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Male-Female, Female-Female, and Male-Male Sexual Behavior in the Stumptail Monkey, with Special Attention to the Female Orgasm[1]

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Mating behavior in Macaca arctoides *has several features unique to the macaques. Observations of laboratory groups of stumptail monkeys revealed that their single-mount copulations are exceptionally long, that male orgasm is unusually salient (being characterized by body rigidity followed by body spasms and a characteristic facial expression and vocalization), and that the couple generally remains united, or "tied," in a genital lock after ejaculation. This pattern behaviorally accentuates some of the physiological aspects of coitus. Consequently, they can be more easily observed than in any of the other macaques. Homosexual encounters were numerous. They always involved sexual inversions (that is, the assumption of the coital role generally assumed by the opposite sex). Orgasms were observed in females during homosexual interactions—they were easily distinguished by all the features enumerated above as characterizing masculine orgasms. Examination of the behavior of females during heterosexual coitus suggests that female orgasms also occur during heterosexual interactions. The female potential for orgasm and ability to assume inversed sex roles offer a new view of nonhuman primate sexuality. Females are evidently capable of taking active roles in coitus, and their potential for orgasm is much more similar to that of males than previously thought.*

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INTRODUCTION

Most previous studies of primate sexual behavior have focused on the behavior of males. This approach has distorted the primatologist's view of primate sexuality and has overemphasized the differences between the sexes. Males have generally been noted to mount, attain intromission, make pelvic thrusts, and come to orgasm and ejaculation, while females have generally been observed to present for copulation, and a few investigators have also remarked on their spasmodic arm reflex.

The study described here on sexual behavior in stumptail monkeys (*Macaca arctoides*) reports a species-specific copulatory pattern of behavior that provides cues to some of the physiological aspects of coitus, so that they can be more reliably distinguished than is possible in other macaques. Observations on the sexual behavior of female stumptails indicate that they have the potential for behavior more similar to that of males than previously suspected. Furthermore, the manifestation of sexually stimulating behavior between like-sexed animals, as well as alternative coital positions, demonstrates that sexual behavior in monkeys can be much more variable than previously thought.

MATERIAL AND METHODS

The data reported here are based on 500 hr of observation made over a 1-year period at the Primates Laboratory of the Department of Psychiatry, Stanford University School of Medicine. The animals were living in a social group housed in a colony cage 12 ft wide by 18 ft long by 7 ft high. The group consisted of ten animals: one adult male, one subadult male, four adult females, one subadult female, and three infants—one male and two females—who were born into the group during the study. The subadults had reached adulthood by the end of the study. The adults were born in the wild. The group was formed 1 year before the initiation of the study and was therefore relatively well integrated.

During this study, 143 sexual encounters were recorded. This figure does not include all incidents that occurred, for some of the recording periods focused exclusively on particular animals and others focused on other kinds of behavior. Most recorded sexual encounters were qualitatively described in longhand in as much detail as possible. Particular care was taken to consider the total behavior of the animals involved, as well as their relationships to each other. In addition, some sexual interactions were observed, using checklists that recorded the behavior of various body parts of the animals and communications between the two animals in different sensory modes. Thus the facial expressions, vocalizations, hand and foot movements, etc., were described. Mounts and their various phases were timed with a stopwatch.

OBSERVATIONS

The Common Heterosexual Pattern

The recorded heterosexual copulations between adult and subadult males and adult and subadult females numbered 107. In *M. arctoides,* either males or females may solicit for copulation. When the male initiates copulation, he looks directly at the female as he approaches or follows her about. This looking and approaching behavior is often accompanied by grunting vocalizations and the lip-smacking or puckered-lips expression (Figs. 1a and 1b). The lip-smacking and puckered-lips expressions are positive emotional expressions most frequently directed toward infants and toward other adults during friendly grooming bouts (Chevalier-Skolnikoff, 1971a). On occasions when the female initiates the copulation, she approaches the male and presents her rear, often looking over her shoulder and initiating eye-to-eye contact, accompanied by the lip-smacking or puckered-lips expression (see Table I).

After the solicitation, the male examines the anogenital region of the female, both manually and orally, and probably olfactorily, and then mounts her from behind. The olfactory aspect of this examination may be of considerable importance, since Michael (1969) has found evidence that sexual activity in male rhesus monkeys, *Macaca mulatta,* is mediated by hormone-dependent olfactory substances or pheromones.

