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Heterosexual Interactions of Pairs of Laboratory-Housed Stumptail Macaques *(Macaca arctoides)* Under Continuous Observation with Closed-Circuit Video Recording

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Female-male interaction of heterosexual pairs of stumptail macaques, housed together continuously, was studied 24 hr per day using closed-circuit video recording. Two pairs were studied for approximately 2 months each. Although no generalizations can be made from such a small sample, no aspect of behavioral interaction varied significantly with the stage of the menstrual cycle of the female partner. Copulation occurred regularly but only during the daylight hours. Both pairs showed several peak ejaculation days (5–21 ejaculations/day), which were distributed throughout the entire menstrual cycle. In general, the highest number of ejaculations was observed to occur when the animals were put together either for the first time or following a separation of a few days. In one pair the female became pregnant, and from the fifth week of pregnancy onward there was a gradual increase in male aggression, coinciding with a decrease in male sexual and grooming behavior. In a second study eight different pairs were observed during the first day together and male copulatory behavior was studied. Two patterns of copulatory behavior could be discerned: pairs displaying a high number of ejaculations (19–38) and pairs displaying a low number of ejaculations (4–8). With regard to the interejaculatory interval (IEI), the male stumptail appeared to be unique. In contrast to what has been reported for other mammals, i.e., a steady increase in IEI with subsequent ejaculations, the stumptail showed increasing IEIs only during the first three to four, as well as between the last, ejaculations; in between, the IEI

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remained relatively constant. The maximum number of consecutive ejaculations observed was 38, displayed during a 10-hr time period [mean (± SEM) IEI, 12.9 ± 3.5 min].

KEY WORDS: *Macaca arctoides;* heterosexual interaction; continuous observation; male ejaculatory potential.

INTRODUCTION

For rhesus (Michael and Zumpe, 1970; Goy and Resko, 1972) and pigtail (Bullock *et al.*, 1972) macaques it has been reported that cyclic changes in sexual behavior occur in phase with the menstrual cycle. In female and male stumptail macaques *(Macaca arctoides),* individually housed in the laboratory and brought together for 20-min pair tests, the stage of the female's menstrual cycle had no effect on heterosexual interaction (Slob *et al.*, 1978b). Furthermore, it was found that no aspect of female–male interaction in the stumptail changed as a function of the menstrual cycle when one male was tested with three cycling females simultaneously during 15-min trio tests (Slob *et al.*, 1978a). On the basis of these findings it was concluded that cyclical fluctuations in the level of ovarian hormones were not significantly related to measures of sexual interactions in laboratory tests of this species.

It is possible, however, that for the stumptail the hitherto employed pair-test situation (time limited) is not an ideal one for identifying a role of ovarian hormones in female–male interaction. It was previously suggested (Slob *et al.*, 1978b) that separation and reunion of the pair may stimulate behavioral interaction more noticeably in this species than in other macaques, and that the repetition of separations and reunions used for testing the animals might exaggerate the use of the copulatory behaviors as a bonding function (Bertrand, 1969). Therefore, it was thought worthwhile to reexamine the effect of the menstrual cycle on heterosexual interaction by housing pairs of stumptails together for about 2 months and monitoring their behavioral interaction continuously, day and night, with closed-circuit video recording.

Previous research had shown that the male stumptail monkey appeared to exceed any other primate studied under laboratory conditions in its ability to display multiple ejaculations in time-limited tests: 11–19 ejaculations during a single 3-hr heterosexual pair test (Goldfoot *et al.*, 1975). That study did not employ exhaustion or satiation criteria for gauging the males' ejaculatory "potential." With continuous observation of pairs of stumptails, it was possible to obtain more information about the males' ejaculatory potential.

MATERIALS AND METHODS

Subjects

Nine female and six male stumptail macaques were used in this investigation. All animals were over 8 years of age, and all but one (444) had been born ferally. Except during experiments, the animals were housed in individual cages in a colony room where they had audiovisual contact with other males and females at the Primate Center T.N.O., Rijswijk, The Netherlands. Conditions of temperature and lighting were standard (20–24 °C; 11½ hr light, preceded and followed by ½ hr "dusk"). The animals were fed Hope Farms monkey chow, supplemented daily with rice and fresh fruit, and water was available *ad libitum*. Most animals had been used previously in laboratory studies of sexual behavior (Slob *et al.*, 1977, 1978a, 1979).

Behavioral Testing

Heterosexual pairs of animals were housed in a large wire-mesh cage (see Fig. 1) in a room (9 × 9 m) which was visually isolated from the rest of the colony. Closed-circuit video recording equipment (IVC 741 time-lapse recorder, 1 frame/2 sec; ITC CTC-6000 camera) was used to monitor the behavior of each pair continuously (with red fluorescent light during the night periods). Behavioral scoring was done by viewing the videotape from a slow-motion video recorder (IVC 801 P/SM) on a Conrac ENA 9/c monitor. One hour of observation was viewed in 75 sec; if sexual and/or aggressive interaction occurred, the speed was slowed down to 1 hr in 5 min and various behaviors were scored using a 20-channel Esterline Angus event recorder.

