more at lower altitudes, occurring mainly in the subtropical, broad-leaved, evergreen forest between 150 and 1900 m, and extending[3–5] to a maximum of 2750 m.

Nothing much is known yet about the field biology of the Arunachal macaque and how it differs in its behavioural ecology from the other members of the species-group. It is also not known whether it is a habitat or diet specialist or a generalist like the Assamese macaque, and how far it ranges, given its distribution in the high altitudes where resources are limited during certain times of the year. Such information is crucial not only in understanding its evolutionary history but also in evaluating the conservation status of this newly discovered primate. This becomes particularly important as the Arunachal macaque is thought to be possibly threatened due to its conflict with the local people over crop depredation and occasional hunting. This led to a short, two-month study on two troops of the Arunachal macaque, carried out during July–August 2005, to investigate the ranging patterns, foraging ecology and time-activity budget exhibited by the species.

## Methods

### *Study area*

After initial surveys in the Tawang District of the State, the Zemithang valley (27°42′N, 91°43′E), located approximately 100 km northwest of Tawang town, was chosen for this investigation (Figure 1). Four Arunachal macaque troops were initially identified within a 2 sq. km area in the valley, and later during the study, two other troops were noticed in the area. Two of these were selected for intensive study. The troops in this area were relatively less shy and allowed for closer observation than elsewhere in the district, possibly, due to a general ban on hunting of wildlife in the area imposed by the local village councils.

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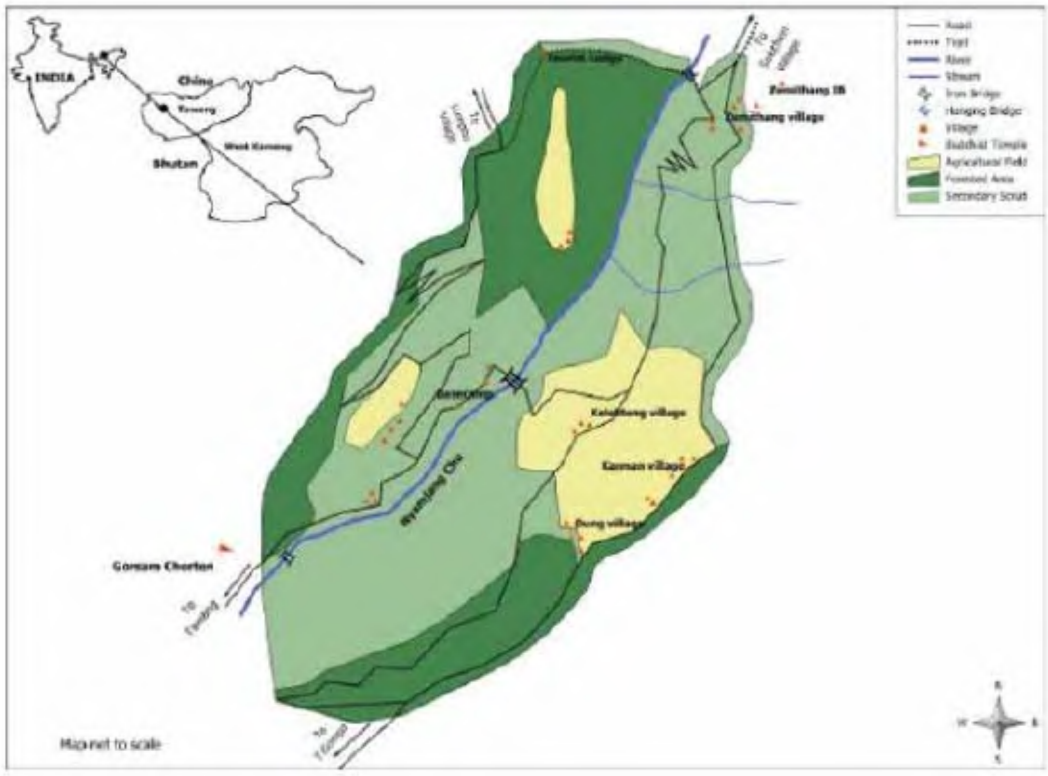


**Figure 1.** Schematic representation of the study area in the Zemithang region, Tawang District where the study on the Arunachal macaque *Macaca munzala* was conducted.