Orgasm and ejaculation generally occur after one mount of 2-3 min, during which the male executes a great number of pelvic thrusts. In *M. arctoides,* copulations can be divided naturally into a preejaculatory phase, an ejaculatory phase, and a postejaculatory phase. During the preejaculatory phase, which lasts about 1 min, the male assumes intromission in the mounted position with his feet grasping the female's legs and his hands gripping her loins. He than executes an average of about 60 pelvic thrusts. He often makes grunting vocalizations and generally has a lip-smacking, puckered-lips, or square-mouthed expression (Fig. 1c) as he performs the pelvic thrusts. In 14%[3] of the copulations, the female was observed to reach back with one hand and grasp and look at the male during this phase, always with a positive emotional expression (lip smack, puckered lips, or square mouth) on her face. (The significance of this reaching-back behavior as evidence of female orgasm has been discussed in some detail by Zumpe and Michael, 1968, and Chevalier-Skolnikoff, 1971b, and will be briefly discussed below.)

The ejaculatory phase is salient and can be easily distinguished by (1) a pause followed by muscular body spasms, (2) cessation of the positive emotional

[3] Since the significance of this behavior was not suspected at the beginning of the study, the behavior was not at first systematically recorded, so these figures may not represent the total number of reaching-back incidents.

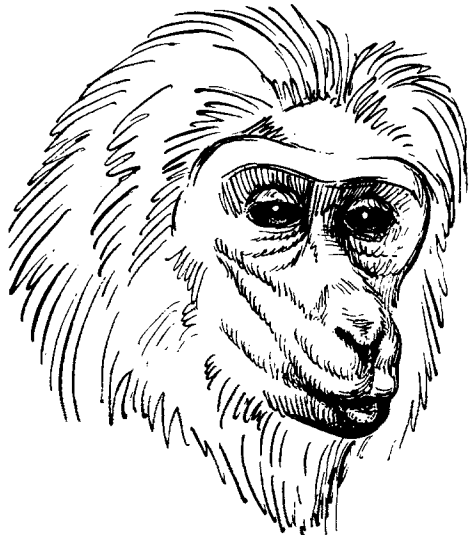

Fig. 1a. Lip-smacking expression, lips parted. The lip-smacking expression involves rapid, repeated movement between a position with lips and jaws slightly open and tongue slightly protruded and a closed-mouth position with lips puckered (Fig. 1b). The lip smack is an intense, affectionate expression. From Chevalier-Skolnikoff (1973).

Fig. 1b. Puckered-lips expression. The puckered lips is an affectionate expression. From Chevalier-Skolnikoff (1973).

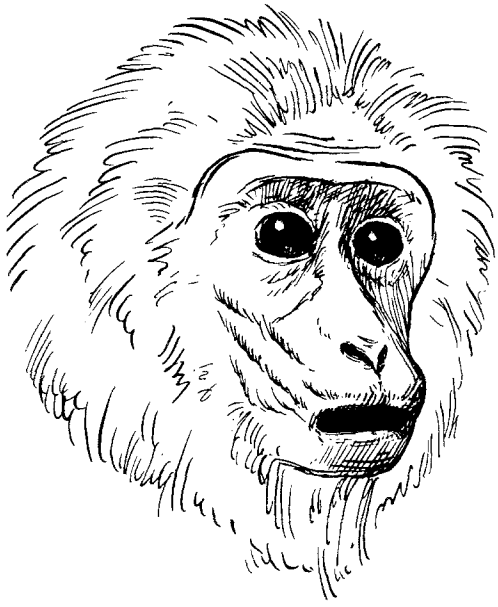

Fig. 1c. Square-mouthed expression. The square mouth is an excited, affectionate expression.

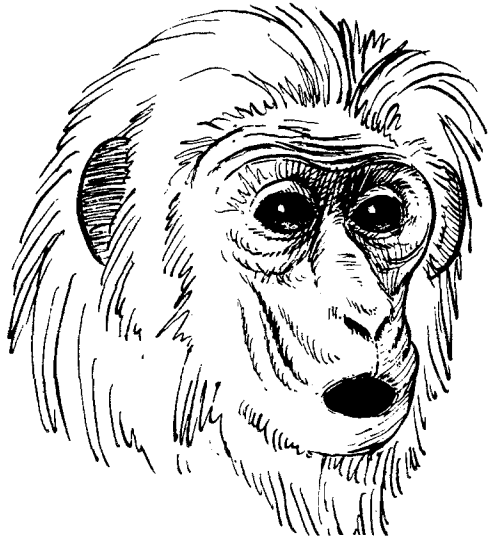

Fig. 1d. Frowning round-mouthed expression. This expression has been observed only during orgasm, in both males and females.