The behaviors which were scored, partially described previously (Goldfoot *et al.*, 1975), are listed below.

Mount: Typical macaque single- or double-foot clasp mount.

Ejaculation: Recognized at the termination of intromissive thrusting by momentary full-body inertia and rigidity.

Threat/aggression: Overt slapping, biting, or chasing of the female by the male.

Groom: Picking through the fur of the partner.

Sleep: Characterized by a typical body posture—a squatted position with the head bent slightly forward between the shoulders.

Wake up: Behavioral activity that disrupts the sleeping posture, e.g., locomotion, goroming, etc.

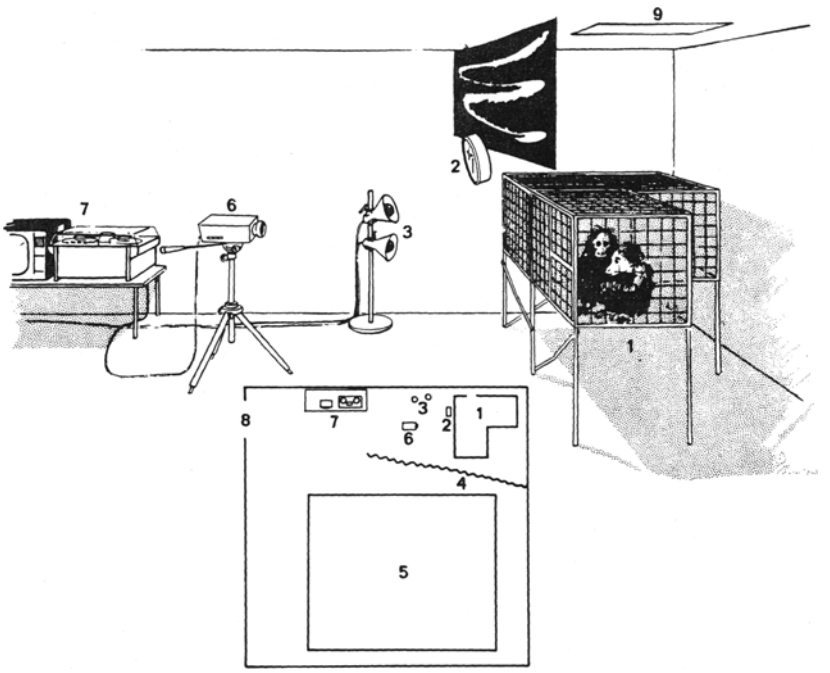

Fig. 1. Test room with experimental setting in which heterosexual interactions of pairs of stumptail macaques were continuously observed with closed-circuit video recording. (1) Animal cage (three compartments, each measuring 0.8 × 0.8 × 0.8 m). (2) Clock, in front of a black curtain to prevent white fluorescent light (9) from shining directly into the video camera (6). (3) Red light bulbs. (4) Black curtain visually isolating animals in cage 1 from three stumptails living in a large cage (5). (7) Time-lapse video recorder plus video monitor. (8) Test-room door.

In addition to these behaviors, the interejaculatory interval (IEI), defined as the time elapsed from the beginning of an ejaculation to the beginning of the next ejaculation (Goldfoot *et al.*, 1975), and the durations of grooming and sleeping were measured.

Long-Term Continuous Observations

The first pair (male 318 and female 425, pair A) was housed together from January 19 to March 17, 1976. For 3 days (February 13–16) during that period, the couple was separated to allow the female to recover from injuries that had been inflicted by the male. Pair A spent 53 complete days and 55 complete nights together.

The second pair (male 318 and female 431, pair B) was together from March 30 to May 31, 1976. Again, there was a 3-day break (April 17–20) because the female had been severely wounded by the male. Twice there was a technical disturbance with the recording equipment, so that during a part of the day no interactions were recorded (May 10 and 24). Pair B spent 57 complete days and 59 complete nights together, of which 55 complete days and 58 complete nights were recorded.

Short-Term Continuous Observations

For studying males' ejaculatory potential, eight heterosexual pairs were housed together for about 2 days during June 1976 (except for one pair observed in January 1976). Figure 7 gives the identities of the animals involved.

Blood Samples and Progesterone Determinations

In the females paired with a male for periods of about 2 months, menstruation was detected by taking vaginal swabs each morning. Additionally, at weekly intervals the females were taken out of the test cage and 5-ml blood samples were taken from the femoral vein or artery while the animals were restrained. The serum was subsequently stored at $-20\,^{\circ}C$ prior to the estimation of progesterone. Progesterone concentrations were later measured by radioimmunoassay (Meijs-Roelofs *et al.*, 1975).

