Group Formation in Adult Japanese Macaques

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The present work was determined by the need to join two groups of Japanese macaques (Macaca fuscata) in one big group. The first group (1.3) had been kept together for about eight years since their arrival and were constantly breeding. The individuals in the second group (1.2) were younger and the story of their coexistence was unknown. Formation of a new group was carried out on the basis of the second group. Starting with submissive animals, individuals from the first group were introduced step by step to the second one. A new group was successfully formed without severe fighting, and in a year began to breed normally.

INTRODUCTION

A group of Japanese macaques had been kept in Moscow Zoo for eight years when, in 1988, a new group of young animals of the same species was brought in. This presented the zoo with a problem. It was desirable to join all the animals in one big group in order to improve the genetic variability of the zoo's population, and moreover there were no extra outdoor cages big enough to house the new group separately. To solve the problem of integrating the animals we used methods of modification of social behaviour based on our own observations of this species in Moscow Zoo, and also on data from some investigations into the social structure of wild primates and the mechanisms by which it is maintained.

MATERIALS AND METHODS

The resident group (Group 1) of Japanese macaques was stable, constantly breeding, and had been kept in the zoo from 1980 to 1988. Its basic structure had not been changed during this period, all young animals being sold on reaching an appropriate age. The group consisted of four adults - a male (Pika, born in 1977) and three females (Rose and Belka, also born in 1977, and Kraska, born in 1979, a submissive female). The group was housed in two outdoor cages (each 6 m wide x 6 m deep x 8 m high), with connecting doors providing access between them. The animals also had a warm house (7 m x 2.5 m x 3 m) where they spent the night or sheltered in bad weather. They generally used the whole space of the outdoor cage, including trees, shelves and metal constructions, for moving and climbing.

In August 1988 the zoo acquired three young macaques (Group 2) - a male (Shampy, born in 1982) and two females (Wo, born in 1983, and Lee, born in 1982). At first we had to divide the outdoor cages and the 5 - house so that the two groups could be housed separately. But this way of housing was not very convenient, and it was clearly necessary to join the two groups in the long run.

Observations were performed through the bars on the side open to visitors. Such methods as all-occurrence sampling, the 'focal animal', etc., were used during observations.

RESULTS

For two months after Group 2 arrived and were placed in the outdoor cage next to that of Group 1, the number of agonistic interactions between animals of the two groups remained at the same level. The greater part of these was observed in males; there were, however, two fights between females too, initiated mainly by the individuals in Group 1 (Rose and Belka). It was obvious that if the two groups were joined at once, serious problems would be encountered. So Group 1 were moved for some time to another, distant cage where Group 2 could not see and hear them, and Group 2 were left in the cage where it was intended that the combined group would be housed.

In December 1988 Kraska was moved to Group 2. Her introduction did not cause any aggressiveness on the part of the Group 2 animals. As usual, her behaviour had all the features typical of a submissive individual. A month later, Belka was also introduced to Group 2. Some aggressive interactions were observed between Belka, Wo and Lee; however, Belka did not behave submissively in interactions with the other females, nor with the male Shampy, towards whom her attitude had all the characteristics of a dominant female's attitude towards a dominant adult male. Belka's relationship with Kraska supported her role of a dominant female. On the whole the various relationships of the individuals had stabilised within two weeks.

One month later Rose was introduced. There were a few aggressive interactions, firstly with Belka and Kraska; these interactions confirmed their former relationships. Several aggressive contacts with Wo and Lee, initiated by Rose, were observed. Towards Shampy Rose behaved like a dominant female towards a dominant male, while Belka immediately began to act as a subdominant in her contacts with Rose.

Two months later Pika was introduced. There was no fighting. The dominant females in the resident group at once began to behave with Pika as with a dominant male, paying no attention to Shampy. The females Wo and Lee took virtually no part in the interactions. All social contacts were initiated by Pika, Rose and Belka. After renewing his interactions with the females, Pika began to make contact with Shampy, whereupon the latter lay down flat, pressing his belly to the ground. Pika stood on Shampy's back for several minutes, and then went away. Shampy lay motionless until Pika came back and again stood on Shampy's back for several minutes. There were no further interactions between the males during that day.

Within about a week the interactions in the whole group had stabilised. There were practically no aggressive acts. Pika remained the J dominant male, while Shampy seemed to be fairly calm and comfortable. In a year Kraska had a baby. Judging by the behavioural characteristics of the infant, Pika was its father, though direct mating of Pika and Kraska was not observed. In 1992 Wo, Lee and Kraska all gave birth. Pika had mated only with Wo; both the other infants were Shampy's.