Table I. Sexual Patterns in Male and Female *Macaca arctoides*

Gender of participants	Sexual pattern	No. incidents recorded	Phase	Activity
Male-female (heterosexual coitus)	Dorsoventral mount	107	Solicitation	Soliciting male looks at female directly, often with puckered-lips or lip-smacking expression. Soliciting female presents her rear, often looking over shoulder at male with puckered-lips or lip-smacking expression.
			Preejaculatory phase	Male mounts female, grasping her legs with his feet and her loins with his hands. Male executes about 60 pelvic thrusts, over a period of about 1 min. Male generally makes puckered-lips, lip-smacking, or square-mouthed expression. Female reaches back and grasps at male in 14% or more of the copulations, with puckered-lips, lip-smacking, or square-mouthed expression.
			Ejaculatory phase	Male pauses and for about 10 sec manifests muscular spasms with frowning round-mouthed look and rhythmic expiration vocalization. Often bites female's neck. Female reaches back and grasps at male in 5% or more of copulations.

			Postejaculatory phase	Male maintains intromission about 2 min. Often grooms, nuzzles, or gently bites neck of female. Often makes the puckered-lips, lip-smacking, or square-mouthed expression manifested during the preejaculatory phase. Female often collapses to the ground. Occasionally grooms male.
	Dorsoventral supine position[a]	–	–	Male pulls female back onto his groin as he falls onto his back.
Female-female	Dorsoventral mount; mounter climbs on mountee's back	23	Solicitation	Soliciting female approaches another with a teeth-chattering expression. Second female presents her rear.
			Preorgasmic phase	Soliciting female mounts presenting female and, over a period of about 1 min, executes a series of pelvic thrusting movements, thereby rubbing her genitals on the back of her mountee. (The mounter is stimulated, but the mountee is not.) Both females make puckered-lips, lip-smacking, or square-mouthed expressions.
			Orgasmic phase	Mounter pauses and, for about 10 sec, manifests muscular spasms, accompanied by the frowning round-mouthed look and the rhythmic expiration vocalization. Mountee continues to manifest the puckered-lips, lip-smacking, or square-mouthed expression. (No mounted postorgasmic phase was observed.)
	Dorsoventral supine position[a]	–	Solicitation	–

Table I. Continued

Gender of participants	Sexual pattern	No. incidents recorded	Phase	Activity
			Preorgasmic phase	Soliciting female pulls another female back onto her groin as solicitor falls onto her back. Genital rubbing occurs (stimulating both females).
			Orgasmic phase	Both or either female may manifest signs of orgasm.
Male-male	Mount with pelvic thrusts	5	Solicitation	Soliciting male presents his rear to another, reaching back with one hand and exhibiting a puckered-lips, lip-smacking, or teeth-chattering expression.
			Preejaculatory phase	The second male mounts the soliciting male, grasping the mountee's legs with his feet and his loins with his hands. For a variable period of time (about 15 sec to 2 min), the mounter makes pelvic thrusts, thereby rubbing his penis against the mountee. Both males continue to manifest puckered-lips, lip-smacking, teeth-chattering, or square-mouthed expressions.[b]
	Mount with intromission and pelvic thrusts	1	Solicitation	Same as above.
			Preejaculatory phase	The second male mounts the soliciting male, as above, gains anal intromission, and executes a series of pelvic thrusts. Both males manifest positive emotional expressions (puckered lips, lip smacking, or square mouth).[b]

Mount with oral genital stimulation	2	Solicitation	Soliciting male presents his rear to another, with a teeth-chattering, puckered-lips, or lip-smacking expression.
		Preejaculatory phase	The second male mounts the solicitor, grasping the solicitor's legs with his feet and his rump with his hands. The mounter licks the solicitor's genitals and takes his penis into his mouth and appears to suck it.[b]
Mount with mutual oral genital stimulation	2	Solicitation	Same as above.
		Preejaculatory phase	The second male mounts the solicitor and stimulates him, as above, and the solicitor bends his head under his body, thereby contacting and orally stimulating the mounter for about 15 sec to 2 min.[b]
Mount with manual genital stimulation	4	Solicitation	Same as above.
		Preejaculatory phase	The second male mounts the solicitor, grasping the solicitor's legs with his feet and his loins with his hands. The solicitor reaches back and with his hand grasps the mountee's penis and rubs his hand up and down the shaft for about 15 sec to 2 min. Both males make puckered-lips, lip-smacking, and teeth-chattering expressions.[b]