RESULTS AND DISCUSSION

Menstrual Cycles

The female of pair A never showed menstrual bleeding during the experiment. Moreover, from the second week of testing to the end, serum levels of progesterone were "high" (see Fig. 2, bottom), indicating that she was pregnant. On July 19 she gave birth to a healthy female infant. From the progesterone data (undetectable on January 21 and 2.58 ng/ml on January 28), one can estimate that ovulation and conception occurred on about January 24. Progesterone levels showed a more or less steady increase during the first weeks of pregnancy, with a peak in the sixth week (6.52 ng/ml), followed by somewhat lower levels during weeks 7 and 8. This pattern is similar to that which has been found in the pregnant rhesus monkey (Bielert *et al.*, 1976). It also corroborates hitherto unpublished pro-

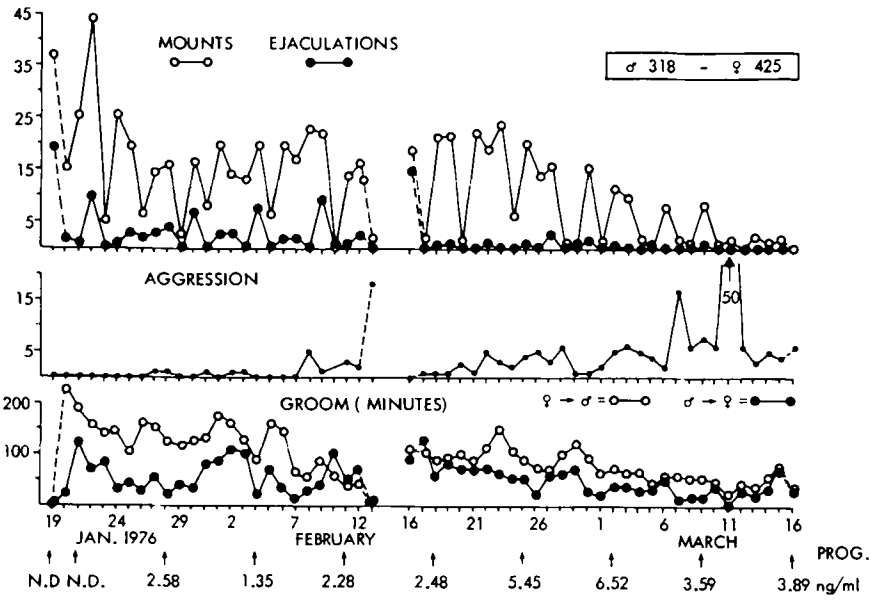

Fig. 2. Daily frequencies of male sexual and aggressive behaviors, as well as male and female grooming times (min), for one pair of stumptail macaques (♂ 318, ♀ 425) housed together continuously for approximately 2 months. The serum progesterone levels (ng/ml) of the female partner are shown at the bottom of the graph.

gesterone data of one pregnant stumptail monkey from an earlier study (Slob *et al.*, 1978b; see Fig. 4).

The female of pair B showed two periods of menstrual bleeding: April 12–20 and May 13–17. Since ovulation in the stumptail occurs about 16–17 days prior to menstruation (Wilks, 1977; Slob *et al.*, 1978b), ovulation could have occurred around March 29 (just around the time the animals were put together) and around April 26. Although no progesterone data from April 27 are available (the blood sample was lost), the serum progesterone level of 1.86 ng/ml on May 7 could indicate a functioning corpus luteum.

Behavior

Figures 2 and 3 reveal that in both pairs the highest ejaculation frequencies were found when the animals were put together for the first time or following a separation of a few days (15–38 ejaculations/day on January 19, February 16, March 30, and April 20). The functional significance of this "initial" high level of sexual behavior is not understood at present, but

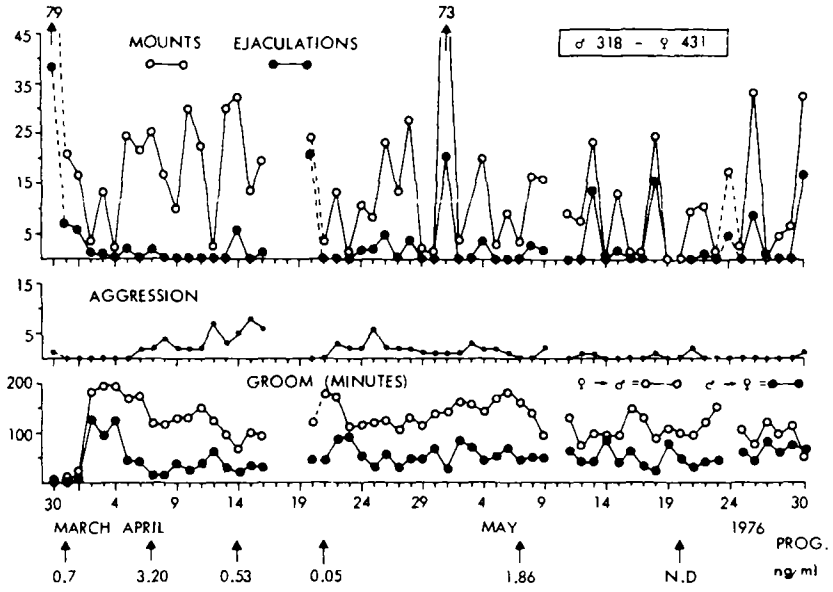

Fig. 3. Daily frequencies of male sexual and aggressive behaviors, as well as male and female grooming times (min), for one pair of stumptail macaques (♂ 318, ♀ 431) housed together continously for approximately 2 months. The serum progesterone levels (ng/ml) of the female partner are shown at the bottom of the graph. The lack of behavioral data on May 10 and 24 is due to technical problems with the recording equipment.

