

Paternal Care in the Wild Japanese Monkey, *Macaca fuscata fuscata*

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I. INTRODUCTION

In societies of non-human primates, little information is available concerning the relation between the adult males of a troop and the infants born in it. It is generally impossible, within a troop society which includes many males and females in one troop, to trace the blood-relationship between father and child; not only is this so objectively, but also, on the part of the child, there cannot be any cognition of "father". Especially those monkeys with a strong terrestrial tendency, such as *Macaca* or *Papio*, form large troops directed toward completing the troop society with a clear class organization. Y. Furuya has observed that, among the Japanese monkeys of Takasakiyama, there exists a comparatively steady grooming relationship between a fixed male and a fixed female with grooming as the medium. But this kind of relationship is not always parallel to the sexual relationship, which rotates in the troop; such a union through a grooming relationship cannot, therefore, be regarded as a family.

We have noticed among the troops of such Japanese monkeys a specially intimate relation between adult males and infants, and though it may not be quite proper to call that relation "paternal" for the reason mentioned above, the behavior itself appears to fit exactly the term "paternal care". It is quite similar to the behavior of a mother toward her infant, except for the lack of suckling. Among Japanese monkey societies it has no connection with the crystallization of the family in the troop society, but since such a phenomenon is observed even among them, may we not, perhaps, anticipate much with respect to the father's role in the familylike troop of the anthropoid society—his participation in caring for the infant? According to M. Mead, an important difference between human and non-human societies depends on whether or not the father participates in caring for the infant, but with the progress of studies on anthropoid society, this theory will have to be modified.

What sort of behavior, then, is this "paternal care" which we are going to discuss? First, we will show a few instances from our field notes.

Observation 1.

1954, May 12, 2.30 p.m., fine.
Takasakiyama.

At the provisioning ground *Syaraku* (SL 6) has a one-year-old female infant pressed to his breast. This infant is much smaller than the other ones born last year who are playing near by. His infant tries to join these youngsters. *Syaraku* quickly goes to it, picks it up to his breast, climbs up to the grassy plot above the provisioning ground, sits down and begins to groom the infant. At 2.40 p.m., he stops grooming and stands up in a hulking manner. The infant jumps upon his loins. *Syaraku* climbs up to the bamboo thicket above, carrying his infant on his loins.

Observation 2.

1954, May 12, 0.50 p.m., fine.
Takasakiyama.

Uzen (SL 4) comes with a one-year infant on his loins. I, the observer, watch him from behind the glass door of a room in the temple; *Uzen* looks into the room cautiously. His infant is a small male, which, somehow or other, suddenly giving a cry "kya!", falls off *Uzen*'s loins. Then *Uzen* takes it up to his breast and deliberately goes away to the provisioning ground.

Observation 3.

1954, July 26, 2.00 p.m., fine.
Takasakiyama.

Above the provisioning ground there are some stone steps on which as many as eight yearlings are gathered. *Monk* (L 4) is sitting under a tree a little way up the steps. From the provisioning ground below comes a one-year female infant that is always carried in *Monk*'s bosom. It makes its way straight to *Monk* and is hugged by him. They open their mouths and playfully bite each other. Soon *Monk* stands up and begins to walk. The infant walks, covered entirely by his body. Once, on the way, it tumbles down. Another infant of the same age comes to play with it. *Monk*, as if saying, "Let's go on", pulls his infant, who at once creeps back and walks under his body. Again it slips away from his shelter and instantly *Monk* pulls it back. It now jumps upon his loins. *Monk* doesn't like this and pulling it down by force, makes it walk under him as before. These two come to the grassy plot at the far end of the provisioning ground, and for a time they are lost in the tall grass. When they are visible again, *Monk* has the infant on his loins. He jumps upon a flat stone, where he puts his infant down off his loins. As he sits down, the infant dashes into his bosom.

In each of these three cases the male is a leader or sub-leader of this troop, all being full adults over 15 years of age. It may be said that there exists no great difference between their behavior toward the infants and the behavior of a mother toward her infant. Of course they have no behavior equivalent to suckling, but these males hug the infants, carry them on their loins, or accompany them when walking. They keep them from wandering away, and, when sitting, take them to their bosom or make them lie down just in front of their feet and groom them, or, sometimes, play with them for hours. It is clear that these adult males are the protectors of the infants, and like a mother with her child, their relation is that of a special male with his special child.

The phenomenon of "paternal care" in the Japanese monkey was discovered by the writer at Takasakiyama in May, 1953. And by K. Fujimoto, who succeeded me in the investigation, it was concluded that this is a general phenomenon in the Takasakiyama troop during the delivery season. The

basic data for this report are chiefly those obtained by the author at Takasakiyama in 1954. The data on other troops have been collected by the research workers at the Japan Monkey Centre, Kyoto University, Osaka City University, Osaka University, etc. This report, on the basis of these data, will introduce the details of "paternal care" and consider its social meaning. From the standpoint of social organization, a most interesting problem is, what will happen to the relation between the protector and the protected when the latter is grown up. But since the discrimination of individuals among one-year infants is extremely difficult, we could make but an imperfect analysis; I accordingly decided to analyze the behavior of the protector males as one of my main subjects.

To those research workers who have provided data on Japanese monkeys, in various places, and to Professor D. Miyadi and Professor K. Imanishi, who directed my work, I express here my hearty gratitude. This paper was printed by the aid from Rockefeller Foundation.

2. SOCIAL ENVIRONMENT OF THE BABIES AND INFANTS

We are not going to treat here "paternal care" itself. Before referring to that problem, it is necessary to give a general idea of the social relation between babies or infants and other individuals except their mothers. We will thus be able to show the difference between paternal care and the forms of behavior similar to it, and at the same time the relations of these to each other. No detailed account of the relation between mother and baby, or of the growth of infants, will be given here.

(1) *Social Environment of Babies*

Toward the new-born baby, all the other individuals except its mother usually take a keep-away attitude.



Fig. 1 A young adult female and a baby about 20 days old.

Observation 4.
1954, June 2, 9.25 a.m., cloudy.
Takasakiyama.

An's baby, 23 days old, comes toddling and tries to jump at *Dandy* (SL2) feeding near it. *Dandy* sats and, with a queer look, keeps about 4 meters away from it. *An*, the mother, hugs the baby hurriedly.

Such scenes as this are commonly observed in the center of the band during the delivery season. Even *Jupiter* (L1), the highest male in the troop, has been seen shunning a baby. Except for newly born babies, there is no monkey who does not give expression of fear, when they come across *Jupiter*. The

baby is not positively protected by any other individual of the troop, but it is kept safe through being shunned by the other individuals, negatively, so to speak.

However, there are some exceptions to this. Among adult females there are some who, instead of turning away from a baby as other individuals do, positively care for it just as they do for their own babies. In 1953, *Dede'* of the Takasakiyama troop gave birth to a pair of twins*, one of which, after a month, was taken by *Adan'*, a female believed to be *Dede's* mother.

Every day *Adan'* cared for the baby in her bosom, but, as she herself did not breed that year, she had no milk and perhaps for that reason, the baby was lost about a week later. In 1953 at Kôshima, also, ♀ 101 had a baby,

which soon died. She then repeatedly snatched away a newborn baby of ♀ 104, lower than herself in rank, and hugged it as her own. In this case, the mother's desperate efforts to recover the baby were successful, but in another case, among the released troop of *Macaca fuscata yakui* at Ôhirayama, we have recorded a step-mother's victory : viz, in 1959, *Hou'* of this troop had no baby, and tried to take the baby of *Popo'*, who was lower than herself in rank ; after some effort, she made the baby completely her own. Now this baby, *Poppy'*, is one year old, and behaves exactly as though she were *Hou's* baby.

Again at Takasakiyama, I recorded the following case.

Observation 5.

1954, July 22, 4.30 p.m., fine.



Fig. 2 Young adult *Dede'* gave birth to a pair of twins, by Mr. Takamaru

*) Among the wild Japanese monkeys, this is the only instance of twins found by us out of very many recorded births.

Takasakiyama.

Old female *Ban's* baby ♂, 41 days old, is separated from its mother and crying. Female *Hota*, with her first baby ♀ in her bosom, comes to it and taking it together with her own baby, begins to walk away. Then *Ban'* appears from the vicinity of the Zen-Hall and, taking her baby to her breast, she threatens *Hota'*. *Hota'* and *Ban'*, each with her own baby, cross the provisioning ground and climb up together.

It seems that a female cares for another's baby only in those cases when she is urged by her own maternal desire or when the baby in question is in some critical situation. Two to four year-old females show a comparatively strong interest in the babies, and this, too, may be thought of as a sign of the awakening of maternal instinct. They fondle the babies as if they were mothers, or like human girls who play with dolls, against too young ones, they also experience a psychological resistance, as though feeling queer about touching very young babies.

