

(様式3)

## 博士論文の要約

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論文題目 Accessibility is a determinant of infant handling in wild Japanese macaques  
(*Macaca fuscata*)

ニホンザル野生群における infant handling の決定要因

In group-living primates, individuals other than mother are often attracted by infants and access to infants. This interaction is called “infant handling” and non-mother individuals are called “handler”. Previous studies have examined functions of infant handling, an influence of mother-infant relationship, and behavioural processes that result in infant handling. However, these phenomena have been studied independently and inter-relationship between these topics remained unclear. Infant handling is consisted of three interactants: mother, infant, and handler. To fully understand the processes and functions of infant handling, it is necessary to consider social relationships among interactants. Also, most of previous studies on infant handling have been conducted in captive or free-ranging provisioned groups whose social characteristics (e.g., group size, group composition and intensity of competition) differ from those in wild groups. Since these differences could affect the pattern or frequency of infant handling, it is necessary to study infant handling in the wild. So, I studied determinants of pattern and frequency of infant handling in wild Japanese macaques by considering social relationships among infant, mother and handler. I collected behavioural data of infant handling, interactions between mother and infant, and grooming from handler to mother before infant handling for three years in Kinkazan Island, Japan.

In the first study (chapter 3), I examined the influence of mother-infant relationship on the frequency of infant handling by using data of infant handling and

mother-infant interactions. I found that mother-infant relationship was characterised by three principal components: infant activity, rejection, and non-protectiveness. Infants who were less active and whose mothers were less protective received more frequent handling by unrelated, higher-ranked, and unrelated higher-ranked handlers, which means that those handlers have a low accessibility to infant. Low-activity infants and infants with less protective mothers were thought to be more accessible to handlers because less active infants interact with their mothers less frequently and because mothers who are less protective are unlikely to interfere with their own infants. So, handlers with less access to infants may concentrate their attentions on more accessible infants. These results suggest that a specific component of mother-infant relationship is negatively associated with the occurrence of infant handling, and raise a necessity of considering a triadic relationship to understand this complex interaction.

In the second study (chapter 4), I focused on a behavioral process before infant handling by examining grooming interactions by handler to mother. Particularly, I tested predictions of the biological market theory in the context of infant handling, which postulate that provision of grooming before infant handling is determined by value of infant. More specifically, the value of infants is predicted to be lower as the number of infant increases. I found that the occurrence and duration of grooming before infant handling was not affected by a number of infants. Its occurrence was affected by the rank difference between handler and mother and the physical distance between mother and infant. The handlers groomed a mother for long duration when their relatedness was low. These results indicated that grooming had no function of a currency as predicted by the biological market theory. Rather handlers needed to provide grooming to mother for increasing maternal tolerance and for accessing an infant when maternal tolerance was supposed to be low.

In the third study (chapter 5), I examined functions of infant handling by testing predictions from five functional hypotheses, i.e., learning-to-mother, kin selection,

reproductive competition among females, coalition formation, and by-product. I found that handling by males rarely occurred, infants were handled by nulliparous females more frequently than parous females, and infants were handled positively in the most cases. These results best fit predictions of the learning-to-mother hypothesis, which proposes that handlers can learn how to treat infants by infant handling and enhance their future reproductive success. In addition, I found partial support for other hypotheses, indicating that functions of infant handling varied with attributes of handlers.

From these results, I concluded that determinants of pattern and frequency of infant handling in wild Japanese macaques were “accessibilities” to infant and mother for handlers. Based on characteristics of social relationships between mother and themselves and an opportunistic availability of an infant, handlers seemed to select an accessible infant that handlers can handle with low cost. These accessibilities reflect social characteristics of female-female relationships in Japanese macaques, nepotism and despotism. This study concludes that infant handling is a complex behavior involving all participants’ social relationships.