it seems to be unrelated to the stage of the menstrual cycle of the female partner (see also Goldfoot *et al.*, 1975). Furthermore, both pairs showed several days with frequencies of five or more ejaculations. The occurrence of these peak ejaculation days is apparently without a marked influence of the ovarian condition of the female partner. For example, if we consider pair B, the behaviors around the estimated day of ovulation (April 26, Fig. 3) do not seem to differ from those seen on many other days. Although, admittedly, the number of pairs is small and therefore generalizations about the stage of the menstrual cycle and female-male interactions cannot be made, the findings reported here, i.e., no clear-cut behavioral cyclicity, are in accordance with earlier reports for this species when tested under time-limited conditions (Slob *et al.*, 1978b; Baum *et al.*, 1979).

It is of interest that pair A did not copulate to ejaculation during their last 4 weeks together (see also Table I). This was likely due to the fact that the female was pregnant. Bielert *et al.* (1976) reported, for rhesus, very low ejaculation frequencies during weeks 4 to 6 of pregnancy, a period of increased sexual interaction between weeks 6 and 10, and a complete cessation of sexual intercourse following the 14th week of pregnancy

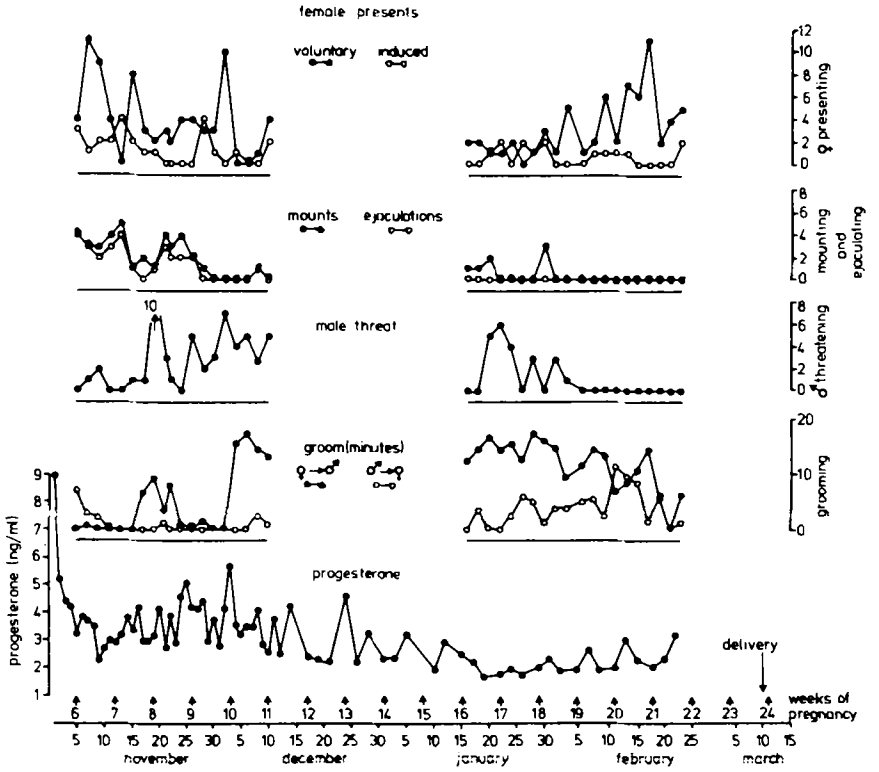

Fig. 4. Various male and female behaviors, as well as serum progesterone levels (ng/ml) of the female partner, for one pair of stumptails tested every other day in 15-min pair tests during weeks 6–11 and 16–22 of pregnancy of the female partner [hitherto unpublished data collected during the study reported by Slob *et al.* (1978b)].

