<NOTE>
Immigration of a Large Number of Adolescent Female Chimpanzees into the Mahale M Group

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INTRODUCTION

Female chimpanzees usually transfer between unit-groups on reaching sexual maturity[1]. All chimpanzees in the Mahale M group have been identified since 1980[2]. Following this date, the maximum number of normal adolescent female immigrations into the M group was 3 per year (Ref. 2, Table 1). Larger number of immigrants was only observed when several adult females transferred into the M group in the course of the K group extinction[2]. However, in 2010, an extraordinarily large number of adolescent females transferred into the M group. Thus, we report here the episodes that occurred when we first observed these females. We also discuss the possible reasons why such a large number of immigrations occurred.

OBSERVATIONS

In 2010, 5 adolescent females immigrated into the

M group. This number is extraordinarily large compared to the annual level of immigration over the last 20 years (Table 1). The 5 chimpanzees were named after completing recognition of their faces and characteristics (Figure 1).

Table 1. Annual number of newly immigrated adolescent females into the M group between 1991 and 2010. The possible immigration of orphans was excluded here. All data came from the long-term data shared by the Mahale Mountains Chimpanzee Research Project. *This study.

Year	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**00**
No. immigrants	1	1	3	2	0	0	2	1	0	0
Year	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**
No. immigrants	1	1	1	0	1	2	0	1	0	5*

The first immigrant, Yuna, was first observed by Nakamura in the northern part of the M group's range at about noon on January 11, 2010. Yuna's sexual skin showed full swelling. She was groomed by an adolescent female, Xantip. Half an hour later, the party, including Yuna, moved further north, and observations ceased for the remainder of that day. Since then, Yuna has remained in the M group.

The second immigrant, Hadija, was first observed for 2 hours by Nakamura in the southeastern part of the M group's range at about noon on June 23, 2010. Hadija's sexual skin showed full swelling. She was groomed by the first immigrant, Yuna, one of the oldest adult females, Calliope, 3 adult males, Fanana, Pimu, and Orion, and an adolescent male, Christmas. She only reciprocally groomed Orion in the form of mutual grooming, and then copulated with him. She also copulated with the oldest male, Kalunde. She was observed on occasion in June and July, but disappeared after a sighting on August 5, 2010.

The third immigrant, Juju, was first observed by Nakashima in the middle of the M group's range at about 5 p.m. on September 4, 2010. Juju's sexual skin was not swelling much. She was sitting on a tree with 2 adolescent females, Xantip and Puffy, and a juvenile female, Zuhura. When an adult female, Gwekulo, climbed the tree, the 3 young females threatened Juju, and Juju screamed. The fuss caused charges by nearby males, while Gwekulo and the other resident females left the site. Since Nakashima was following Gwekulo on that day, the observation of Juju was terminated. An hour later, Juju was found again in a tree. An adult male, Primus, came and sat near her. Then, the alpha male, Pimu, climbed the tree excitedly, chased Primus, and beat Juju. Subsequently, Juju copulated with an adult male, Orion, and then Orion and an adolescent male, Christmas, simultaneously groomed her. When Primus rushed to the site, Orion immediately left, but Christmas beat Juju. Overall, she was groomed by Primus, Orion, and Christmas, but she groomed only Yuna.

The fourth immigrant, Badiri, was first observed by Hayakawa in the middle of the M group's range at about noon on November 15, 2010. Badiri's sexual skin showed full swelling. When Hayakawa followed a juvenile male, Teddy, who was walking alone, Badiri was found accompanying the first immigrant, Yuna. Badiri left the location when Teddy (and Hayakawa) came closer. On the morning of November 30, 2010, Hayakawa followed Badiri, whose skin was not swelling much. When Badiri approached a small party, which consisted of 2 adult females, Omo and Ua, 2 adolescent males, Caesar and Emory, and Teddy, she was attacked by Ua. Badiri screamed touching her left nipple with the right hand. She continued to touch in this manner for several tens of seconds, although she became quiet on the way. Afterwards, she was again seen to touch her left nipple with the right hand for 10 seconds while pant-hooting. An hour later, when she was travelling alone, she was threatened by an adolescent female, Xantip.

The fifth immigrant, Rajua, was first observed by Hayakawa in the middle of the M group's range on the morning of December 3, 2010. Rajua's sexual skin was not swelling much. She was sitting on a tree close to a bed where 2 former immigrants, Juju and Badiri, were sitting, while a few males were on the ground beneath. About 30 minutes later, the 3 immigrants were attacked by resident adult females and dispersed. Subsequently, Hayakawa followed Calliope. At 3 p.m., Calliope was eating the fruit of *Saba comorensis*, and the 3 immigrants came closer and ate the same type of fruit, nearby. Twenty minutes later, the 3 immigrants groomed Calliope. Juju and Badiri groomed Calliope's back, while Rajua groomed Calliope's back and right leg. During grooming, an adult male, Alofu, came beneath the tree. Juju and Badiri approached Alofu once, but returned quickly. An hour later, Calliope left alone. Although Calliope was followed and observed until 7 p.m., she did not meet any immigrants again on that day.

Among the 5 immigrants in 2010, 4 remained in the M group for at least a few months, but Hadija has not been observed again.

Figure 1. Immigrants in 2010, and the months of first observation. Photos by T. Hayakawa (Yuna and Badiri), M. Nakamura (Hadija), and S. Inoue (Juju and Rajua).

DISCUSSION

Previous studies indicate that newly immigrated females are received in a friendly manner by males but with hostility by resident females[3].

Our observations of grooming and copulation with males and attacks by females were concordant with this notion. However, we also recorded attacks by males and friendly behaviors with resident females. It should also be noted that we observed affinitive relationships among the immigrants. Hadija, Juju, and Badiri were accompanied by Yuna when first observed. Moreover, Juju, Badiri, and Rajua fed with and groomed Calliope simultaneously. One possibility is that these immigrants identified one another as just migrating into the M group, and thus readily associated. Another possibility is that all or almost all of them had immigrated from the same natal group, and thus already knew one another. However, since the M group is the only currently habituated unit-group at Mahale, it is difficult to determine more about the natal group(s) of them.

The M group once received many immigrants in the course of the K group extinction[4]. The unusually large number of immigrants in 2010 might also be a result of similar extinction of a nearby unit-group. However, it is premature to conclude this, because at the time of the K group extinction, not only adolescents but also up to 6 parous adult females per year immigrated into the M group[2]. If group extinction is the case, the M group should also receive many adult females in the near future.

Female immigration contributes to behavioral variations of the unit-group, which may or may not be directly connected with genetic variations. In this respect, it is interesting that Badiri pressed her nipple in an apparently habitual fashion. This behavior is known as "nipple press," which only a certain portion of Mahale chimpanzees do[5], although the mechanism for this behavioral variation has not been investigated in detail. Immigrants often have idiosyncratic habits, which are likely to be customs of their natal groups[6,7]. Therefore, it is interesting to see how these immigrants and their different behavioral customs will cope with the existing M group customs.

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