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Interactions of a Captive Maturing Female Hamadryas Baboon

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ABSTRACT

In the wild, hamadryas baboons (*Papio hamadryas hamadryas*) typically practice male philopatry, where females transfer out of natal units to avoid inbreeding (Swedell et al. 2011). However, little is known about hamadryas female transfer in captivity. In this study, we used focal animal sampling (Altmann 1974) to observe female transfer in a captive group comprised of two one-male units. The group includes a subadult female, whom we expected to transfer to the non-natal unit soon after reaching sexual maturity. We recorded the proximity between the subadult female and all other individuals, as well as affiliative and agonistic behavior exhibited between them. Although the size of the enclosure forces all individuals to be closer to each other than they may be in the wild, we hypothesized that the female would act in accordance with wild populations in transferring out of her natal group and practicing inbreeding avoidance (Swedell et al. 2011). Preliminary results show that at this time, the subadult female is still spending, on average, a greater percent of her time with her natal unit than with the non-natal unit. However, data collection needs to be continued for a longer period of time to determine whether or not a trend in proximity or behavior is present.

INTRODUCTION

In the wild it is typical for female hamadryas baboons to leave their natal families, also called one-male units, to join another. The family is the smallest of the species' social organization, which is divided into multiple levels. The next largest level consists of many one-male units headed by related males (Mori et al. 2007). This level of society is referred to as a band in most studies, but research performed on one group of hamadryas baboons in Erer-Gota, Ethiopia, recognized an additional level between the family and band, which they referred to as the clan (Swedell 2002). The final, and largest group, is called the troop. It consists of multiple bands (Mori et al. 2007).

This multi-level social structure is unique to *Papio hamadryas hamadryas*, and serves multiple purposes. At night, all one-male units come together on sleeping cliffs to protect themselves from predators (Kummer 1968). During the day, bands break apart from the troop to forage. This allows all individuals to get enough food in the sparsely vegetated regions in which they occur in the wild. If food availability is especially low, one-male units will separate from each other within the band (Schreier and Grove 2010). The flexibility of the multi-level social structure provides hamadryas baboons with several advantages in the arid semi-desert region of north eastern Africa where they live (Altmann 1974).

In order to maintain this multi-level social structure, sexually mature males must leave their natal units and start initial units, the beginning of their family. The males in these families typically find mates outside the clan or band level to avoid inbreeding. Sometimes adult males bring adult females into pre-existing units. This process typically involves violence between the female's mate and the challenger male, thus making it less common than other forms of female transfer (Kummer 1995). More commonly, young males start initial units with a juvenile or subadult female, which can be accomplished in a few different ways.

One way in which initial units are formed is when a follower, a subadult male attached to a one-male unit, kidnaps and begins herding an infant or juvenile female. As subadult males, followers typically have little chance of acquiring an adult female from an adult male by force, so they pursue more easily attainable sexually immature females. The subadult male takes the young female from her natal unit and cares for her like a mother until she reaches sexual maturity, when he can successfully mate with her. This tactic works particularly well for subadult males because there is little competition over sexually

immature females. In addition, fathers are rarely possessive over their juvenile daughters (Kummer 1995).

Similarly, a young female is sometimes courted by a follower, who takes special care not to upset her father. This practice may be similar to herding mentioned above; however, it is done in a more subtle, gentle manner. Instead of abruptly taking the female from her natal unit, the young male puts himself between the female and her unit, providing many opportunities for her to bond with him (Abegglen 1984). If all goes well for the follower, he may eventually be able to lead the young female away from her birth family, but if he acts too rashly, he can scare off the female or upset her father, delaying or perhaps ending his courtship. (Kummer 1995).

While herding and courting are typical methods for the transfer of subadult females, adult females, who are more valuable, are generally only obtained through fighting between the mate and rival. In general, adult males do not take adult females from other males. Kummer (1984) showed that males looking for females typically have respect for previously established bonds. However, there is one main exception to this rule. The dwindling strength and fighting ability of an old male is an invitation for younger, stronger males to take his females by force (Kummer 1995). Typically, when the health of the oldest male in a clan begins to decline, he is overthrown by the next oldest males, who split the former's females between themselves (Kummer 1995). If an adult male steals an adult female when her male is absent, and there is no fight between the males, then the transfer is unlikely to be permanent. The original male typically locates the stolen female and retrieves her (Pines and Swedell 2011).