(heterosexual pairs observed in daily time-limited mating tests). A somewhat similar pattern was found (see Fig. 4) in one pair of stumptails tested under similar laboratory conditions; a heterosexual pair, put together and observed every other day for 15 min during weeks 6 to 11 and 16 to 22 of pregnancy of the female partner (Slob *et al.*, 1978b), showed high ejaculation frequencies between weeks 6 and 9, very low frequencies between weeks 10 and 11, and an almost complete cessation of sexual interaction during the third trimester of pregnancy. This corroborates findings obtained in the Japanese macaque *(M. fuscata)* (Hanby *et al.*, 1971) and also in the human (Morris, 1975; Tolor and DiGrazia, 1976). It is tempting to speculate that changes in hormone levels in the pregnant female stumptail caused the changes in sexual interaction. Although the administration of progesterone for an 8-week period to intact, nonpregnant female stumptails had no effect

on female–male interaction in pair tests (Slob *et al.*, 1978a), it is possible that the prolonged exposure to high progesterone levels during pregnancy had an antagonistic effect on sexual interaction. The latter suggestion has been made for the rhesus macaque (Michael *et al.*, 1968; Bielert *et al.*, 1976; Baum *et al.*, 1977). For the stumptail it was recently reported that ovariectomy plus adrenalectomy of the female partner had no effect on heterosexual interaction, again suggesting (in this macaque species) that endogenous sex hormones do not seem to play a "behavioral" role (Baum *et al.*, 1978). Therefore, it is even more interesting to find that pregnancy of the female partner seems to be the only "condition" which clearly affects male–female sexual interaction. Whether changes in hormone levels in the pregnant female are indeed responsible for this effect remains to be studied.

It is striking that both pairs had to be separated for a few days because of increased aggression of the male toward the female partner. We have no explanation for this phenomenon. It does not seem to correlate with the endogenous progesterone levels in the female partners: high circulating levels in female 425 (pair A) and low levels in female 431 (pair B). Following reintroduction of the female, the occurrence of male aggression was quite different for each pair. In pair A there was a gradual increase in aggression, coinciding with a decrease in mount frequency and grooming frequency (see Table I). This is possibly due to the fact that the female partner was pregnant, because in pair B sexual interaction as well as grooming remained relatively the same as before separation, whereas male aggression showed a more or less steady decrease.

Figures 5 and 6 show the distribution over the day of the number of ejaculations and the time the animals spent grooming. This analysis does not include the introduction days and the incomplete days. The ejaculation pattern of the male was rather similar in both pairs, i.e., a small peak in the early morning hours and a second peak in the early afternoon. For the Japanese macaque, living under semiwild conditions, it has been reported that during the breeding season, the highest mating activity was observed during the first 3 hr after sunrise and before feeding; then a decline occurred, followed by a slow increase to a small second peak late in the afternoon (Hanby *et al.*, 1971).

The pattern of grooming was somewhat different between the pairs. Pair A showed the highest grooming frequencies late in the afternoon (after feeding), with female grooming consistently higher than male grooming. Pair B showed a different pattern, although female grooming was also consistently higher than male grooming. The behavior patterns during weekdays were not different from the patterns during weekend days, when the animals were less disturbed (no daily cleaning of the room and the cage).

The number of minutes spent asleep during the night (11½ hr) was fairly constant throughout the time period the pairs were together. In pair A

Table I. Various Sexual, Social, and Aggressive Behaviors (Mean Frequencies/Day/Week) of Two Heterosexual Pairs of Stumptail Macaques[a]

Male 318–female 425 (A)							Male 318–female 431 (B)						
Weeks of pregnancy	Mounts	Ejacs	% Days with ejac	Grooming (min) Male	Grooming (min) Female	Male aggression	Weeks together	Mounts	Ejacs	% Days with ejac	Grooming (min) Male	Grooming (min) Female	Male aggression
−1	23.2	2.8	80	68.4	175.0	0	1	13.5	2.8	83	68.7	124.5	0
1	12.0	2.7	71	43.9	131.0	0.4	2	18.3	0.3	14	34.6	136.3	3.0
2	15.7	2.6	71	62.6	131.9	0.3	3	24.0	1.8	50	28.8	90.5	5.5
3	15.2	2.8	60	59.0	55.6	2.6	4	10.2	1.5	50	62.8	139.2	2.5
4	13.8	0.4	40	83.0	93.2	1.2	5	18.9	3.6	29	53.6	136.6	1.6
5	15.9	0.9	43	56.4	100.9	4.0	6	11.5	2.2	67	51.8	148.5	1.2
6	5.9	0.4	29	38.4	75.6	3.4	7	8.0	2.3	29	53.9	113.1	0.3
7	3.4	0.1	14	25.9	49.4	13.6	8	9.4	3.1	43	43.8	111.3	0.5
8	2.0	0	0	46.7	57.3	4.0	9	13.3	4.3	50	66.2	95.5	0.2

[a]The pairs were housed together for about 9 weeks and continuously observed through closed-circuit video recording. Only behaviors observed during complete days are included in the calculations; excluded are data from the first day the animals were put together and the first day following a separation of a few days. Note that in pair A (♂ 318, ♀ 425) the female became pregnant during the first week the animals were together.