The altitude within the study area (Figure 1) ranged from 2000 to 2400 m, and comprised of secondary scrub vegetation, forested areas (subtropical broadleaved evergreen forest) and agricultural fields. The secondary scrub vegetation was dominated by *Erythrina arborescens*, *Elaeagnus parvifolia* and *Debregeasia longifolia*, with *Pteridium* (a species of fern), and *Aconogonum molle* forming the ground cover. A large forested patch occurred west of the river Nyamjang Chu, which flows through the study area; the common tree species here were *Schima wallichii*, *Alnus nepalensis*, *Rhus javanica*, *R. wallichii*, *Populus* sp., *Engelhardia* sp., *Quercus griffithii* and *Q. lanata*; while shrubs like *Aconogonum molle* and *Viburnum* sp. formed the dense undergrowth. Agricultural fields in the area were usually close to settlements and the crops grown included mainly millet and maize. Heavy to moderate rain showers occurred throughout the study period, while foggy conditions prevailed regularly early in the day. Average temperatures of 17 and 35°C respectively, were recorded during early morning and midday during the study period.

### *Study troops*

Two troops, respectively called the Bridge Troop and the Rock Troop owing to certain features of their home ranges, were chosen for this study. The Bridge Troop was larger, with 22 individuals, and comprised of five adult males, six adult females, four subadults and seven juveniles of both sexes. All six females in the troop had infants at the beginning of this study. One of the infants got left behind in a kitchen garden in Zemithang village in June, when the troop was being chased away by people, and was later adopted as a pet by a villager. The presence of only five infants with six adult females was one of the notable features used to identify and locate the troop.

The smaller Rock Troop had 13 individuals comprising three adult males, four adult females, two subadult females and four juveniles of both sexes. One of the subadult females had half of her left forelimb missing and this was one of the characters used in the identification of this troop. Only one female had an infant in this troop and she appeared to be younger than the other three females in the troop. Of the four juveniles in the troop, one appeared younger than the others and an adult female was regularly observed to suckle this juvenile.

### *Data collection and analysis*

Observations on the two troops were made either from close distance (50–75 m) by following them on foot or from selected vantage points in the area using a pair of 8 × 40 binoculars. Information on time-activity budgets, ranging patterns and foraging ecology of the two troops was collected

over two months, July and August 2005, during regular follows spread over each month. The troops were usually active between 0600 and 1800 h, and observations were thus carried out within this time period. Due to the inhospitable terrain, however, the troops could be followed throughout the day only on few occasions. The rest of the data were collected from sporadic scan sampling opportunistically over each day. Whenever possible the troops were located at their sleeping sites during the late afternoon and followed from early morning the next day as they left the site. Only group scan sampling[6] was carried out and data on both behaviour and ecology were recorded at 5 min intervals.

The behaviours that were considered in the time-activity budget included sitting, resting, moving, foraging, autogrooming, alarm calling, and social interactions such as allogrooming, playing, mounting, mating, and aggression. Resting refers to those observations when the individuals of the study troops were in the trees, sleeping or just sitting in the shade of the foliage during the day, while sitting was when the individuals were found sitting on the ground or on large boulders in the area, not partaking in other activities such as grooming or foraging. Visibility was often a problem as the entire troop or a few individuals moved into the undergrowth or into forested tracts, where it was not possible to follow them further. On these occasions, data were collected only from those individuals that were visible during each scan.

When feeding, information on the plant species and the parts eaten by individual macaques was noted. When macaques were observed feeding on the ground, the location was searched after the macaques had left the area in order to investigate what they had fed on. Food plants and other plant samples from the area were collected and identified[7]. The locations of the troop and the paths traversed by it while moving and foraging were recorded during each observation period using a GPS (Garmin eTrex, Kansas City, USA) and used to map the home ranges of the troops. Two different home-range estimates were obtained, one using the minimum convex polygon (MCP) method (the program CALHOME[8]) and the other by directly joining the outermost points where each troop was located, using GIS. Information on other troops occurring in the area was also recorded whenever possible.

After initial exploration of the data, we decided to pool the scan samples (Table 1) into three sessions – morning (0430 to 1000 h), midday (1000 to 1500 h) and afternoon (1500 to 1830 h) respectively, as the data collected were often only by sporadic scan sampling and there were no data available for certain times of the day. Data on the two troops for the two months were also analysed together to obtain certain generalizations for the species, particularly as the study was conducted over only a short period of time.

