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Some Aspects Related to Conception of the Japanese Monkey (*Macaca fuscata*)

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ABSTRACT. The season of birth, age of the first parturition, gestation period, and vaginal bleeding and mating after conception were surveyed with Japanese monkeys (*Macaca fuscata*). The analyses of the former two items were dependent on the birth records in the Ohirayama troop collected from 1957 to 1973, and the analyses of the latter two items were dependent on data obtained by a 48-hour mating in a laboratory.

Birth in the Ohirayama troop converged into the months from March to July, especially from April to June. The age of the first parturition was three years and 11 months at the earliest, and nine years and two months at the latest. The monkeys giving their first birth at the age of five or thereabouts were most frequently observed (68.6%), and most of the monkeys had their first parturition from about the age of four years to about the age of six years.

The gestation period calculated from 17 cases, which was defined as the period from the first day of a 48-hour mating to the day before parturition, was 173 ± 6.9 days ranging from 161 to 188 days.

In 25 out of 28 cases, the vaginal bleeding was observed after conception. It began slightly later (between 16 and 24 days after mating) than the forecasted time of the next menstrual hemorrhage, and usually lasted longer than bleeding of the usual menses.

Each of three female monkeys caged together with a male monkey 30 days after conception was observed to have copulated, and the male was observed to have ejaculated.

INTRODUCTION

At present, there are few reports related to conception of Japanese monkeys. Although three reports (HAZAMA, 1954; ASAKURA, 1960; KAWAI, 1966) on a gestation period of this species were published, none of them is considered to be complete, because the data given by HAZAMA and ASAKURA seem to be questionable in their diagnoses of the conception, and the report given by KAWAI is of only one monkey.

In this paper, the birth season, the age of the first parturition, the gestation period, and the vaginal bleeding after the conception are reported as basic data of reproductive physiology of the Japanese monkey.

MATERIALS AND METHODS

SEASON OF BIRTH AND AGE OF FIRST PARTURITION

As to the season of birth, a total of 315 births recorded in the Ohirayama troop (Japan Monkey Centre, Aichi Prefecture) during the preiod from 1957 to 1973 were analyzed.

Data of 32 monkeys of the troop whose birth dates were precisely known were used to calculate the age of the first parturition.

GESTATION PERIOD

Some monkeys were mated in a laboratory for 48 hours between day 10 and day 15 of their menstrual cycles. Data on 17 monkeys giving birth were analyzed. The period from the first day of the 48-hour mating to the day before the parturition was regarded as the gestation period.

VAGINAL BLEEDING AND MATING AFTER CONCEPTION

Twenty-eight monkeys which had been conceived after the 48-hour mating were examined for the presence of the blood stains in dropping pans of the individual cages.

It was observed with three female monkeys whether or not they mated again when they were introduced into a male cage about 30 days after conception.

RESULTS

SEASON OF BIRTH

Table 1 shows the monthly distribution of births in the Ohirayama troop every year during the period from 1957 to 1973.

Although there were some differences in the number of births from year to year, it is clear that almost all births converge into the months from March to July, especially from April to June. However, a few unseasonable births were observed in September and October.

AGE OF FIRST PARTURITION

Table 2 shows the distribution of the age of 32 monkeys in the Ohirayama troop at the time of their first parturition. The earliest age at the first parturition was three years and 11 months and the latest one was nine years and two months. Six (about 18.8%) out of 32 monkeys gave their first parturition at about four years of age, 22

Table 1. Monthly distribution of births in the Ohirayama troop.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1957				5	1	2	1						9
1958				1	3		1						5
1959			1	3	1				1				6
1960			1	4	8	5							18
1961			1	3	8	1							13
1962			1	4	14	4							23
1963				2	8	3	1						14
1964			4	14	6	1							25
1965			2	5	10	2	1			1			21
1966		1	1	18	6	1	1						28
1967			1	3	16	2	4						26
1968			2	12	6	4			1				25
1969			2	7	10	2							21
1970			1	11	8	4	2						26
1971			2	5	6	1							14
1972				8	9	9		1					27
1973				4	4	3	3						14
Total	0	1	19	109	124	44	14	1	2	1	0	0	315

Table 2. Age of first parturition.

Age	Years and months	Number of cases
Age of four or thereabouts	3/11	1
	4/ 0	2
	4/ 1	2
	4/ 3	1
Age of five or thereabouts	4/ 9	1
	4/10	1
	4/11	3
	5/ 0	8
	5/ 1	7
	5/ 2	1
	5/ 3	1
Age of six or thereabouts	5/ 9	1
	5/11	1
	6/ 2	1
More than seven	9/ 2	1
Total		32

(about 68.8%) at about five years of age, three (about 9.3%) at about six years of age, and one (about 3.1%) at nine years and two months.