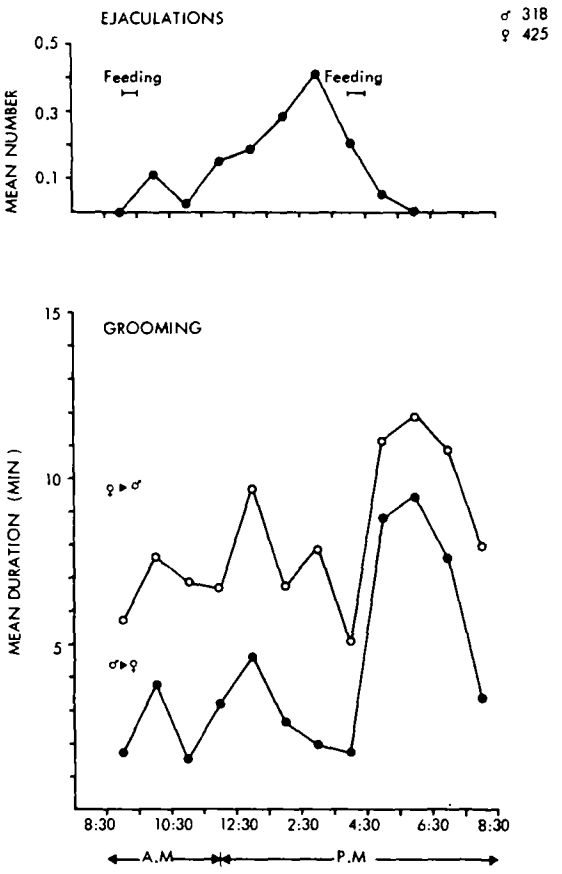

Fig. 5. Distribution over the day of male stumptail ejaculatory behavior and male and female grooming in pair A (♂ 318, ♀ 425).

there was no significant difference in mean nightly sleep duration between the male and female ($\bar{X} \pm$ SD: male, 632 ± 35 min; female, 624 ± 48 min), whereas in pair B the male slept significantly more than the female (male, 669 ± 11 min; female, 624 ± 19 min). The number of times the animals woke up during the night differed between the pairs: pair A—male, 5.4 ± 2.9; female, 4.4 ± 2.5; pair B—male, 1.5 ± 1.0; female, 5.0 ± 2.1. In pair A most waking up occurred during the first 2 hr of the night and during the last 3 to 4 hr; in pair B the vast majority of this waking up occurred only during the last 3 or 4 hr of the night.

During the night, behaviors other than sleeping occurred at very low frequencies. Ejaculations never occurred, and mounting very seldom (pair A, mounting in 9 of 55 nights; pair B, mounting in 2 of 58 nights). Male

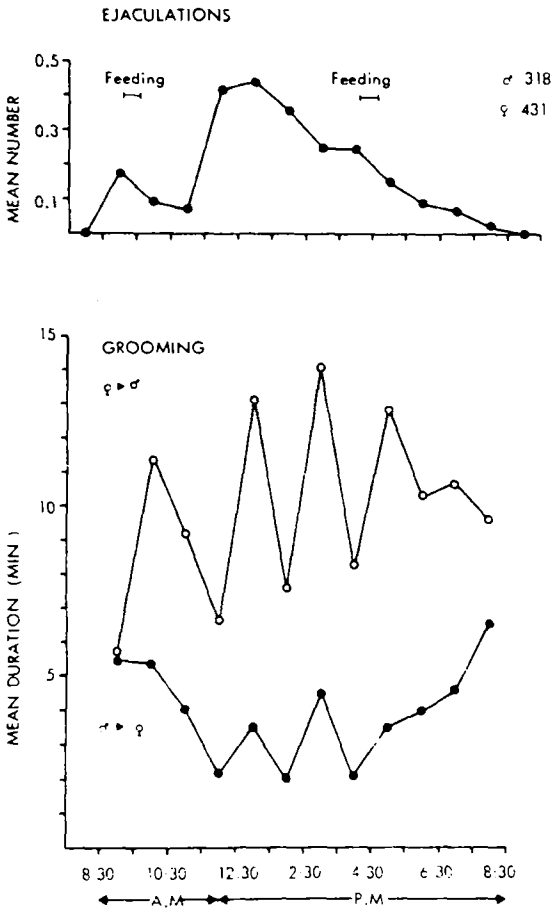

Fig. 6. Distribution over the day of male stumptail ejaculatory behavior and male and female grooming in pair B (♂ 318, ♀ 431).

aggression during the night was seen only once in pair A. In both pairs, only females groomed during the dark phase and this occurred exclusively during the first 2 hr of the "night" ($\bar{X}$ ± SD: pair A, 8.6 ± 18.1; pair B, 27.2 ± 12.1 min).