Observation 6.

1954, June 27, 10. 10 a.m., cloudy.

Takasakiyama.

In one corner of the provisioning ground the three babies of *Fue'*, *Illi'* and *Lan'* are playing, hanging from the branches of the low shrubbery. *Fue's* baby is 38 days old ♀, *Illi's* is 36 days old ♀ and *Lan's* 28 days old ♂. Their bodies are still too soft and their motion is very slow. *Lan's* baby climbs a shrub, then a juvenile ♀, about two years old, comes near and, stretching out her hand, feels the baby's tail, hip and head gently, but she dares not hug it. As *Lan* comes from the provisioning ground below, the juvenile stops feeling the baby and assumes a defensive posture toward her.

Next the behavior of the males will be considered. This is quite different from that of the females. In the field, 2-3 year-old males usually have no interest in babies and seldom protect them. The behavior to be reported must therefore be due to a caprice of the moment.

Observation 7.

1954, July 5, 9.00 a. m., cloudy.

Takasakiyama.

Lan's baby ♂, 36 days old, is 3 metres away from *Lan*. A two year-old infant approaches, tries mounting on the baby, then holds it in his arms. *Lan* knows this, but makes no objection whatsoever.

The young males, partly because they are habitually in the peripheral part of the troop, far from the central part where the babies are found, show no positive behavior toward babies. Adult males, especially the leaders in the central part and the sub-leaders near the central part, also show no regular behavior of this kind, as a general rule. The records so far secured are limited to some cases among monkeys which have been reared in captivity, and some cases among the troop of Takasakiyama, among the pastured troop at Ôhirayama and the troop of *Macaca irus* at Kidima in Mikawa Bay.

In June, 1955, at Rakutenti Zoo in Beppu, I recorded that the most

dominant adult male in the colony of 8 *Macaca fuscata yakui* was caring for a new-born baby. In autumn, 1958, M. Kawai observed that the leader male, *Momota* of the Japanese Monkey *Macaca fuscata yakui* in the large cage at Ôhirayama had a baby ♂, not half a year old, in his bosom for a long time. Similar phenomena involving new-born babies are also recorded by Y. Furuya from the pastured troop of *Macaca irus* at Kidima. In 1959, a sub-leader ♂ in this troop took a new-born baby from its mother by force and walked about with it in his bosom until the baby died of hunger.

Most of the cases in the field have involved protective behavior of the female, as already referred to, in some critical situation of the baby.

Observation 8.

1954, July 6, 2.50 p.m., fine.

Takasakiyama.

Females and infants are feeding at the provisioning ground, with 2 leaders, *Pan'* (L 3) and *Boor'* (L 6), in the center of the troop. Mr. Ando, the keeper, goes into the provisioning ground to clean. *Boor'* attacks Mr. Ando, while *Pan'* hastily takes up a baby ♀ which has been just beside him, apart from its mother *Kichi'*, and, sitting with the baby in his bosom, threatens Mr. Ando. As soon as the keeper leaves the provisioning ground, *Pan'* lets the baby go. *Kichi'*, the mother, who has been watching this from a distance of 7 meters, rushes to the baby, takes it to her breast and runs away hastily. This baby is 41 days old.

This instance was of a simple, casual relation which dissolved instantly when the baby got out of danger, while, in the case that M. Kawai recorded of the Ôhirayama pastured troop, the relation lasted much longer. Early in January 1960, adult ♀ *Matu* died, leaving a baby ♂ about 6 months old, who immediately sheltered himself under *Noro'*, a sub-leader. *Noro'* shows no



Fig. 3 *Yubi* (SL3) who, at the height of the breeding season, walked about carrying a baby about half a year old. With the baby held to his breast, he raised one of his legs and masturbated.

inclination to hug it, but he always walks with it and grooms it carefully. Their relation has continued for the succeeding half a year.

Now, of such behavior of adult males toward babies in non-critical situations, we have some records on 4 adult males at Takasakiyama. *Jupiter* (L 1), in September 1955, walked, on one occasion, with a baby ♂ on his loins. Its mother could not be ascertained, and it is not clear why he felt like carrying it on his loins all of a sudden, and only this once, while he would usually keep away from babies. We saw, however, that *Jupiter* was quite composed and no extraordinary situation had arisen.

Yubi (SL 3), moreover, at the height of the breeding season, in January 1954, walked with a baby hanging on his breast; and standing on all fours, he raised one of his legs and repeated behavior to give an incentive to his own penis. His state of having the baby in his bosom seemed to give rise to this strange masturbation and to add to the incentive. Exactly the same behavior as *Yubi*'s was seen with *Dandy* (SL 2), in January, 1956, — also at the height of the breeding season, and after that in every breeding season this behavior has been recorded of *Dandy* by H. Mizuhara.

Our last instance is concerned with *Pan* (L 3), who cared for *Til*'s baby ♂ (about 70 days old) for about a week.

Observation 9.

1954, August 9, 4.00 p.m., fine.
Takasakiyama.

At the provisioning ground, *Pan* (L 3) and *Til* are sitting side by side. As *Pan* stands up and goes away, *Til*'s baby ♂, 73 days old, follows him. *Til* calls "ga - ga - ga - ga ..." and starts after them, but, seeing *Pan* hug the baby, *Til* gives up threatening. On the part of the baby, it is much attached to *Pan* and has rushed into his bosom. *Pan* is sitting still with the baby and *Til* is feeding leisurely. Then, suddenly, *Til* attacks adult ♀ *Fae* who is near her. Upon this, *Pan* gives a rhythmic lip movement to the baby, as if saying "That's all right, all right. Don't be afraid."

In this case, *Til*, the mother, showed some uneasiness about the relationship between her baby and *Pan* (L 3); babies, on the other hand, usually show a tendency to approach anything without fear. It is therefore highly probable that it was *Pan*'s attitude in not rejecting the baby's behavior that established their relationship. According to Y. Furuya's records in the breeding season, 1955—1956, *Pan* and *Til* were in a specially intimate relation through grooming. Whether it was because *Pan* and *Til* were on intimate terms that *Pan* and *Til*'s baby had a chance to be attached to each other, or whether there exists some relation deeper than that, between a male and a female in grooming relationship, we cannot decide by this one instance.

These examples of adult males caring for babies vary in content, each being a special and rare case, and different in many points from the paternal care which will be discussed below.

(2) *Social Environment of Infants*

For about a year after birth, the mother is, of course, the most important being for the bringing up of the infants as well as for their suckling. But it must be noted that maternal care varies according to the personality of the mother. There are fond mothers who hate to let their infants go for a long time after birth, while there are also such cold mothers as *Elk'* at Takasakiyama, who left her infant, 2 days old, on the ground and busied herself in feeding; this characteristic varies regardless of whether the female is central or peripheral, high or low in rank, old or young. The differences observed in maternal care must therefore depend on the individual personality of the female, and the duration of the suckling period, accordingly, also on the mother's personality.

One more situation similarly important in determining the duration of suckling depends on whether the mother is going to have another baby the next year or not, and if she is, whether it is early or late in the season. With the Takasakiyama troop, the delivery season begins early in May and ends late in August, including 4 months. Since a mother who bred a baby early in a certain year does not always breed early in the next year, among the infants whose mothers breed the following year, and who are thereby deprived of their greatest source of protection and support, the youngest is 8 months old and the oldest is 16 months old. Early in the delivery season, that is to say, when the infants born the previous year are 8 to 12 months old, we notice that in the central part of the troop all the pregnant females are free of their infants, and the females that carry infants in their bosom or on their loins are those who have not conceived in the current year.

The third factor that influences the duration of suckling lies in the sex

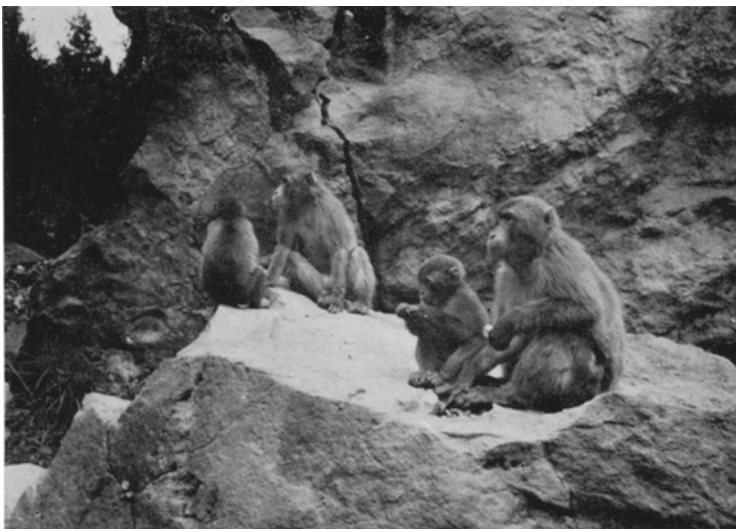


Fig. 4 Peripheral young males and male infants, 1 to 2 years old. This shows peripheralization of male infants.

of the infant: i.e., there is a difference between the sexes in the process of social maturing. While the males are inclined to leave their mothers comparatively earlier to make a troop of infants of the same age, the female infants tend to stay longer with their mothers.