## Results

### *Home range and habitat associations*

In order to map troop home ranges, 36 different locations for the Rock Troop and 46 locations for the Bridge Troop were obtained, with the troops often being found in many of these locations repeatedly during the study.

The two troops had distinct home ranges, which overlapped with each other partially. The larger Bridge Troop had an approximate home range size of 24 to 28 ha (estimated by the GIS and the MCP methods respectively), while that of the Rock Troop was estimated to vary from 11 to 16 ha by the same methods. The extent of overlap between the two home ranges was estimated to be 3.5 ha but the two troops were never observed simultaneously here. The Bridge Troop mainly ranged along the river Nyamjang Chu, while the Rock Troop occurred only on the slopes east of the river (Figure 2), with an average daily ranging distance of approximately 1.5 km for both troops.

Most locations of the two troops, observed during July and August, were in a secondary scrub habitat (Figure 2).

**Table 1.** Scan hours and scan samples for study troops of the Arunachal macaque *Macaca munzala* during July–August 2005

| | | July | | August | | Total | |
|---|---|---|---|---|---|---|---|
| Troop | Session | Hours | Sample | Hours | Sample | Hours | Sample |
| Bridge | Morning | 12.17 | 125 | 08.50 | 95 | 20.67 | 220 |
| | Midday | 08.83 | 127 | 05.25 | 65 | 14.08 | 192 |
| | Afternoon | 02.25 | 17 | 07.17 | 84 | 09.42 | 101 |
| | Total | 23.25 | 269 | 20.92 | 244 | 44.17 | 513 |
| Rock | Morning | 04.75 | 39 | 14.00 | 165 | 18.00 | 204 |
| | Midday | 07.67 | 126 | 20.42 | 235 | 28.01 | 361 |
| | Afternoon | 07.58 | 80 | 13.25 | 134 | 20.83 | 214 |
| | Total | 20.00 | 245 | 47.67 | 534 | 67.67 | 779 |
| Overall | | 43.25 | 514 | 68.59 | 778 | 111.84 | 1292 |

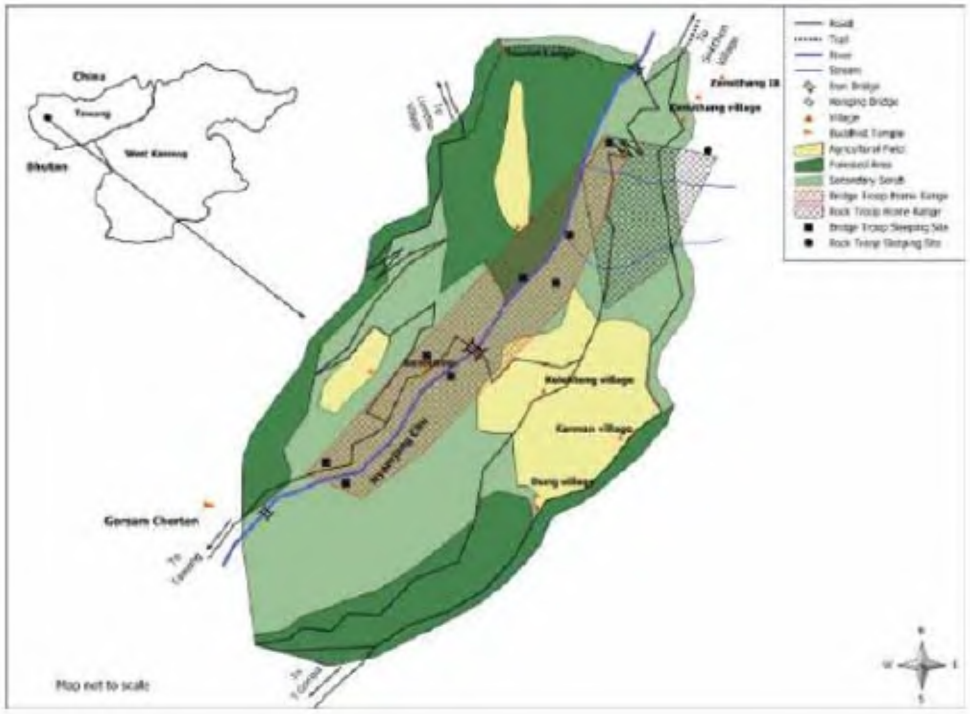


**Figure 2.** Map of the study area showing home ranges and sleeping sites of the two study troops of *M. munzala*. The home ranges have been calculated using the minimum convex polygon method.