Males' Ejaculatory Potential

The number of ejaculations observed during the first day a male and a female stumptail were put together ranged from 4 to 38 (see Fig. 7). Pair A

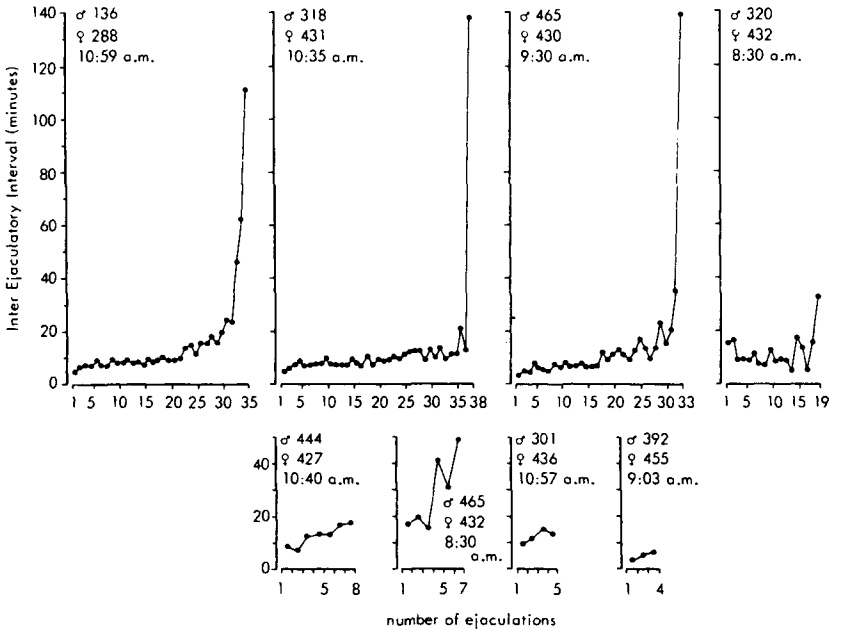

Fig. 7. Interejaculatory intervals (in minutes) between the ejaculations observed during the first day a male and a female stumptail macaque were put together. The identification numbers of the animals as well as the time of day when the pairs were put together are indicated in each of the eight graphs.

(see the preceding) was not included because this pair was put together for the first time at 3:00 PM, which left them a "day" of only 5½ hr (during that time period the male ejaculated 19 times, with a mean (±SEM) interejaculatory interval of 8.77 ± 0.46 min). Two patterns of ejaculatory behavior seemed to be distinguishable: pairs that displayed a high number of ejaculations (19–38) and pairs with a low number of ejaculations (4–8). There is no easy explanation for this difference. It does not seem to depend on the male partner: Fig. 7 shows that male 465, paired with female 430, displayed 33 ejaculations, but paired with female 432, "only" 7 ejaculations. On the other hand, it does not seem to depend on the female partner either: female 432, paired with male 320, received 19 ejaculations, but paired with male 465, only 7 ejaculations. One could speculate that this difference might have been related to the stage of the menstrual cycle of the female partner, but this is extremely unlikely because of earlier findings already mentioned in the Introduction (e.g., Goldfoot *et al.*, 1975; Slob *et al.*, 1978b). The high number of ejaculations displayed by some pairs did not occur only on the first day the animals were paired. For the two pairs

Table II. Number of Ejaculations and Interejaculatory Intervals (First, Middle, and Last, in Minutes and as *z* Scores) of Eight Pairs of Stumptail Macaques During Their First Days Together[a]

Pair		Number	Interejaculatory interval (IEI)						
			First		Middle		Last		Total
Male	Female	ejacs	*min*	*z score*	*min*	*z score*	*min*	*z score*	(mean ± SEM)
136	288	35	4.4	−0.60	9.5	−0.35	111.0	+4.73	16.5 ± 3.5
318	431	38	4.7	−0.38	9.2	−0.17	138.0	+5.85	12.9 ± 3.5
465	430	33	3.3	−0.46	8.5	−0.24	139.4	+5.28	14.2 ± 4.2
320	432	19	15.5	+0.59	10.4	−0.20	32.1	+3.18	11.7 ± 1.5
Mean ± SEM			7.0 ± 2.9	−0.21 ± 0.27	9.4 ± 0.4	−0.24 ± 0.03	105.1 ± 25.2	+4.75 ± 0.57	13.8 ± 1.0
444	427	8	8.6	−1.07	13.1	+0.13	17.5	+1.31	12.6 ± 1.4
465	432	7	17.5	−0.81	28.2	−0.04	49.2	+1.46	28.6 ± 5.7
301	436	5	9.8	−1.22	13.3	+0.42	13.2	−0.37	12.4 ± 1.1
392	455	4	3.1	−1.13	5.6	+0.38	6.2	+0.74	5.0 ± 1.0
Mean ± SEM			9.8 ± 3.03	−1.05 ± 0.08	15.0 ± 4.7	+0.22 ± 0.1	21.5 ± 9.5	+0.97 ± 0.25	14.6 ± 5.0

[a]Start of tests, between 8:30 and 11:00 AM; end of tests, 8:30 PM. Note the two groups: pairs with 19 ejaculations or more, and pairs with 8 ejaculations or less.

that were housed together for about 2 months (see the preceding,) several peak ejaculation days also were observed.