Gestation Period

The mean length of the gestation period obtained from 17 cases was 173 days with the standard deviation of ± 6.9 days, ranging from 161 days to 188 days. As shown in Figure 1, the most frequently observed gestation period was 176–180 days in six cases, and the 2nd most frequent period was 171–175 days in five cases. The gestation period taking 171–180 days was 64.7%. In only one case was the gestation period more than 180 days.

Vaginal Bleeding and Mating after Conception

In 25 out of 28 monkeys, the vaginal bleeding were observed after conception. Bleeding began between 16 and 24 days after mating, and the duration of the bleeding was usually longer than the menstrual hemorrhage. In some cases, however, the bleeding was indistinguishable from the menses.

Figure 2 shows five typical cases of bleeding after conception. The bleeding of *Case* 1

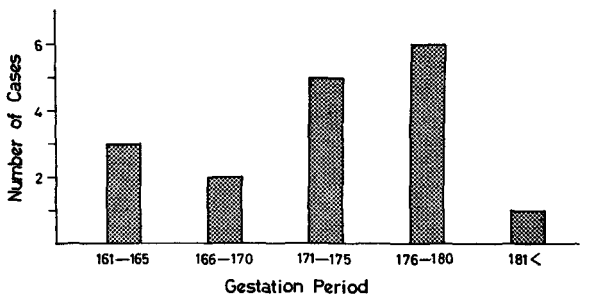

Fig. 1. Distribution of gestation period.

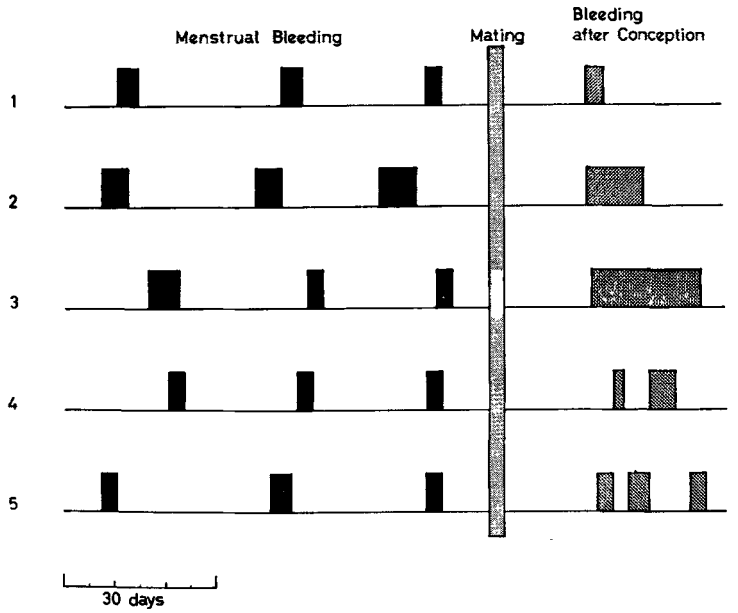

Fig. 2. Five typical cases of bleeding after conception.

was indistinguishable from normal menstrual bleeding at the time of onset and for the duration of the bleeding. Such cases numbered four out of 28. In *Case* 2 the bleeding began slightly later (around 20 days after mating) than the forecasted time of the next menstrual hemorrhage, and lasted longer (7–14 days) than that of normal menstrual bleeding. Such cases numbered 13 out of 28. Among five monkeys represented in *Case* 3, the duration of the bleeding was considerably longer, more than 15 days, sometimes as long as 28 days. The bleeding was observed twice in two monkeys of *Case* 4, and three times in one of *Case* 5. In the remaining three monkeys, the bleeding after conception was not detected.

As mentioned above, it is concluded that the postconceptional bleeding usually began slightly later than the time of the normal menstrual hemorrhage, and that the duration of bleeding in most cases was longer than that of the normal menstrual flow.

Three female monkeys copulated when they were introduced into a male cage 30 days after conception, and the male was observed to have ejaculated.

DISCUSSION

SEASON OF BIRTH

It is well known that the Japanese monkey is the "seasonal breeder." However, KAWAI et al. (1967) reported that there were some differences in the birth season among the troops of the various districts of Japan. Almost all of the births in the Ohirayama troop converged into the period from March to July, especially from April to June, but a few births occurred exceptionally in September and October.

It has not yet been clarified what causes such convergence of births into a certain season, and, on the other hand, why unseasonal births sometimes occur, in spite of the fact that convergence of births is common in the Japanese monkey.