Among the infants, there according to either of the situations mentioned above, some leave their mothers earlier and others later; and in any case, early in the delivery season, there is a time when some infants are seen walking alone here and there in the central part, away from the direct protection of their mothers.

The other monkeys in the troop are usually gentle with these infants, and no longer show toward them the avoiding behavior which they evidenced toward new-born babies. The young females that have had no pregnancy experience are strongly interested in these infants, making them their playthings rather than choosing them as their playmates. Their relation is, moreover, only a temporary one; when tired of playing, they separate from each other.

When the infants are one year old, the males begin to gather into a troop and try to explore the peripheral part, where the playful elder juveniles and young males are. They are often seen to be caught by young males and receive mounting behavior again and again, or to be treated as a substitute for a ball. Sometimes 1 to 2 year-old male infants gather around the young males, and make a playing group there.

Observation 10.

1954, June 16, 10.20 a.m., fine.

Takasakiyama.

By the road below the stone steps there is a storage building. In the open space before it there are 2 young adult males, *Hosi* and *Cri*, and around them a one-year male and a two-year male are playing.

In this case, it must be remembered that the relation between the young adult males and the infants is not one between special individuals, but between a group of infants and young males. *Hosi* and *Cri* belong to the First Class of peripheral males and in 1954 were about 8 years old. *Hosi* showed an especially strong inclination toward this behavior, and on June 10 and 13 similar behavior on his part was recorded. Among the Second Class males in the peripheral part, this inclination is not so strong as among those of the First Class, but *Tamo* and *Goemon* are observed to show this behavior.

Such behavior is not limited to the peripheral males, however, but is also found among the sub-leaders or even the leaders during the delivery season — in 1954, 3 cases of leaders and 7 cases of sub-leaders. Among the leaders, *Monk* (L 4) and *Boor* (L 6), showed this behavior, while of 7 cases among the sub-leaders, *Uzen* (SL 4), was involved in 5 cases, and *Kuro* (SL 5) and *Aomé* (SL 7) were recorded in one case each.

Observation 11.

1954, August 20, 8.00 a.m., fine.

Takasakiyama.

Below the stone wall about 50 meters away from the provisioning ground, *Monk* (L 4) has gathered 10 infants, 1 to 2 years old, around him and is playing with these youngsters. The infants enjoy wrestling and some jump at *Monk*, who sits and lets them attack him in play.

Observation 12.

1954, June 17, 9.45 a.m., fine.

Takasakiyama.

Uzen (SL 4), with 6 infants 1 to 2 years old, enters the provisioning ground and begins



Fig. 5.6 Typical paternal care. *Syaraku* (SL 6) and an infant ♀, a year old, which is being groomed.

feeding with them. There are some females among the infants. Soon the infants stop feeding and begin to play around *Uzen*. One of them bullies another. *Uzen* threatens the bullying infant.

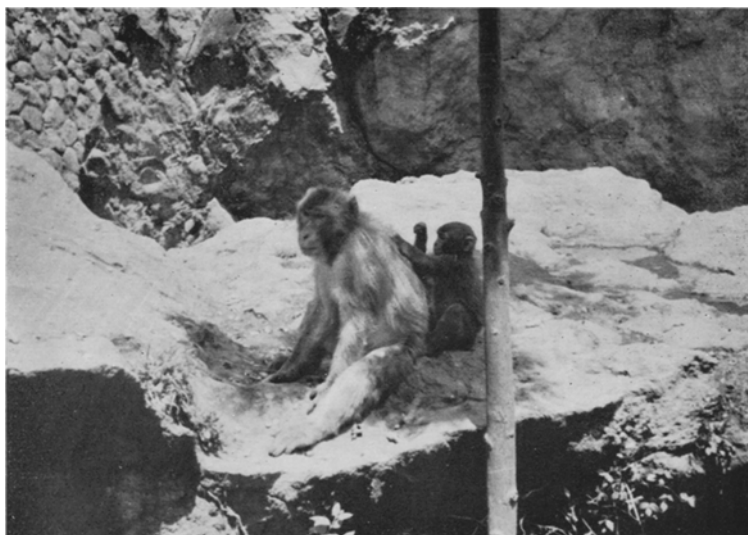


Fig. 7 The one-year female infant, seen in Figures (5) (6), is grooming *Syaraku* (SL 6) in return.

In 1953, this behavior of *Uzen*'s was especially conspicuous, so that he received the nickname of "Kindergarten Teacher".

The most remarkable behavior, however, in the relation between infants about one year old and other monkeys, is found in three cases on the part of the adult males; in the Introduction, this was called paternal care. A detailed description of this will be given later; here I will present the characteristics of such behavior, to clarify the difference between this behavior and those similar types of behavior which have been discussed above.

- (a) Paternal care is observed only during the delivery season.
- (b) The objects are infants, 1 to 2 years old.
- (c) These infants are protected irrespective of sex.
- (d) The protecting individuals are limited to leaders or sub-leaders except for a few instances of peripheral males.
- (e) Nearly all the leaders and sub-leaders show this behavior.
- (f) The relationship between adult males and infants sometimes has a certain durability.
- (g) It is a phenomenon not observed in every troop of Japanese Monkeys.

3. THE CHARACTERISTICS OF PATERNAL CARE

(1) *The season when paternal care is observed*

As mentioned above, it is only during the delivery season that paternal care is observed. Although 2 or 3 similar phenomena have been observed during other seasons, these are extraordinary cases and have none of the typical marks of paternal care as pointed out above. In 1954, 99 cases of

paternal care were recorded in the Takasakiyama troop, all between the middle of May and the end of August, which corresponded to the delivery season of that year. The number of births in each ten days and the frequency with which paternal care was observed are as shown in Table 1. The frequency of paternal care was strikingly great in the early and middle periods of the delivery season and afterwards decreased rapidly; a few cases appeared in a scattered fashion toward the end of August, and in September no cases at all were encountered. While the births draw a regular curve, paternal care abruptly reaches a peak which is inclined to occur earlier than does the peak of the delivery season.

With respect to the beginning of paternal care, a very interesting phenomenon was observed. The female who was delivered of a baby first that year was *An'*; this was on May 11. On May 12, the next day, four sub-leader males simultaneously showed the first paternal care seen that year. It was clear that *An's* delivery stimulated them, but at the same time we felt that there might exist a sort of sense of rivalry. These four males were *Dandy* (SL 2), *Uzen* (SL 4), *Kuro* (SL 5), and *Syaraku* (SL 6), all near each other in rank.

A little later, on May 15, *Cali'*, one of the most dominant of the females in the central part who were in special relation with the leaders, was delivered of the 3rd baby of that year; the next day, May 16, three males in

Table 1 Delivery season and the season when paternal care was observed. (1954) Takasakiyama

Month	Decade	Number of births heads	Paternal care cases
May	I	0	0
	II	5	14
	III	8	14
June	I	5	28
	II	15	17
	III	10	9
July	I	6	12
	II	11	1
	III	5	3
August	I	6	0
	II	8	0
	III	2	1
September	I	0	0
	II	1	0
	III	0	0
Total		82 heads	99 cases

I shows the 10 days from 1st to 10th

II // the 10 days from 11th to 20th

III // the 10 days from 21st to 30th (or 31st)

the highest class, *Jupiter* (L 1), *Titan* (L 2), and *Pan* (L 3), showed their first paternal care of that year. While it may have been *Cali*'s delivery that led to their paternal care, at least two of the three leaders cared for infants which were not *Cali*'s. Although we have not yet confirmed the matter, there is a possibility that *Cali*'s infant was not among the three which were protected. If paternal care is simply induced by the situation of an infant being obliged to leave its mother on her delivery, does it not suffice if one leader or sub-leader protect *An*'s or *Cali*'s infant? Of course, in this season there are many other infants left away from their mothers, but besides this situation, we can surmise that the fact itself that a male of a certain class exhibits paternal care will become a strong incentive to the other males of that class. It is, so to speak, the propagation of a type of behavior, and, moreover, it bursts out very suddenly, which is a highly interesting phenomenon. This point will be fully discussed in another place. In the society of the wild Japanese Monkey the breeding season, for instance, begins as abruptly as does the beginning of paternal care, like the breaking of a dam.