It has previously been reported that, during 3-hr heterosexual pair tests (with 11–19 ejaculations), there was a progressive increase in the interejaculatory interval (IEI) for the initial two to four ejaculations, followed by either a plateau or a transient decrease in this measure (Goldfoot *et al.*, 1975). The present data corroborate these findings. Table II gives information about first, middle, and last IEIs for eight pairs of stumptails (with an even number of IEIs, the middle IEI was calculated as the mean of the middle two IEIs). The data, transformed to z scores [$z(X) = (\bar{X}-X)/SD$], were subjected to a two-factor analysis of variance (split-plot $p\,q$ design; Kirk, 1968). There was a significant effect of groups [$F(1/6) = 82.12$, $p < 0.01$], a significant effect of first, middle, and last IEI [$F(2/12) = 66.48$, $p < 0.01$], and a significant interaction [$F(2/12) = 22.6$, $p < 0.01$]. Subsequent analysis with the simple main-effect method (Kirk, 1968) revealed a significant effect for the first group (pairs with a high number of ejaculations) [$F(2/12) = 80.49$, $p < 0.01$] and for the second group (low number of ejaculations) [$F(2/12) = 10.17$, $p < 0.05$]. For the first and middle IEIs the two groups did not differ significantly, but the last IEI was significantly longer in males with a high number of ejaculations than in males with a low number of ejaculations [$F(1/18) = 87.92$, $p < 0.01$]. Finally, analysis with the least significance difference (LSD) method (Kirk, 1968) showed that in both groups the last IEI was significantly longer than the first ($p < 0.01$). In males with a high number of ejaculations the first and middle IEIs did not differ sig-

Table III. Number of Ejaculations and Interejaculatory Interval (First, Middle, and Last, in Minutes) of Two Pairs of Stumptails Continuously Housed Together, During a Reintroduction Day and During Peak Ejaculation Days

Pair			Interejaculatory interval (min)			
Male	Female	Number ejacs	First	Middle	Last	Total (mean ± SEM)
318	425	15[a]	6.8	13.0	15.0	10.8 ± 0.7
		(9)[b]	24.1	20.9	27.9	24.1 ± 3.6
		(10)	5.0	9.6	23.5	14.3 ± 2.1
Mean ± SEM			14.5 ± 9.6	15.2 ± 5.6	25.7 ± 2.2	
318	431	21[a]	3.5	10.0	148.6	19.0 ± 7.1
		(21)	3.1	10.4	7.7	10.5 ± 0.7
		(14)	2.7	26.1	24.4	11.3 ± 1.8
		(16)	6.0	11.5	33.0	13.2 ± 1.6
		(9)	7.9	15.6	15.3	13.0 ± 1.0
		(17)	15.4	10.2	20.2	13.5 ± 1.2
Mean ± SEM			7.0 ± 2.3	14.8 ± 3.0	20.1 ± 3.1	

[a]Reintroduction day (first day together following a separation of a few days).
[b]Peak ejaculation days (arbitrarily defined as days with nine or more ejaculations) in parentheses.

nificantly, while in males with a low number of ejaculations the middle IEI was longer than the first ($p < 0.01$) but not different from the last IEI.

The question could be asked whether pairs that are housed together constantly will show a similar (to those depicted in Fig. 7) ejaculatory pattern during the first day together following a separation of a few days (reintroduction day) or during the aforementioned peak ejaculation days. Such data are presented in Table III. Analysis of variance (split-plot p q design) revealed that pair A (♂ 318, ♀ 425) did not show any significant effects: no differences between reintroduction day and peak ejaculation days, no significant increase in IEI, and no significant interaction. Pair B (♂ 318, ♀ 431), however, showed significant F values for the two factors and for their interaction. Subsequent analysis with the simple main-effect method showed a significant difference for the last IEI between reintroduction day and peak ejaculation days [$F(1/12) = 254.97$, $p < 0.01$]. Furthermore, there was a highly significant increase in the IEI during reintroduction day [$F(2/8) = 125.2$, $p < 0.01$], whereas the IEI increase during peak ejaculation days only approached significance [$F(2/8) = 4.04$, $p \approx 0.05$]. These results suggest that the ejaculatory behavior pattern of male stumptails brought together with a female partner after having been individually housed for several days or weeks is different from that displayed when a pair is housed together constantly for several weeks.

Although there are no identical (laboratory) studies on other primate species available, we can conclude that the stumptail macaque appears to exceed any other primate in its ejaculatory "potential" (Hanby *et al.*, 1971; Bielert and Goy, 1973; Kanagawa and Hafez, 1973; Nadler and Rosenblum, 1973; Chevalier-Skolnikoff, 1975; Nadler, 1976). The maximum number of ejaculations per day was found to be 38 (♂ 318, ♀ 431), displayed during a 10-hr period, with a mean (±SEM) IEI of 12.9 ± 3.5 min. In another aspect also, the male stumptail seems to be unique. For all mammals studied it has been reported that the amount of time between successive ejaculations increased steadily [e.g., see review by Beach *et al.* (1966)]. The present study has shown that the male stumptail showed increasing IEIs only during the first few and the last ejaculations, and remained constant in between.

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