Age of First Parturition

Nigi (1975) reported that the Japanese monkey had nearly regular menstrual cycle from the first mating season after they attained to the age of three, and that in the case of conception in this season the first birth would occur at the age of four or thereabouts at the earliest.

The results given here were the same as those in the previous report, and the earliest age of the first parturition was three years and 11 months. However, among the free-ranging troops, it seemed that the age of the first parturition slightly differed from one to another. By Hayashi (pers. commu.), in the Miyajima free-ranging troop (Hiroshima Prefecture), 33.3% of the monkeys gave their first births at the age of four or thereabouts, 44.4% at the age of five, 16.7% at the age of six, and 5.6% at the age of seven. On the other hand, data on the Koshima troop (Miyazaki Prefecture), given by the staffs of Koshima Field Laboratory of Primate Research Institute of Kyoto University (pers. commu.), showed that: the percentage of the first parturition occurring at about four years of age was 3.7; at five years of age, 25.9; at six years of age, 40.7; at seven years of age, 25.9; and at eight years of age, 3.7. The results obtained in the former troop agreed fundamentally with the Ohirayama troop, in that almost all of the monkeys gave their first parturitions between the ages of four and six, and that the cases of first parturition around the age of five were the most frequent. However, it is characteristic that the age of the first parturition in the Koshima troop was later than that in both the Ohirayama and Miyajima troops. Factors causing such differences are not clarified at present.

In the past, however, no case of parturition of the Japanese monkey at about three years of age has been reported in any troop or laboratory. Therefore, it could be concluded that the Japanese monkey has its first birth at the age of four, or thereabouts, at the youngest, and that almost all of the Japanese monkey have the first parturition by the age of seven, or thereabouts.

Gestation Period

In the past, there were only three reports on the gestation period of the Japanese monkey. Hazama (1954) regarded one day in the last estrus of a Japanese monkey as "the day thought to be pregnant," and the period from this day to the day before parturition was 150 days. Asakura (1960), who defined the gestation period from when the last consorts with the leader were observed to the day before the parturition of 13 Japanese monkeys in Ueno Zoo, found that the mean gestation period was 5.4 months, ranging from 5.0 to 6.0 months. Kawai (1966) reported a gestation period of 171–180 days in one Japanese monkey, which was calculated from estrus to the day before parturition.

Among the three reports above there may be a possibility to include some errors for the former two reports, because the authors of these reports were swayed by the

"last estrus." As mentioned already, many Japanese monkeys usually have the vaginal bleeding like the menstrual hemorrhage after conception, and they mate even after they become pregnant.

The results given in the present study do not necessarily mean the accurate gestation period, since the day of the ovulation of each case was not ascertained. However, these results are thought to be reliable, because the data were obtained from the mating for a relatively short period, a 48-hour mating, between 10 to 15 days during the menstrual cycle. The large variation in the gestation period, ranging from 161 to 188 days, would be thought to be normal for the individual variations of the Japanese monkey.

The gestation period of Japanese monkeys given in this paper seems to be slightly longer than those of the rhesus monkey (VALERIO et al., 1969; VALERIO, PALLOTTA, & COURTNEY, 1969; VAN WAGENEN, 1972), the cynomolgus monkey (FUJIWARA et al., 1969; VALERIO, PALLOTTA, & COURTNEY, 1969), and the bonnet monkey (VALERIO, PALLOTTA, & COURTNEY, 1969).

VAGINAL BLEEDING AND MATING AFTER CONCEPTION

Vaginal bleeding after conception was not peculiar to the Japanese monkey but has been reported in other primate species, for instance, in the rhesus monkey (VALERIO et al., 1969; VALERIO, PALLOTTA, & COURTNEY, 1969; VAN WAGENEN, 1972) and the cynomolgus monkey (FUJIWARA et al., 1969; VALERIO, PALLOTTA, & COURTNEY, 1969). The meaning of this bleeding is not exactly known at present.

In Japanese monkeys, the bleeding usually began slightly later than the forecasted time of the next menstrual hemorrhage, and usually lasted longer than the normal menstrual hemorrhage. However, in some cases the bleeding was indistinguishable from the menstrual bleeding. Thus, although the bleeding after the conception could be one of the diagnostic signs of conception in the former situation, the discrimination between it and the menstrual hemorrhage is not necessarily easy.

All of the three monkeys caged together with the male monkeys 30 days after conception were observed to mate. This fact suggests that Japanese monkeys do not necessarily mate only in the ovulation phase of the menstrual cycle.

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