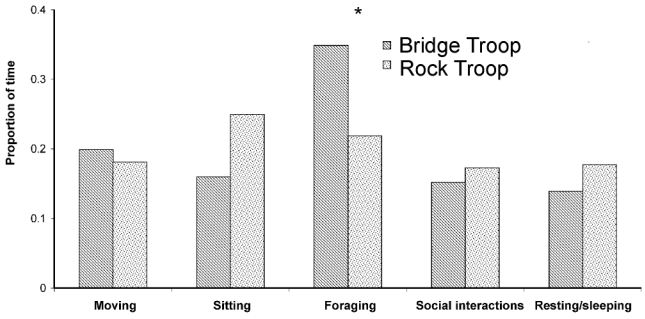


**Figure 3.** Time-activity budgets of the two study troops of the Arunachal macaque *M. munzala* during July–August 2005. The asterisk indicates a significant difference between the two troops in the proportion of animals that foraged during the study period (Mann–Whitney *U*-test, $P < 0.05$).

Only occasionally (5% of the observed locations) did the Bridge Troop move into the forested area west of the river Nyamjang Chu. The Rock Troop, in contrast, ranged only in secondary scrub and was never observed to visit the forested area on the slopes above its home range. The altitudinal range of the Bridge Troop varied from 1975 to 2100 m, while that of the Rock Troop ranged from 2050 to 2250 m.

### *Time-activity budget*

Instantaneous scan sampling of the two study troops yielded a total of 12,017 individual behavioural records during 1292 scan samples over a total time of *c.* 111 h (Table 1). Of these, 6436 and 5581 were individual behavioural records of the Bridge and Rock troops respectively.

The two study troops spent, on an average, 48% of the observed time in moving and foraging, 36% in sitting and resting, and only 16% in social interactions (Figure 3). Foraging alone accounted for 29% of the time-activity budget and was the major activity of the macaques throughout the study. The two troops exhibited similar time-activity budgets over the study period, with only the proportion of time spent in foraging being significantly different (Mann–Whitney *U*-test, $P < 0.05$; Figure 3); the larger Bridge Troop foraged more than did the smaller Rock Troop. A comparison of the performance of the different behaviours across the day revealed a significant difference in the distribution of resting and sleeping from that shown by the other behaviours (chi-square test, $\chi^2 = 11.9$, df = 2, $P = 0.003$; Figure 4); the study troops preferentially rested and slept during the late morning and mid-day.

Allogrooming was the most common social interaction observed, with approximately 12% of all individuals indulging in it, on an average, across the scans. This was followed by playing (3%), while other interactions such as agonistic interactions and sexual behaviour accounted for less than 1% of all behaviours displayed. Our study yielded 214 records of allogrooming (Table 2), and on virtually all occasions, regardless of the age–sex category of the parti-

cipating individuals, grooming was reciprocated within each bout. Adult males and females distributed their grooming differently across the age–sex categories of the recipients (*G*-test of independence, $G = 50.08$, df = 3, $P < 0.001$), tending to preferentially allogroom adult members of the same sex (Table 2). Subadult and juvenile individuals too distributed their allogrooming differently from each other ($G = 8.83$, df = 3, $P < 0.05$) with most juveniles preferring to groom adult females.

Agonistic interactions occurred at low levels within the study troops, with 0.3% of individuals displaying, on an average, mainly mild non-contact aggression, including open-mouth threats, stares and eye-flashes. It was not possible to compare the levels and nature of such interactions between the two study troops as they occurred very rarely.

Some of the other behaviours that were observed in the study troops, but the levels of which could not be measured accurately owing to their relative rarity, included presenting by both adult and subadult females to adult males, mounting between adult and subadult males, branch-shaking by dominant males and sexual behaviours such as the inspection of females, which were presumably sexually cycling, by males and sexual mounting of adult or subadult females by adult males.