(2) *The cared-for individuals*

Table 2 gives the age and sex of the infants which were objects of paternal care in 99 cases in 1954. As shown in this table, the cared-for individuals are limited to those from 1 to 2 years old. Furthermore, infants about one year old account for about 74% of the total, emphasizing the close relationship between the females' delivery and paternal care. Attention will, therefore, first be directed toward the remaining 25 cases, which concern the 2 year-old infants as cared-for individuals.

Table 2 Age and sex of cared-for individuals. (1954)
Takasakiyama

Age	Year of Birth	No. of cases	♂	♀	Sex not confirmed
about 1 year old	1953	74	28	34	12
about 2 years old	1952	25	5	20	0
Total		99	33	54	12

First, it must be noticed that in 20 out of the 25 cases (of infants born in 1952), the objects were females (80%); and in 3 of the 5 cases of males (20%), the objects were weak, under-grown individuals. Two of these cases involved *Titan* (L 2), and his object was *Kappa* in both cases. *Kappa*, in 1953, had been specially cared for by *Titan* for a long period. This infant before he was one year old, received a serious wound in his head. Nearly all the hair of his head fell out and it took him quite a long time to recover from this wound. *Kappa* was therefore far behind the other infants of his age in growth. He was not, however, specially cared for by *Titan* or the other adult males during the other parts of the year. *Titan*'s

care in 1953 ceased after the end of the delivery season, and the same behavior was not seen again until the delivery season of 1954.

The remaining case is similar to the case of *Kappa*, *Nake*, like *Kappa*, was injured in 1953, and after the wound healed his face was distorted and there were always tears in his right eye. He also was cared for by *Titan* (L 2) during the delivery season of 1953, and on a single occasion (June 4, 1954), was the object of paternal care by *Kuro* (SL 5).

Other than these, there were only two cases in which 2-year-old males became the objects of paternal care by adult males—one by *Jupiter* (L 1), and the other by *Achilles* (SL 1). *Jupiter*'s case, unusual with him, was a relation between him and a 2-year infant male chiefly in play, and, as was also true of *Achilles*'s case, seemed not to be of very long duration.

With a 2-year infant female also, there may be observed cases of being cared for by an adult male for 2 successive years, as was *Kappa*. I recorded that from May 16 to July 7, 1954, *Pan* (L 3), bestowed paternal care 8 times on a 2-year-old female. The cared-for individual was *Cob*. This infant was much fatter than the average, but she was then wounded on her left leg and walked with limp. Perhaps this may have been the reason why she was an object of paternal care. The fact is, however, that she had been hugged by *Pan* (L 3) in 1953, and during the delivery season in 1955, when she was 3 years old, she was observed keeping close to him. This was one of the rare cases in which identification of the cared-for individual was possible, and it is regrettable that we could not trace their relationship further because of *Pan*'s separating from the troop.

As mentioned above, it may be quite natural to surmise that the social relationship of especially close intimacy established between the adult male and the cared-for infant will reappear in the succeeding year, and make the same infant the cared-for individual again.

When the infant is female, its relation with the adult male may develop into a grooming relationship, as Y. Furuya says, but since no confirmation has yet been made, this problem remains to be studied in the future.

At any rate, the fact that, among the 2-year-old individuals cared for, the females surpass the males in number may be a natural consequence of the different ways of living of male and female infants. In the cases of the one-year infants also, the predominance of females (34) over males (28), suggests that already at this early age the difference between males and females is beginning to appear. As to the question of which sex is chosen as the object of paternal care, the terms of choice seem not to be exercised by the adult male; it may rather be proper to suppose that on the part of the infant there are reasons to be chosen. For example: *Monk* (L 4) cared for a one-year female 15 times and a 2-year female once; *Uzen* (SL 4), for a one-year male 8 times, a one-year female once and an infant, sex unknown, 7 times; *Dandy* (SL 2) also cared for a one-year male 7 times, a 2-year

female once and an infant, age and sex unknown, once; and *Syaraku* (SL 6) cared for a one-year female 16 times and a one-year male once. Since it is not possible to discriminate with absolute certainty between individuals, when we say a one-year female 16 times, for instance, we are not always certain whether it was the same individual, but the marked tendency for one sex or the other to predominate, as seen in the cases above, will help to strengthen the possibility of its being the same individual. From these cases, it can consequently be deduced that no choice based on sex was made through some intention on the part of the adult, the protector, but the combinations were made without relation to sex.

At the same time, on the part of the infants, it is not groundless to think that if the individual which is the object of paternal care is a female, it will exert influence over the central part of the troop, and if it is a male, having a chance to be influenced by the personality of the leaders or sub-leaders, it will be more capable of carrying on the tradition of the troop than other infants, and thus will become a member of the important staff of the troop. Undoubtedly, the infant of a female nearer to the center of the troop has more opportunity to be given paternal care by a leader or sub-leader than the infant of a female in the more peripheral part of the troop. Since the females in the central part are higher in rank, their infants are placed in a more advantageous situation than the others, but here we must pay particular attention to the fact that it is not all the one-year infants or all the infants of the central females that are objects of the paternal care of the adult males. I have shown, among the 2-year infants, cases of paternal care being given to especially undergrown and weak ones, and this same thing can be said with respect to the one-year infants. *Uzen* (SL 4) and *Syaraku* (SL 6) cared for the same infants for a remarkably long time, and these infants were both very small for their age—one full year. The undergrown infants then have more opportunity than the wellgrown ones, which may be inconsistent with the idea that the superior individuals should carry on the next generation. It is obvious that extremely important problems in this area remain unsolved.

(3) *Protectors and their social status*

The adult males of Takasakiyama have been divided into three classes. In 1954, this class organization closely paralleled the age organization. The leader class, the highest in the troop, consisted of 6 males who were concluded to be around 20 years of age; the sub-leader class, the second class, consisted of 10 males around 15 years of age; the third included the peripheral males who constituted outer portion of the troop. This last class was further differentiated into three subclasses: the first subclass had 10 members, about 10 years old; the 2nd subclass had 8 members about 7 years old and the 3rd subclass, 10 members, 4 or 5 years old.

Among these groups, the only males who showed paternal care were

individuals that belonged to the leader class, the sub-leader class or the 1st subclass of the peripheral-male class. The frequency with which paternal care was recorded in the respective classes is as shown in Table 3. In each class, the numbers of individuals showing no paternal care were—1 in the leader class, 1 in the sub-leader class, and 7 in the 1st subclass of the peripheral males. These data, and also the mean frequency per capita indicate that this behavior is typical of individuals belonging to the leader and the sub-leader classes.

Table 4 shows the frequency of paternal care by each individual belonging to the 3 classes recorded by the author in 1954. In the first place, with the leader and the sub-leader classes, it is found that the frequency of paternal care by each individual has little relation to the rank order, that is,

Table 3 The frequency of records on paternal care in each class. (1954)
Takasakiyama

Class	Members constituting the class	Frequency of records on paternal care	Mean frequency per capita in each class
leader class	6 heads	35 times	5.8 times
sub-leader class	10	60	6.0
1st class of peripheral males	10	4	0.4

Table 4 Frequency of each individual's paternal behavior. (1954)
Takasakiyama

Order	leader class	sub-leader class	1st class of peripheral male
1	<i>Jupiter</i> 2	<i>Achilles</i> 3	<i>Soba</i> 0
2	<i>Titan</i> 5	<i>Dandy</i> 9	<i>Con</i> 2
3	<i>Pan</i> 9	<i>Yubi</i> 1	<i>Gen</i> 1
4	<i>Monk</i> 16	<i>Uzen</i> 16	<i>Shib</i> 0
5	<i>Bacchus</i> 0	<i>Kuro</i> 4	<i>Pac</i> 0
6	<i>Boor</i> 3	<i>Syaraku</i> 18	<i>Don</i> 1
7		<i>Aomé</i> 5	<i>Siro</i> 0
8		<i>Utamaro</i> 0	<i>Hosi</i> 0
9		<i>Saruta</i> 3	<i>Cri</i> 0
10		<i>Cyrano</i> 1	<i>Aktaré</i> 0
Total	35	60	4

it is not observed that the higher (or the lower) the individual's rank, the greater the frequency of this behavior.

On examining Table 4 more closely, however, we find that in neither the leader nor the sub-leader class is this behavior seen very often among those of especially high or low rank; it is much more characteristic of those of rather middle rank in each class. The membership and organization of these two classes in May, 1960, was just the same as it had been in 1954,

except for two in the leader class (Pan [L 3] and Monk [L 4]) who deserted from the troop and Syaraku (SL 6), who died in April, 1960. We will therefore divide each class into 3 layers (upper, middle and lower), and at the same time fix our attention on those individuals whose rank changed during the period between the delivery season of 1954 and March, 1960, and those who deserted from the troop for one reason or another in order to study the relation between these facts and paternal care.