Female hamadryas baboons do not usually transfer to other families voluntarily, unlike other primate species that undergo female transfer (Polo and Colmenares 2012). However, the female's preference appears to influence a male rival's decision of whether or not to attack her present mate to gain possession of her (Bachmann and Kummer 1980), (Sigg and Falett 1985). If she seems uninterested, the rival male may decide that the task is too difficult to pursue (Kummer 1984). Females become comfortable in their one-male units, over time becoming accustomed to the rank and order of things, and transferring to new families can be very stressful. Joining a new family presents the challenge of assimilating with new members, in what can be a very hostile environment (Polo and Colmenares 2012).

In a zoo setting that only contains two families, it is difficult to predict where a subadult female approaching sexual maturity might end up. It is unlikely that she will reproduce in her birth family because of inbreeding. In the wild, she would most likely transfer to a non-natal family, either through the courtship of or abduction by a subadult male follower. However, there are no followers in this exhibit. We predicted that the young female, Yara, would most likely join the other one-male unit, based on evidence of male philopatry in wild populations (Swedell et al. 2011). In the wild, the male of the non-natal unit would probably show little interest in her until she reached sexual maturity, but in a captive setting there may be increased interactions due to the forced close proximity of individuals. Alternatively, Yara's father may show more possessive behavior toward her in response to the other adult male's close proximity. We hypothesized that Yara would begin to spend more time in proximity to, and exhibit more affiliative behaviors with all members of the other, non-natal one-male unit, as she approached sexual maturity. We expected her to exhibit these changes with the non-natal male as she became interested in mating. We also predicted that she would display these changes with the non-natal females, as they would need to establish relationships and adjust the hierarchy upon her entrance to the unit.

METHODS

We observed a captive troop of hamadryas baboons at Riverbanks Zoo & Garden, in Columbia, South Carolina. The troop consisted of two one-male units, with a total of 7 individuals. Yara's unit consisted of one adult male (her father), two adult females (her mother and sister), and herself. The other unit included one adult male and two adult females, one of which was considerably old, at age 32. We began observations in March, 2014, and continued through June, 2014. During this time we accumulated

over 21 hours of observations during 13 sessions. The animals were not disturbed since we observed them from outside of the enclosure, where regular zoo visitors view them.

We used focal animal sampling (Altmann 1974) to record the behavior of the subadult female, Yara, including her use of space and her interactions with natal and non-natal unit members. We recorded instances when Yara was within close proximity to other individuals, dividing it into the following categories: contact, arm's length, $\leq 1\text{m}$, and $\leq 3\text{m}$. All behaviors exhibited were recorded, including those in which Yara interacted with other individuals. Social behaviors recorded included approach interactions, where one individual approaches another, as well as affiliative and agonistic behaviors. After approximately 21 hours of observations, we calculated the mean percent of time Yara was spending within close proximity to all individuals in the group. However, due to the temporary removal of the non-natal unit from the enclosure, we were only able to use about 9 hours for proximity analysis. From the 9 hours, we determined the percent of Yara's time spent within each proximity category to each individual for each day of observations, and then calculated means to account for all days.

RESULTS

Our preliminary data analysis shows that the subadult female, Yara, was spending more time in proximity to her natal unit (41.72%) than with the non-natal unit members (18.02%). This pattern was consistent among every proximity category. In addition, the data showed that Yara was spending a higher percent of her time in close proximity to females than to males of either group (Figure 1). Finally, it is important to note that a great deal of variation can be seen in day-to-day means among several proximity categories.

When considering only the males of the group, the data shows that Yara spent more time overall with the male of her natal unit, her father, Makale, than the non-natal male. This pattern is consistent among every proximity category except contact. She spent a higher percent of her time in contact with the non-natal male, Bubba (Figure 2).

With regard to her relations with adult females, Yara spent the most time in close proximity to her natal unit females. In fact, the proximity means were higher for natal unit females in all proximity categories. The difference is especially high in the contact category, where Yara spent more than 5 times as much time with her natal unit than with the other unit (Figure 3).