### *Diet and feeding behaviour*

The study troops were observed to feed on approximately 25 species of plants, with two species, *E. parvifolia* and *E. arborescens* alone, forming about 88% of their diet during the study period (Table 3). Approximately 40 species of plants, however, contributed to the diet of the species across Tawang District (Kumar, pers. obs.). Of the total of 3452 individual feeding records obtained for the study troops, the food items in 119 of them (3.4%) could not be identified as the macaques were largely feeding on the ground and the parts eaten by them could not be found or identified. It is noteworthy that the macaques were observed to only feed on plant matter during the study, though local people reported insect larvae and earthworms to be part of their diet.

The fruits of *E. parvifolia*, a deciduous shrub fruiting extensively during July–August, formed the major constituent of the diet of the troops during the study period, accounting for 65.8% of the feeding observations, followed by *E. arborescens* (22.3%; Table 3). During April–June, prior to the intensive study period, however, the macaques mainly fed on leaves, leaf stalks, bark, pith and the flowers of the latter species. Given the short duration of the intensive study, we observed the study troops to forage on most plant species only sporadically; an exhaustive analysis of the entire diet composition for the species was thus not possible. Our observations *ad libitum*, however, did yield some noteworthy records. One of the other troops in the study area, for example, was found to feed on mud from an exposed slope alongside a stream on a particular occasion, suggesting the possibility of geophagy in this primate.

A month-wise analysis of the feeding records of the two troops showed an increase in the consumption of *E. parvifolia* during August, when the fruits of this species had ripened fully and were easily available, with a simultaneous decrease in the intake of *E. arborescens* and *Viburnum* sp. (Table 4), the fruiting season of the latter species also having come to an end.

Millet was represented in the diet of the Bridge Troop, as this troop occasionally ventured into the crop fields in the area. This troop also raided fruit orchards, scavenged on human-generated garbage, and rarely raided the kitchens of houses within its home range.

### *Sleeping sites*

The Bridge Troop was observed to use nine sleeping sites during the study period, all of which were located between large boulders with dense shrubby undergrowth, overlooking the river Nyamjang Chu. The average height of the sleeping sites was 15 m amidst vegetation with a canopy cover of *c.* 25%. Two of the nine sleeping sites of this troop consisted of a bare, relatively unprotected, *Prunus cerasoides* tree, which the individuals used even in heavy rain, and a neighbouring *Rhus wallichii* tree; all the other sites were in secondary scrub habitat. The Rock Troop, on the other hand, used only a single sleeping site in stunted shrubby vegetation on a cliff face, high up on a slope at 2160 m, overlooking Zemithang village (Figure 2).

**Table 2.** Allogrooming events observed across age–sex classes in the study troops of *M. munzala*

| Actors | Recipients | | | |
|---|---|---|---|---|
| | Adult males | Adult females | Subadults | Juveniles |
| Adult males | 20 | 4 | 16 | 12 |
| Adult females | 6 | 55 | 14 | 18 |
| Subadults | 8 | 14 | 5 | 3 |
| Juveniles | 2 | 30 | 5 | 2 |

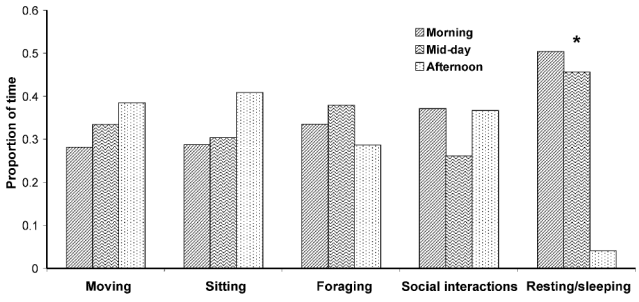


**Figure 4.** Distribution of different behaviours displayed by the study troops of *M. munzala* across the day during July–August 2005. The asterisk indicates a significant difference in the distribution of resting and sleeping over different times of the day from that shown by the other behaviours (chi-square test, $\chi^2 = 11.9$, df = 2, $P = 0.003$).