The changes which occurred, in the order* of ranking between the delivery season of 1954 and March, 1960, are shown in Table 5. As this table indicates, while there was no change in the upper layer of the leader class, both the two individuals in the middle layer deserted from the troop in 1956, and in consequence the two individuals in the lower layer took their place. In the sub-leader class, those in the upper layer came down all together, their order among themselves remaining unchanged; i. e., they were simply out-distanced by *Uzen* and *Kuro*, who had belonged to the middle layer.

While *Syaraku*'s rank in the middle layer did not change, *Aomé* fell off to the lower layer, even to the lowest rank, and consequently the three originally lowest individuals, with their order among themselves unchanged, rose to the next higher rank. This shows that both among leaders and sub-

Table 5 The changes of ranking between the delivery season of 1954 and March of 1960. (1954 & 1960) Takasakiyama

Class	the name of the individuals	order during the delivery season, 1954	order in May, 1960	order rising // falling // not changed deserted	(+) (-) (±) ↗
L E A D E R C L A S S	<i>Jupiter</i>	1	1	(±)	
	<i>Titan</i>	2	2	(±)	
	<i>Pan</i>	3		(-)	↗
	<i>Monk</i>	4			↗
	<i>Bacchus</i>	5	3	(+)	
	<i>Boor</i>	6	4	(+)	
S U B L E A D E R C L A S S	<i>Achilles</i>	1	3	(-)	
	<i>Dandy</i>	2	4	(-)	
	<i>Yubi</i>	3	5	(-)	
	<i>Uzen</i>	4	1	(+)	
	<i>Kuro</i>	5	2	(+)	
	<i>Syaraku</i>	6	6	(±)	
	<i>Aomé</i>	7	10	(-)	
	<i>Utamaro</i>	8	7	(+)	
	<i>Saruta</i>	9	8	(+)	
	<i>Cyrano</i>	10	9	(+)	

* The decision of rank order in 1960 is according to H. Mizuhara.

leaders, the changes were most marked in the middle layers during these six years.

From these results we see that those whose status changed most showed the most marked behavior of paternal care during the delivery season in 1954. Can we, then, trace some relation between stability of status and paternal care?

(4) *The Personality of the Protecting Individuals*

Now, for each of the individuals belonging to the two upper classes, we will study the personality and trace its relation to paternal care. In connection with personality, instead of making a very close analysis here, we will attempt a classification of personality with the following three characters supposed to be related to paternal care, on the basis of observations made in 1954.

The first of these is whether the individual has sociability or not. Some individuals have excellent sociability and are active and cheerful. In contrast to these, there are others of unsociable personality who live more or less in solitude among the troop.

The second characteristic is the degree of aggressiveness: an individual with a high degree of aggressiveness is short-tempered and pugnacious, while another with a low degree has a more peaceful and milder personality.

The third trait depends on the intensity of interest shown by the individual in the central part of the troop. Except for the completely solitary males, all the adult males have more or less interest in the central part, although in this point, also, there is a clear difference between individuals. This trend, in a sense, may be interpreted as showing their effort to have their own status promoted. With respect at least indicating to the Takasakiyama troop, we have no positive record that the rank order of adult male was changed by fighting between individuals. What capacity their fellows have, or whether each is worth his stand or not, seems to be sufficiently plain to them without resorting to force. Moreover, the interest that a male takes in the affairs of the central part shows, so to speak, his attitude toward maintaining his status. Such effort or spirit is observed through various activities affecting the central part of the troop. Apart from their social status, there are monkeys full of this spirit and monkeys with little of it. The intensity of this interest can be perceived through a male's activity in the central part during the breeding season and by the position he usually takes in the expansion of the troop.

In order to formulate an evaluation of the leaders and sub-leaders with respect to these three personality traits, the following system was employed. 'S' represents high sociability while 's' represents low sociability; 'A' represents high aggressiveness while 'a' represents low aggressiveness; 'C' represents strong interest in the central part while 'c' represents less interest. The result of this evaluation is shown in Table 6. By combining these three traits, eight

types of personality are formed; viz., the Types SAC, SAc, Sac, sac, SaC, sAc, sAC, and saC. But, in reality, there can be no individuals corresponding to the two types, SAc and sAC, and we therefore have six types left for consideration.

Table 7 shows the individuals belonging to each of the types and the mean value of paternal care in each type. As a general tendency, the higher the sociability of the individual, the greater is the frequency of paternal care; furthermore, the lower the degree of aggressiveness and the higher the interest in the central part, the more cases of paternal care are seen. In Table 7 these are arranged in order successively, beginning with the type which is low in the mean value of paternal care.

Table 6 Personality of leaders and sub-leaders. (1954) Takasakiyama

Names of individuals	Sociability high (S) low (s)	Aggressive (A) or not (a)	Interest in the central part strong (C) or not (c)
<i>Jupiter</i>	S	A	C
<i>Titan</i>	s	a	C
<i>Pan</i>	S	A	C
<i>Monk</i>	S	a	c
<i>Bacchus</i>	s	A	c
<i>Boor</i>	s	a	c
<i>Achilles</i>	s	A	c
<i>Dandy</i>	S	a	c
<i>Yubi</i>	s	a	c
<i>Uzen</i>	S	a	C
<i>Kuro</i>	S	A	C
<i>Syaraku</i>	S	a	c
<i>Aomé</i>	S	a	c
<i>Utamaro</i>	s	a	c
<i>Saruta</i>	S	A	C
<i>Cyrano</i>	s	a	c

Table 7 Six personality types and the mean value of paternal care accompanying each type. (1954) Takasakiyama

Type	Names of individuals belonging to each type	Mean value of paternal care with each type
s a c	<i>Boor, Yubi, Utamaro, Cyrano</i>	1.25
s A c	<i>Bacchus, Achilles</i>	1.5
S A C	<i>Jupiter, Pan, Kuro, Saruta</i>	4.5
s a C	<i>Titan</i>	5.0
S a c	<i>Monk, Dandy, Syaraku, Aomé</i>	12.0
S a C	<i>Uzen</i>	16.0

The four individuals of Type sac, with the exception of *Yubi* (SL 3), are in the lower layer of each class. They have indeed many characteristics in common. In spite of being taciturn, they are comparatively active. They are rather marginal beings. Even *Boor* (L 6), though a leader, is not an exception, since he gives the impression of being in a marginal position in the leader class. *Boor* was promoted to a higher rank automatically by the desertion of *Pan* (L 3) and *Monk* (L 4) from the troop. *Yubi* (SL 3) was demoted together with *Achilles* (SL 1) and *Dandy* (SL 2) by the advance of *Uzen* (SL 4) and *Kuro* (SL 5) to a higher rank. *Utamaro* (SL 8) and *Cyrano* (SL 10) were also automatically raised by *Aomé's* extreme decline. It is common to these 4 individuals that, in spite of the differences in (+) and (-), their marginal positions isolate them from the whirlpool of the status race in each class, and they are therefore able to hold comparatively stable positions.

As for *Bacchus* (L 5) and *Achilles* (SL 1), both of Type sAc, *Bacchus* has never given paternal care and *Achilles* only three times, making the mean value for this type only 1.5. These males are unsociable, and though of a passionate disposition, not very ambitious in the central part. Another characteristic common to them is being destined to decline in rank. In Table 6, *Bacchus's* demotion is not shown, but he was Leader 4 in 1953, and he was replaced by *Monk* who was previously Leader 5. He is the oldest of all the adult males and shows in his behavior traits not found in any of the other monkeys except *Jupiter*, making it not unreasonable to suppose that he was the most dominant male before *Jupiter*, and may have lost prestige as he grew older. *Achilles* was deprived of his position of Sub-leader 1, which he had so long enjoyed, by *Uzen* (SL 4); this may have been the natural fate of *Achilles* who was just because of his violent temper and lack of sociability. In 1955, *Achilles* collected several females and infants in the peripheral part of the troop and tried to form a small splinter troop, but this attempt was unsuccessful.

The SAC Type, which includes *Jupiter* (L 1), *Pan* (L 3), *Kuro* (L 5) and *Saruta* (SL 9), can be thought of in contrast to Type sac. The fewest cases of paternal care (2) were reported for *Jupiter*, the most (9), by *Pan*, and the mean is 4.5. Except for *Pan*, who later deserted the troop, this is an ascending type which is already in a high position or is on the way to higher positions. It may be possible to think that in such a form of adaptation as this, *Jupiter*, *Kuro* and *Saruta* succeeded, which *Pan* failed. The difference between this and Type sAc lies in the existence of especially strong interest in the central part of the troop.

Type saC has only one representative, *Titan* (L 2), for whom five cases of paternal care are recorded. *Titan* is, in personality, a mild and passive monkey, nearest to the Type sac and what distinguishes him from that type must be his delicate position—Leader 2. In 1956, he tried to surpass

Jupiter, but, perhaps wanting in A character, failed in the attempt.