DISCUSSION

The first observations of the interactions of the two groups showed that it would have been impossible to join them at once. It is known (Wilson, 1978) that in a natural environment relations between macaque groups are based mainly on mutual avoidance. When meeting with each other they demonstrate antagonism which very often turns to fighting and bloodshed (Panov, 1983), where the winner is that group whose hierarchic social rank is higher. This depends on many different factors including the animals' ages and the duration of their coexistence. Thus our second group appears to be much weaker and hierarchically lower than the resident one.

We decided to place the newly-arrived group into the outdoor cage where we intended the united group to be kept. This was because we considered the forming of new pairs or groups of primates to be more effective if they join up on the territory of the socially weaker animals. As a rule, the social strength (or weakness) of an animal is determined by its age, sex and social status in interaction with other individuals. Putting together two animals is a situation of high social uncertainty, which is much higher for the animal coming into an alien environment. Sometimes the latter's reaction to this situation takes the form of a lack of confidence or avoidance of aggression, which gives it the opportunity to investigate the other animal. An aggressive reaction is usually observed in the socially weaker animal, and in fact is aggressive only in a formal sense, calming down in the absence of any reinforcement. The absence of an avoidance reaction on the part of the weaker animal means that it does not stimulate or reinforce aggression in the stronger one. Thus there is no bloodshed. This is our general principle in making introductions, though variations are possible in any particular case.

We planned to introduce animals from the first group into the second one step by step, beginning with the females. The point is that, according to our own observations and also to data in the literature, the females are the heart and the foundation of the social group (Kawamura, 1961; Bernstein and Sharpe, 1965; Vandenbergh, 1967; Baldwin, 1968; Neville, 1968; Budnitz and Dainis, 1975; Estrada, 1977). Low-ranking individuals support the hierarchy and subordination in the group (Rowell, 1966; Struhsaker, 1967; De Waal, 1977; Estrada, 1977). That is why we decided to start group formation by introducing low-rank individuals first.

When the second, 'weaker' group had got used to their new open cage, Kraska, whose social rank in the first group was the lowest, was introduced into the second group. The attitude of other animals towards a newcomer depends upon its own style of behaviour. As far as we can judge, the latter is determined by the sex and age, the social status and the individual social experience of the animal. Kraska's behaviour towards the other females and the male was typical of a low-rank female, which is what she had been for several years of her life in the first group. There was practically no aggression. Kraska did not initiate any interactions with the other females and demonstrated subordination when they attempted contact. She would come up to the male and invite grooming only when the other females were not near. She also approached food very carefully and only in the absence of the other animals.

Only after the relationships in the group seemed to have achieved a certain stability was Belka introduced. Belka was a subdominant in the first group, and there appeared to be a sort of coalition between her and the dominant female Rose. As compared with Kraska, Belka behaved much more actively, investigating the territory and initiating interactions with the young females, very often aggressively. However, this aggression to a great extent seemed to be a demonstration, and lunges with actual physical contact were only occasionally observed. She acted as a dominant, coming up to Shampy, suggesting grooming, and pushing off the other females. During feeding, too, Belka pushed away the females but gave way to the male. Her dominating behaviour, indeed, was somewhat excessive, which is typical of an animal that lacks self-confidence. Probably it could be accounted for by the fact that Belka's 'coalition partner' Rose was not present.

The next step was the introduction of the dominant female Rose. At first she had contact only with Belka, then initiated interaction with the young females, but in a rather aggressive way. The two females in the coalition supported each other (Kaplan, 1978). Rose's attitude towards the young male, Shampy, was distinctly subordinate, as if towards an adult dominant male. She would let him up to the food and push away all the other females, demonstrate subordination to him and invite grooming. But she acted as a dominant in her relationships with the other females, pushing them away when they started to groom Shampy.

After two months of keeping the group in this way, Shampy had changed. He had begun to behave more self-confidently in his relationships with the adult females, demanding grooming, pushing them away from food, and displaying aggression towards the zoo staff, which would have been absolutely untypical of him before Rose's introduction. This indicates that the presence of an experienced female can assist the development of male behaviour in a young, inexperienced male. It also shows that a male's domination is based not only on his age and strength, but also on his general social background in the group and the attitude of the females towards him (Neville, 1968).

When the relationships in the group had stabilised we performed the last stage of group formation - the introduction of Pika. We were sure that, being a strong adult male, he would become dominant in the group. The direct correlation between the age of male macaques and their hierarchic rank has been pointed out already in the literature (Johnson, Modahl and Eaton, 1982). We were afraid of violent confrontations between the males, ending in bloodshed. In the event, however, everything went off very peacefully. After being introduced to the whole group, Pika for some time (about half an hour) paid no attention to Shampy, interacting only with the females, mainly with Belka and Rose, whose behaviour supported Pika's dominance. Only after renewing his coalition with them did he initiate contact with Shampy, who at once obeyed Pika.

We only considered our group completely established when, a year later, three of the females, Kraska, Lee and Wo, had given birth. As mentioned above, only one infant, that of Wo, was Pika's, while both the others were Shampy's.

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