**Table 3.** Food plants consumed by *M. munzala* during the study. Percentage contribution to the diet is given for only those species that were consumed by the study troops during the two-month intensive study

| Species | Family | Habit | Parts eaten | Percentage contribution |
|---|---|---|---|---|
| *Elaeagnus parvifolia* | Elaeagnaceae | Shrub | Flower, fruit | 65.8 |
| *Erythrina arborescens* | Fabaceae | Small tree/shrub | Leaf, young shoot, flower, pod, bark | 22.3 |
| *Viburnum* sp. | Sambucaceae | Shrub | Fruit | 1.6 |
| *Aconogonum molle* | Polygonaceae | Shrub | Stem | 1.4 |
| *Morus acidosa* | Moraceae | Small tree | Young leaf, shoot | 1.1 |
| *Selinum tenuifolium* | Apiaceae | Herb | Whole plant | 0.6 |
| *Debregeasia longifolia* | Urticaceae | Small tree/shrub | Young leaf, fruit | 0.4 |
| Unknown | | Herb | Leaf | 0.3 |
| *Persicaria capitata* | Polygonaceae | Herb | Stem | 0.2 |
| *Rhus wallichii* | Anacardiaceae | Tree | Fruit | 0.1 |
| *Arundinaria* sp.? | Poaceae | Bamboo | Bamboo leaf | – |
| *Cirsium verutum* | Asteraceae | Herb | Flower | – |
| *Coriaria napalensis* | Coriariaceae | Shrub | Fruit, new leaf? | – |
| *Elaeagnus pyriformis* | Elaeagnaceae | Climbing shrub | Fruit | – |
| *Fagopyrum dibotrys* | Polygonaceae | Herb | Leaf, stem | – |
| *Fragaria nubicola* | Rosaceae | Herb | Fruit | – |
| *Glochidion* sp.? | Euphorbiaceae | Shrub | Fruit | – |
| *Hedychium* sp.? | Zingiberaceae | | Inner stem, flower | – |
| *Laportea terminalis*? | Urticaceae | Herb | Young leaf, shoot | – |
| *Magnolia campbelli* | Magnoliaceae | Tree | Base of petal | – |
| *Primula denticulata* | Primulaceae | Herb | Peduncle | – |
| *Prunus cerasoides* | Rosaceae | Tree | Leaf | – |
| *Pteracanthus urticifolius*? | Acanthaceae | Shrub | Young leaf, shoot | – |
| *Pteridium* sp. | | Fern | Rhizome | – |
| *Pyrus* sp.? | Rosaceae | Tree | Fruit | – |
| *Rhododendron keycei* | Ericaceae | Small tree | Flower | – |
| *Rubus ellipticus* | Rosaceae | Shrub | Fruit, inner stem | – |
| *Salix sikkimensis* or *S. daltoniana* | Salicaceae | Shrub | Catkin | – |
| Species of mushroom | | Mushroom | Whole | – |
| Unknown | | Shrub | Fruit | – |

## Discussion

Primates that exploit highly dispersed and unpredictable food supplies are known to have larger home ranges than species feeding on dense resources that are evenly distributed and predictably available[9]. Larger home ranges would, in turn, necessarily entail relatively greater foraging distances and higher proportions of travelling time in the daily activity budget of individuals.

The two troops of the Arunachal macaque did not appear to have large home ranges, at least during the months of July and August when this study was carried out, compared to those of other macaques living in higher latitudes and in cold temperate regions. Rhesus macaque populations occurring in such environments, for example, range[2,10–13] over large areas of 8–22 km, while a population of Japanese macaques in a cold temperate forest had an even larger home range[14]. The small home ranges of the Arunachal macaque were correlated with high levels of foraging activity but relatively small distances travelled daily in search of food. Such short ranging distances were possible because of the ready availability of food resources with both *E. parvifolia* and *E. arborescens*, the two principal food plants of the macaque during July and August, completing their full growth phase during these two months.

The inter-troop variation in home-range size of the two study troops could be due to differences in their group size, a finding reported in other species of macaques as well[13,15,16]. The variation in the number of sleeping sites between the two troops also reflects the difference in home range size, possibly mediated by the availability of suitable roosting sites within them. The Rock Troop had a small home range close to the cliffs where it roosted, while the Bridge Troop ranged along the river Nyamjang Chu and used several tall trees overlooking the river as alternative sleeping sites. The selection of sleeping trees along river edges and cliffs appears to be a behaviour associated with predator avoidance, as has been reported for *Macaca fascicularis*[17], although this needs further confirmation.