All of Type Sac except *Dandy* (SL 2) belong to the middle layer of their respective classes. They are active and of high sociability, but very mild and low relatively in aggressiveness, and the degree of their interest in the central part through direct action, at least, is very low. In fact, because of this characteristic, they are likely to be of a group declining in rank—*Monk* (L 4), deserted the troop, *Dandy* (SL 2) fell to the 4th and *Aomé* (SL 7) to the lowest position. *Syaraku* (SL 6) was able to maintain the 6th position, but he died in April 1960; the cause of his death is believed to be a bite on his abdomen, and this accident may indicate a trend in connection with the other three individuals of this type. The monkeys of this type are in contrast respectively with those of Type sac who have succeeded somehow in the marginal position in each class, with those of Type SAC who push forward by force, and with those of Type sAc who, though having also a tendency to lose status, dare not behave actively. The high rate of the mean value (12), for paternal care may indicate, in a sense, a sort of compensatory effort.

While Type Sac consists of cases which, in spite of such efforts, ended in failure, Type SaC may be said to be characterised by success. *Uzen* (SL 4) showed paternal behavior as many as 16 times. His extraordinarily strong interest in the central part of the troop is well illustrated by the behavior mentioned above, of gathering infants around him, with himself as the nucleus, and also by the fact that he is always found in the central part of the troop. The most important difference which distinguishes him from Sac Type monkey may be said to be his vigorous tenacity to the central part. Moreover, he succeeded in raising his own position from the 4th to the 1st; not promoted like *Eoor* (L 6) or *Utamaro* (SL 8), by sitting passively and leisurely, but by clinging to the central part positively and steadily he succeeded in taking a position even higher than that of *Achilles* (SL 1), who was, as it were, intrepidity itself. Although *Uzen* is blind in one eye, he may perhaps succeed *Jupiter* (L 1) in future, and then there will appear a leader who has a personality different from that of *Jupiter*.

We have so far discussed the relationship between the personality of each individual leader and sub-leader and paternal care, and we arrive at the conclusion that even paternal care itself is also to be considered a manifestation of a strong interest in the central part of the troop. Although this is not the only factor for decision, as discussed above, they, through their behaviors of this kind, these males are seen to be in indirect competition with each other, not by acts directed toward one another, but with the central part of the troop as a medium, which must be a very interesting thing.

Finally, I will discuss the four cases of paternal care seen in the 1st sub-class of peripheral males. As shown in Table 4, the males concerned in

these cases were *Gon* (P 12), *Gen* (P 13) and *Don* (P 16), individuals who ranked in the upper and middle layers. In the breeding season of 1954 *Gon* was bitten so that he had a serious wound on his leg. As a result his status declined in the succeeding year (1955) to the lowest position in his class, and he is still in the lower layer at the present time. *Gen* deserted the troop in 1955 and *Don*, in 1956. All three of the individuals who showed paternal care during the delivery season of 1954 have thus been unlucky since. However, this should be interpreted, together with the playing behavior shown by *Hosi* (P 18) and *Cri* (P 19) who belonged to the lower layer of this class, as behavior indicating a process of social growth: that is, when the peripheral males rise to the middle or the upper layer of the 1st class, their interest in the central part gradually increases and the behavior of paternal care begins to appear. In other words, if the behavior observed on the part of *Hosi* and *Cri* advances further, it may grow into paternal care of one to one, and the two different types of behavior may be linked developmentally, for paternal care is, of course, a kind of behavior typical of leaders or sub-leaders, but it never appears suddenly.

(5) *Some supplemental notes on paternal care*

The infant receiving paternal care is sometimes given privileges of different kinds by the adult male who is its protector. This is exactly similar to the case in which a female is given privileges by a male with whom she is in consort relation.



Fig. 8 The infant (one year ♀) is allowed to eat peanuts in *Syaraku*'s presence.

Observation 13.

1954, May 21, 3.30 p.m., fine.

Takasakiyama

Syaraku (SL 6) enters the provisioning ground with an infant, an especially small one

among those born last year, on his loins. The infant suddenly jumps off and picks up some peanuts which are in front of *Syaraku*, who tolerates it. He just watches, neither taking the peanuts from the infant, nor threatening or attacking it.

Between an adult male and an infant in ordinary relations, such behavior is seldom observed. Thus, being under the protection of an adult male means having some influence over the other monkeys. In a word, as long as the infant is beside its protector, the others treat it just as they do the adult male, its protector.

Observation 14

1954, June 7, 3.00 p.m., cloudy.

Takasakiyama.

Monk' (L 4) is eating wheat with a one-year ♀ infant in his bosom. Soon the infant, leaving *Monk'*, begins to play alone in the vicinity. The observer, as a test, throws a loquat so that it rolls to a spot a meter away from the eyes of *Hati*, an adult ♀, who is close to the infant. Instantly the infant picks up the loquat. Such behavior usually causes a great commotion, but *Hati* pretends to be ignorant of it, and even *Monk'* allows the infant to have the loquat and goes on eating wheat himself.

When this happens many times, the infant grows very strong-willed. A black-faced one-year male, a size smaller than the other infants, which was protected by *Uzen'* (SL 4) for a long time, has become much more domineering than the other infants of the same age. With *Kappa'* and *Nake'*, who were referred to above, the same phenomenon is observed. It is not yet clear to what extent this condition will last or what influence it has on the infant's personality.

On the contrary, sometimes the adult male gets subjected to many influences of the infant protected by him. This, in 1958, was already pointed out by me. For instance, I observed that an adult ♂ learned to eat a new food from an enterprising infant which was under his care. Like the tie between mother and baby or between mother and infant, the tie between the adult ♂ and the infant forms, so to speak, an important channel for many other new habits, in addition to those concerning food, to propagate among the troop.

Observation 15

1954, June 27, 3.50 p.m., cloudy.

Takasakiyama.

Outside the provisioning ground, *Syaraku'* (SL 6) has that yellowish-haired infant, a one-year-old female, in his bosom. I show them an apricot, which is a new food to this troop. The infant in *Syaraku'*'s bosom instantly shows interest and tries to leave *Syaraku'* and take it. *Syaraku'* catches the infant's hand, pulls her to him, gestures to give warning, and then, slowly approaching the apricot himself, picks it up, smells it carefully three times, peels it, smells it once more, and eats it slowly. This is the first record of *Syaraku'*'s eating an apricot. The infant has eaten apricots many times.

Adult males protecting infants usually become very mild. One even receives the impression that a sort of streak of femininity is developed in

them by hugging the infants. Because of their responsibility to protect the infants, of course, they inevitably stand on the defensive, and their behavior is, compared to that shown when they are not hugging infants, rather timid, although there are some exceptions—cases in which they take the aggressive when they are accompanied by infants.

Observation 16

1954, May 16, 2.30 p.m., cloudy.

Takasakiyama.

At the provisioning ground, *Cob* (2-year ♀), surprised by the clicking sound of peanuts thrown by some spectators, runs away crying "Ki, Ki, Ki". *Pan'* (L 3), who has been at the end of the provisioning ground, comes running to meet *Cob*, and menaces the spectators on all fours with the infant in his bosom. After a while *Cob* leaves him to go running to the other end of the provisioning ground, and *Pan'* suddenly tries to attack the spectators.

Pan' (L 3) is by nature an aggressive monkey, and when he is protecting an infant, he becomes especially furious, while *Cob'* often shrieks at mere trifles and attacks other monkeys or the spectators. Such behavior as *Cob's* has never been seen among other one-year infants. *Dandy'* (SL 2), by nature a very mild monkey, like *Pan'* becomes especially aggressive when he is protecting an infant.

Observation 17

1954, July 9, 4.30 p.m., fine.

Takasakiyama.

On the stone steps, *Dandy'* (SL 2) is walking with the one-year infant of the adult female *Dede'*. When the observer attempts to approach them, *Dandy'* attacks him furiously the infant held behind him in a protecting manner.

However, the behavior generally characteristic of adult males who are protecting infants is very mild, as shown by the following cases.

Observation 18

1954, May 24, 2.50 p.m., cloudy.

Takasakiyama.

Syaraku' (SL 6) is walking with that yellowish infant on his loins. On the way he takes it to his breast, and then on to his loins. When I try to approach *Syaraku'*, he hugs it again hurriedly and quickly runs away instead of taking an aggressive posture.

Observation 19

1954, June 8, 4.15—4.30 p.m., rainy.

Takasakiyama.