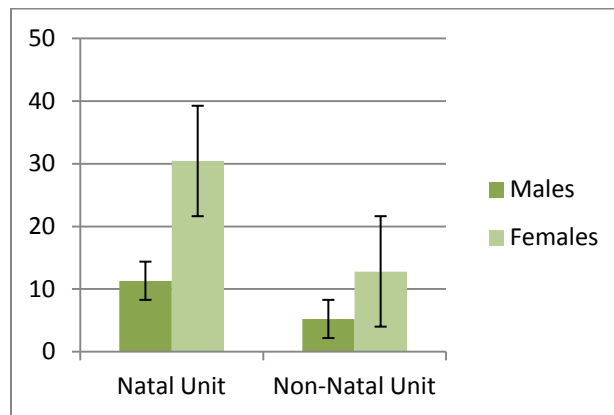


Figure 1. Mean percents of time the subadult female, Yara, spent in proximity to natal and non-natal units.

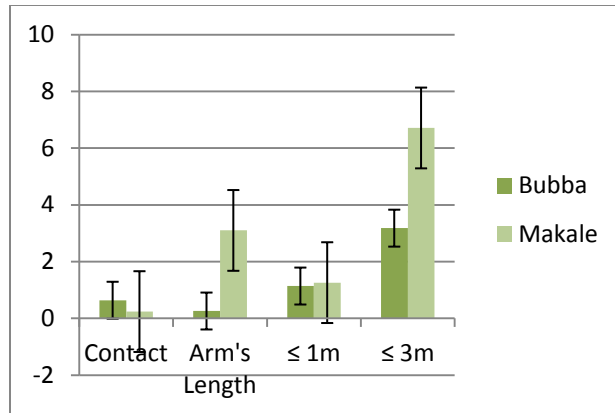


Figure 2. Mean percents of time the subadult female, Yara, spent in proximity to natal (Makale) and non-natal (Bubba) males.

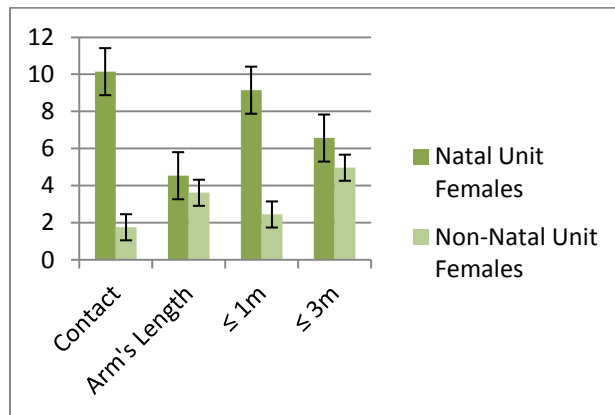


Figure 3. Mean percents of time the subadult female, Yara, spent in proximity to natal and non-natal females.

DISCUSSION

According to Kummer, wild female hamadryas baboons typically transfer to initial units by the age of three (1968). While Yara is three and a half years old, there are no initial units in the troop for her to join. As a subadult female in captivity, it is difficult to predict when she may transfer to the non-natal unit. In addition, with the lack of subadult male followers, it is unclear whether she will transfer at all as a subadult. The small amount of time Yara is spending with the non-natal unit may indicate that she is developing relationships with the non-natal unit in anticipation of transfer. However, she is still maturing, and her transfer could take several more months. It is possible that the non-natal male may attempt to abduct Yara after she becomes an adult, especially if his elderly female dies, leaving him with only one female. Little research has been conducted on captive hamadryas baboons, making it more difficult to predict when her transfer might occur.

It is important to point out that these results are preliminary, and the sample size is small. Thus, more observations and a larger sample size may indicate differences in the group's behavior. Currently, a significant degree of variation can be seen in several proximity categories over multiple days of observation. For example, within the natal unit contact category, mean percents range from 0.49-19.09% over a five day period. However, smaller percents of time spent with the natal unit do not necessarily indicate more time spent with the non-natal unit. In most instances, when Yara spent less time in proximity to natal unit females, she spent more time by herself.

We are currently collecting additional data, and plan to evaluate additional behaviors, mentioned above. Once we have achieved about 30 hours of data, we will reassess the data and perform statistical analysis. This additional data should give us a clearer picture of how the baboons are interacting, and whether Yara is beginning to transfer to the non-natal unit.

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