The involvement of a relatively greater proportion of the troop individuals in foraging and moving, exhibited by the Bridge Troop over that by the smaller Rock Troop, could be due to three factors. It is possible that the larger size of the former troop required individuals to move and forage more, simply because it was difficult to obtain

**Table 4.** Percentage contribution of major food plants to the diet of the two troops of *M. munzala* during July–August 2005. Figures in brackets indicate the number of feeding records for that month

| | Bridge Troop | | Rock Troop | |
|---|---|---|---|---|
| Major food plants eaten | July (1054) | August (1159) | July (465) | August (774) |
| *E. parvifolia* | 31.7 | 75.8 | 52.4 | 87.3 |
| *E. arborescens* | 36.0 | 16.6 | 41.7 | 11.8 |
| *Viburnum* sp. | 4.1 | 1.0 | 3.9 | 0.2 |
| *A. molle* | 4.7 | 0.8 | – | – |
| *M. acidosa* | 4.8 | – | – | – |
| Millet | 3.9 | – | – | – |

adequate food for a greater number of animals. Secondly, the frequent occurrence of this troop close to crop fields and human habitations may have led to them being chased more often by the local people or harassed by village dogs. The Rock Troop, in contrast, rarely ventured close to human settlements. Thirdly, the overlap in the home range of the Bridge Troop with those of three other neighbouring troops may have caused the individuals of this troop to intensify their foraging activity and perhaps even move more to avoid interacting with the members of those troops. The Rock Troop, in contrast, had a small home range that overlapped partially with the Bridge Troop but was far away from those of the other troops.

Our preliminary observations of allogrooming and other affiliative interactions *ad libitum* suggest that the Arunachal macaque may have a matrifocal society, characterized by a close association between grooming and social bonding, as exemplified by the Assamese macaque and other closely-related macaque species as well[18,19]. The extremely low levels of observed intra-troop aggression also provide some evidence for the relatively tolerant social relationships that prevail in this society, again as has been proposed for the *sinica* species-group of this genus[20]. More detailed behavioural observations are, however, required before a complete characterization of the Arunachal macaque society can be attempted.

Sexual behaviour, including copulations with ejaculation, was only observed in the Rock Troop and not in the Bridge Troop, possibly because three of the four adult females of this troop were without infants, with the fourth female occasionally nursing a young juvenile. The six adult females of the Bridge Troop, on the other hand, had dependent infants, all of which appeared to form a cohort born in the spring (April–May) of that year. Fooden[4] has reported a spring birth peak in *M. assamensis* in Thailand, while Zhao[21] observed births during March in *M. thibetana*. Whether there exists a clear birth season in Arunachal macaque is not clear, as few other troops in the area had infants when observed casually earlier, during the month of February. The inter-birth interval in this species also remains unknown, though our preliminary observations suggest a period of two years (A. Sinha, pers. obs.), a feature that it potentially shares with *M. thibetana*[21]. *M. assamensis*, on the other hand, has an inter-birth interval of a year[4].

The high proportion of fruits in the diet of Arunachal macaque observed during the study suggests the species to be principally frugivorous. This, however, could be influenced by the phenology of the food species as, prior to the intensive study period, the macaques were observed to mainly feed on leaves. Fruit has also been reported to be the principal natural food of *M. assamensis* in Thailand[4]. A large number of plant food species has been reported in *M. thibetana*, with leaves being preferentially consumed over seeds and fruits[21]. The diet of the Arunachal macaque troops, occurring in forested tracts of the study area, may vary from that of the study troops as well, a hypothesis suggested by our observation that the principal food species of the study troops – *E. parvifolia* and *E. arborescens* – were not commonly found in the forested tracts. A parallel study on the diet of the Arunachal macaque in winter indicates that food may be a major limiting resource for the troops during the harsh winter months in the study area[22].

The continued presence of the focal troops in the secondary scrub habitat of the study area suggests that the species may be able to successfully adapt to changes in their natural environment, as do many other macaque species. This however, should not be considered necessarily beneficial to the species, as with the steady decline of natural habitats the macaques could become increasingly dependent on human-dominated landscapes, which would, in turn, lead to human–primate conflict. It is imperative that awareness and mitigation programmes for human–macaque conflict be initiated in cooperation with the local community and regional government departments in Tawang District, for the future welfare of the Arunachal macaque.

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