On the large rock beside the provisioning ground *Monk'* (L 4) sits with an infant, a one-year female, and when I approach, *Monk'* eagerly repeats rhythmic lip movements on me, and continues to do so as he, comes directly in front of me, as if trying to show a feeling of friendship and begging pardon. As I go still nearer, *Monk'* pulls the infant into his bosom, and retreating to the upper part of the rock, puts the infant on his loins and begins to show an aggressive posture against the observer. At 4.30 p.m. some wheat is scattered over the provisioning ground, and *Monk'* takes up his infant on to his loins, and enters the provisioning ground, accompanied by eight other one-year infants. Besides *Monk'*, *Eoor'* (L 6) is there. *Monk'* pulls down the infant off his loins, and begins to eat the wheat.

Monk (L 4), when he was protecting an infant, almost always made his rhythmic lip movement against the observer. The other adult males did not go so far as to make these lip movements, but grew milder and usually ran away without delay, showing no resistance to the approach of the observer. It may be said that in general adult males protecting infants, with the exception of *Pan* (L 3) and *Dandy* (SL 2), never attacked other individuals with their infants in their bosoms or on their loins.

During this period, I often observed the troop moving in a procession, and it was usual that no sign of paternal care was observed during the moving of the troop. The infants usually walked close by and when they reached their destination, the provisioning ground, jumped into the adult male's bosom. The following is a rather rare case in which *Uzen* (SL 4) had his infant in his bosom when the troop was moving.

Observation 20

1954, June 19, 11.55 a.m.—0.16 p.m., rainy.

Takasakiyama.

The troop is moving from Akaiwa to the provisioning ground. The observer is in front of the Zen-Hall, recording this procession from the side. In the 119th position behind the leader, *Uzen* (SL 4) comes with a one-year infant on his loins. This infant is recorded as the 120th. *Uzen* stops on the way, and taking it to his breast, watches those coming after them. It is now 0.15 p.m. The infant in *Uzen*'s bosom suddenly shrieks "kiya kiya kiya...". At 0.16 p.m., *Uzen* puts his infant on his back again and proceeds toward the provisioning ground.

The following case observed on another day again records *Uzen*'s behavior just before his arrival at the provisioning ground where the moving of the troop came to an end.

Observation 21

1954, May 28, 8.57 a.m., fine.

Takasakiyama.

The troop comes down from the right toward the provisioning ground. *Uzen* (SL 4) appears on his back a small, one-year male infant with a black face. Five more infants of the same age follow them, and on arriving at the ground, hurry away to the watering place all together, while *Uzen*, with his black-faced infant in his bosom, is feeding. *Jupiter* (L 1) comes from above, surrounded by females. *Uzen* stops eating and goes out of the provisioning ground with his infant on his back.

The one-year infants were leaving their mothers during this period to form an infant group in a corner of the central part. *Uzen* (SL 4) knew that being on intimate terms with the infants gave him access to the central part. He always stayed among the infants and made efforts to get into the central part of the troop, where he was close to the leaders and the females of higher rank. He did not go alone, almost always having an infant in his bosom when he showed such behavior. For *Uzen*, the infant was, as it were, playing the part of a passport for the central part of the troop. Perhaps, it is possible that when he was with an infant, he was treated as a female and allowed to enter the central part.

Observation 22

1954, June 1, 9.50-10.15 a.m., cloudy.

Takasakiyama.

Uzen (SL 4) enters the provisioning ground with a one-year infant on his back. Around them there are several other infants. At 10.15 a.m. there are 15 infants around *Uzen*, but he has only one of them close beside him.

Observation 23

1954, May 26, 11.30 a.m., fine.

Takasakiyama.

In the center of the provisioning ground, the females of the central part are feeding in a group surrounding *Titan* (L 2). *Uzen* (SL 4), with a one-year infant on his abdomen, goes into the central part and gradually begins to eat. He is not driven back by the females.

On July 6, in my field-notebook, I wrote:—

“Lately *Uzen* (SL 4) almost always takes an infant in his bosom on purpose when he enters the provisioning ground, even though he has been without one outside”.

Compared to this behavior of *Uzen* (SL 4), that of *Monk* (L 4) was somewhat at variance, even though he belonged to the leader class. During the delivery season, he would take an infant to the large rock beside the provisioning ground where he usually spent the day in a leisurely fashion. He seemed to prefer this way of living to carry out the role of leader, by governing and supervising the troop. This was the place where *Syaraku* (SL 6) also used to come with his infant, and might be called a gathering place for the sub-leaders rather than for the leaders. *Monk* and *Syaraku* would carry on masturbation there with their infants in their bosom.

Observation 24

1954, June 11, 11.00 a.m., cloudy.

Takasakiyama.

Syaraku (SL 6), coming down to the large rock by the provisioning ground, sits with his one-year female infant in his bosom. The infant grooms *Syaraku*'s body. *Syaraku*, after enjoying the grooming for a time, makes his penis erect and begins to masturbate, without emission of semen.

Observation 25

1954, June 30, 8.20 a.m., cloudy.

Takasakiyama.

On the fence on the edge of the provisioning ground *Monk* (L 4) sits with a one-year female infant. While the infant is playing apart from him, *Monk* leisurely begins to masturbate, and when the infant come back to him while he is enjoying himself thus, he gets angry with her.

Observation 26

1954, June 6, 4.50 p.m., rainy.

Takasakiyama.

Above the provisioning ground *Monk* (L 4) tries to hug a 2-year female infant in his arms, then, in so doing, he bends himself over the infant, and mounting on her, makes

several thrusts, but *Monk's* penis is not erected and of course is not invaginated. As the observer goes nearer, he hastily takes the infant to his breast again, and, making rhythmic lip movements, runs away quickly.

In no case has a true copulation been observed between the protector and the protected, and no case of ejaculation is recorded in connection with the masturbation of *Syaraku'* (SL 6) and *Monk'* (L 4). But, in spite of the fact that sexual behavior in the non-breeding season is generally very rare, it has been observed in adult males who are showing paternal behavior. This may be interpreted as a phenomenon involving a sort of illusion, as well as an indication that femininity is strengthened in the adult males who give paternal care. However, we have not kept records concerning such sexual behavior for all the individuals who have given paternal care.

The discussion so far has been concerned with the relation between the adult males and the infants through paternal care, and some different phases of paternal care have illustrated with case records from the Takasakiyama troop. The situation in the other troops of monkeys will now be considered.

4. PATERNAL CARE AS A CULTURAL BEHAVIOR

This behavior, which is found among the Takasakiyama troop, cannot be described as generally characteristic of any troop of Japanese monkeys. I will give here a brief report on the paternal care among the other 16 troops—the troop in Kôshima, Toimisaki, Oborayama, Nametoko, Syôdosima K, Syôdosima S, Syôdosima T (=Okinosima), Katuyama, Taisyakukyô, Takahasi, Tubaki, Minoö A, Minoö B, Arasiyama, Ôhirayama and Hagati.

First, no paternal care is observed in the following 8 troops—those of Toimisaki, Syôdosima T, Katuyama, Taisyakukyô, Minoö A, Minoö B, Ôhirayama and Hagati—with the single exception of the case in the Ôhirayama troop mentioned above, in which sub-leader *Noro'* protected *Matu's* baby after her death. This case will be excluded from the present discussion.

In some rare cases in which paternal care is observed, we surmise that probably other phenomena similar to paternal care are mingled to some extent. Such cases have been observed among the 7 troops of Kôshima, Oborayama, Nametoko, Syôdosima S, Syôdosima K, Tubaki and Arasiyama. At Kôshima only *Mobo'*, the 3rd adult male in rank and a sub-leader, shows this behavior in the delivery season. In the troops of Ôhirayama and Nametoko, we have only the report that such cases are rarely seen. Among the Syôdosima S troop, M. Yamada has recorded that *Sen'*, a peripheral adult male in this troop, protected only once, in 1956, a 2-year male infant. In 1957, when we captured the whole troop of Syôdosima T, *Sen'* was among the troop as a semi-solitary.

The T troop was subsequently removed to Okinosima in Mikawa Bay,

to set up a new colony ; here *Sen* has not shown paternal care. According to M. Yamada's record of the Syôdosima K troop, *Globe* (L 4), showed paternal care with a 2-year female in 1956, a one-year male in 1957 and a 2-year male in 1958, each time during the delivery season in these three successive years. In this troop, however, only *Globe* showed this type of behavior. According to S. Maegawa's record of the Tubaki troop, in the delivery season in 1956 a 4-year male and a 5-year male protected 1- and 2-year infants, respectively. Although males 4-5 years of age are too young to show this behavior, we must note that this troop is peculiarly organized, in that it has very few adult males. In the Arasiyama troop, K. Nakadima observed two somewhat similar cases in leader males in the delivery season of 1957, but he has not recorded distinct paternal behavior.

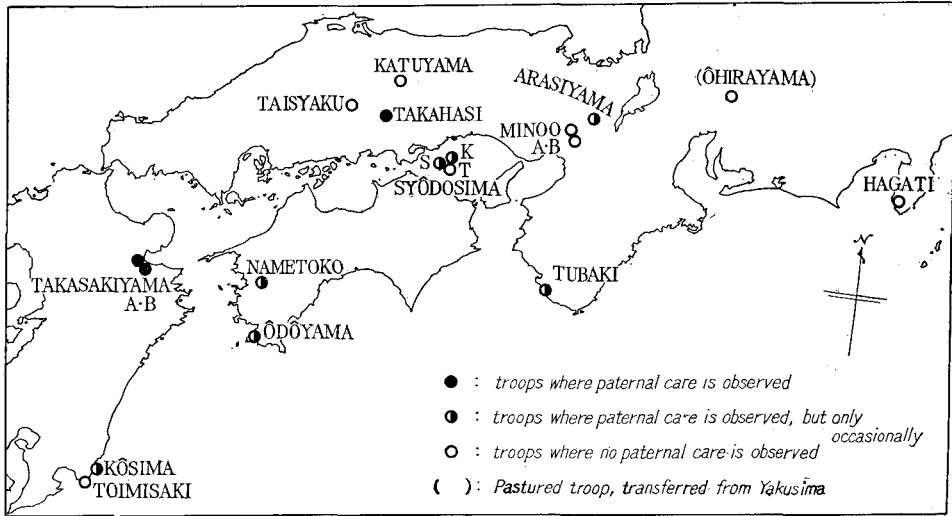
Finally, in the Takahasi troop, Y. Furuya has described paternal care as being a comparatively general phenomenon. Among the members of this troop, paternal care is observed only in the leader and decline leaders. The 1st and the 3rd leaders and a decline leader have shown paternal care in the delivery season every year. With the 2nd leader, no case of paternal care has been recorded. Y. Furuya will make a precise report on paternal care in this troop elsewhere.

We have still one more troop which shows paternal care. This is the Takasakiyama B troop which separated in 1954, and now in 1960 consists of about 150 individuals. The leaders are *Hosi*, *Siro* and *Cri*, who once belonged to the lower layer of the 1st sub-class of peripheral males in the main troop. H. Mizuhara is now studying the paternal care among this detached troop, and according to his report, exactly the same paternal care as in the main troop at Takasakiyama is observed during the delivery season among the leaders of the detached troop.

Map 1 shows the geographical location of these 18 troops and the incidence of paternal care in each troop. This map indicates plainly that there is no relation at all between the two items. Accordingly, the paternal care in the Takasakiyama and Takahasi troops may be supposed to have grown up independently.

The existence of paternal care may, to some extent, have a relation to the size of the population. In 1953, however, the population of the Takasakiyama troop was about 230, and already at that time, this troop had established the habit of paternal care. Now at present, no habit of paternal care is established, among the troops of Toimisaki and Syôdosima S and K, in spite of their being troops of nearly this size. These considerations suggest that paternal care is a cultural behavior among the Takasakiyama and Takahasi troops. We have hitherto dealt with various problems of culture among the troops of Japanese Monkeys, such as the differences in food between troops, the potato-washing behavior propagated within the Kôshima troop, etc.; paternal care may be said to warrant the same treatment.

Map 1 Locations of troops and incidence of paternal care



Moreover, the problem is interesting in that it is not simply individual behavior like that concerning food or the way of feeding, but rather a highly socialized form of behavior, and although indirect, or indeed because it is indirect, it is behavior which has a certain social value. In future this behavior pattern will be handed down as a factor in the culture of the Takasakiyama and Takahasi troops and in the two classes of leaders and sub-leaders, even when the generations change.

Following the relationship between the protectors and the protected through a long period must be left as a future work, but we believe that the existence of paternal care has definitely demonstrated the dynamic social organization of the Japanese Monkey.

5. SUMMARY

(1) The behavior called paternal care in this report is a pattern of behavior in which, during the delivery season, the adult males of high rank in the troop, such as the leaders and sub-leaders, protect one-year, or sometimes two-year, infants in the same way as the mothers do.

(2) This relationship exists between a given adult male and a given infant, usually with a certain definite duration.

(3) The adult male hugs the infant, takes it on his loins or walks with it; when sitting, he will groom it, and on critical occasions he takes it under his protection.

(4) Paternal care is commonly observed among the Takasakiyama monkeys during the delivery season; 5 out of 6 leaders and 9 out of 10 sub-leaders have shown this behavior.

(5) Paternal care, which has such a universality, is distinguished from behavior similar to it. Among the forms of behavior belonging to the latter category, there are cases closely resembling paternal care, as when adult males protect new-born babies or walk with half-year babies in their bosom during the breeding season; but these forms of behavior are seldom observed.

(6) The period during which paternal care is observed corresponds exactly to the delivery season, but on comparing the curves we find that while the latter has a nearly normal curve, the peak of the former lies in the first period of the delivery season and gradually falls off after that.

(7) The period of paternal care should be said to correspond rather to the situation that the females have to let their infants born in the previous year go away from them on account of delivery, than to the simple fact of the delivery season.

(8) In the case of the one-year infants, among 62 protected individuals in which discrimination of sex was possible, 28 were males and 34 were females, suggesting that sex is not a major factor.

(9) Among 25 two-year infants, on the other hand, only five were males while 20 were females, indicating an important sex difference.

(10) This seems to be caused, not by a preference for female infants on the part of the adult males, but by the different life histories of males and females; the male infants form an infant group, showing a tendency toward peripheralization, while the female infants stay in the central part of the troop.

(11) Moreover, it is quite noticeable that many of the infants put under paternal care after they were two years old were especially under-grown and weak individuals.

(12) The records of 2-year infants include some cases in which the same pair of adult male and infant in paternal care relationship appeared during the delivery seasons in two successive years.

(13) The records with respect to the protecting individuals show: in the leader class, 35 times (mean, 5.8); in the sub-leader class, 60 times (mean, 6.0); in the 1st class of peripheral males, 4 times (mean, 0.4). From these data, it may be concluded that paternal care is a form of behavior typical of leaders and sub-leaders.

(14) Studying these 2 classes, no relation is observed between the order of rank and the frequency of paternal care.

(15) However, this behavior was seen especially often among those in the middle layer of each class. If their rank during the delivery season in 1954 is then compared with that in 1960, it appears that the individuals whose social positions were most changeable showed paternal care more frequently; that is, it can be said that those in more unstable positions showed more of this behavior.

(16) Each individual of the two upper classes was rated with respect

to three characteristics—sociability, aggressiveness and degree of interest in the central part of the troop—in an attempt to divide their personalities into types according to the different combinations of these characteristics, and thus to determine the degree of correspondence between personality and paternal care. We have found 6 actual types of personality, and our conclusion is that, among these, those of the type which is high in sociability, low in the degree of aggressiveness and high in interest in the central part show more paternal care.

(17) It is plain that paternal care itself is a sign of interest in the central part of the troop, and the males which display it are trying to establish their social position indirectly through the medium of their activity in the central part. Paternal care can be thought of as behavior of this sort.

(18) A few cases of paternal care observed among the first subclass of peripheral males may be interpreted as a sign that they are in the stage of becoming interested in the central part, according to their social growth.

(19) In the relationship between the protector and the protected, the protected infant may be given certain privileges concerning food or other things by the adult male, its protector.

(20) Moreover, being protected by a dominant adult male means having some influence over other females and infants.

(21) We have recorded a case in which the protected infant, thus won dominancy among its fellows, but it is not yet clear to what extent this will actually last.

(22) The adult male, on the other hand, is influenced by a progressive infant in many ways, for instance, feeding on a new food.

(23) An adult male protecting an infant usually becomes much milder and behaves as if femininity were strengthened in him. But there are also a few males who become still more aggressive.

(24) We have records of the process by which one of the sub-leaders attempted to move into the central part of the troop. The fact that by hugging an infant he succeeded in being tolerated by the females and leaders is, with his rising in rank, a very interesting phenomenon.

(25) Among the adult males who bestow paternal care, certain sexual behavior is sometimes observed in periods other than the breeding season. This is chiefly masturbation, while ejaculation is not observed.

(26) A survey of the existence of paternal care among the 18 troops of Japanese Monkeys gave the following result: this behavior was found to be general in 3 troops, very rare in 7 troops and absent in 8 troops.

(27) One of the three troops where paternal care was observed was the Takasakiyama B troop which separated from the main troop in 1959.

(28) The existence of paternal care shows no relation to the geographical distribution of the troop, and seems to have no relation to the size of the

population of the $\frac{v}{x}$ troop.

(29) Paternal care may be thought as cultural behavior. Moreover, since it is an extremely socialized form of behavior, it has social value.

(30) It is regrettable that unfortunately the difficulties connected with discriminating between individual infants made it impossible for us to follow up the relationship between the protectors and the protected for a long period. This must be an important problem in social organization left to be solved in future.

July 24, 1960.

at KAMPALA, UGANDA

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