Table I. Continued

Gender of participants	Sexual pattern	No. incidents recorded	Phase	Activity
	Presentation with oral genital stimulation	2	Solicitation	Same as above.
			Preejaculatory phase	The second male approaches the solicitor from the rear and appears to lick and suck the presenter's genitals for about 15 sec to 2 min.[b]
	Presentation with manual genital stimulation	1	Solicitation	Same as above.
			Preejaculatory phase	The second male approaches the solicitor from the rear and manipulates the presenter's testicles and penis, rubbing his hand up and down the shaft for about 15 sec to 2 min.[b]
	Mutual presentation with manual genital stimulation	2	Solicitation	Two males simultaneously present their rears to each other with a teeth-chattering expression.
			Preejaculatory phase	Both males, standing rump to rump, simultaneously reach back with one hand and manipulate each other's genitals for about 15 sec to 2 min.[b]

[a]Observed by Kling (1972) but not seen in this study.
[b]Preorgasmic phases of male-male sexual interactions either terminated before ejaculation or were immediately followed by other methods of stimulation, which in turn terminated before ejaculation occurred.

expressions manifested during the preejaculatory phase, (3) the invariable display of the frowning round-mouthed look (Fig. 1d), and (4) a voiced or unvoiced rhythmic expiration vocalization. This vocalization varies from a low-intensity unvoiced expiration, which sounds "breathy" and consists of long phrases of repeated expirations, to a medium-intensity voiced vocalization, which also occurs in phrases (Chevalier-Skolnikoff, 1971a). The male often gently bites the neck of the female during ejaculation. In 5% of the copulations (see footnote 3 on p. 97), females were observed to reach back and look at the male during this phase of copulation, rather than during the preejaculatory phase.

By the end of the ejaculatory phase, the female often collapses to the ground due to the weight of the male, who is often more than twice as heavy as she is. During the postejaculatory phase, the male remains mounted and maintains intromission. He often displays the same affect expressions during this phase that were made during the preejaculatory phase. He frequently hugs, nuzzles, grooms, or continues to gently bite the neck of the female, and the female occasionally grooms the male, should a hand or some other part of his body come within her reach. (The heterosexual copulatory pattern of stumptail macaques has been described in further detail in Bertrand, 1969; Blurton-Jones and Trollope, 1968; Chevalier-Skolnikoff, 1974; Lemmon and Oakes, 1967; and Trollope and Blurton-Jones, 1970. See also Kanagawa and Hafez, 1973, and Kanagawa *et al.*, 1972, on the copulatory behavior of vasectomized males, whose behavior differs from that described in the other studies.)

Comparison with Other Species

Copulations in *M. arctoides* differ considerably from those of other macaques. The extraordinary length of the single mounts leading to ejaculation, the large number of pelvic thrusts per single mount, the particular facial expression and vocalization at orgasm, and the long postejaculatory phase, which evidently represents a genital lock, all appear to be specific to *M. arctoides*, although further studies on other macaque species might reveal similar patterns.

Female Homosexual Behavior

Twenty-three female homosexual interactions were recorded out of the total of 143 sexual interactions recorded during this study. Females were observed to experience orgasm during some of these encounters. The term "homosexual," as used in this paper, refers to interactions between individuals of the same sex that involve prolonged[4] intensive genital stimulation of at least one of the animals. This definition excludes most mountings that function mainly as

[4] Estimated 15 sec or more in duration; most encounters lasted 1 or 2 min.

dominance behavior, since these mountings rarely involve prolonged genital stimulation. (A more detailed discussion of the distinction between dominance and homosexual mountings has been presented in Chevalier-Skolnikoff, 1971c.) The number of homosexual interactions observed during this study is unusually high and opens the question of how representative these observations are of the behavior of the species in the wild. This question cannot be answered at present, but observations of other laboratory groups of stumptail monkeys suggest that *M. arctoides* has a propensity for homosexual behavior, at least in captivity. Furthermore, Kummer and Kurt (1965) and Rowell (1967) have found that the behavioral repertoires of captive and wild monkeys of the same baboon species (*Papio hamadryas* and *P. anubis*) are similar, suggesting that homosexual behavior may occur in wild as well as in captive groups of *M. arctoides.* (See Chevalier-Skolnikoff, 1971c, for further discussion of this question.)

Four of the five adult and subadult females in the Stanford group were involved in homosexual behavior. In this study, the female homosexual interactions, like heterosexual copulations, consisted of dorsal mountings. One female would approach another female with an intense teeth-chattering expres-

Fig. 1e. Teeth-chattering expression, teeth together. The teeth-chattering expression involves rapid, repeated movement between a teeth-together position and a teeth-parted position with tongue protruded (Fig. 1f). Teeth chattering is an ambivalent affectionate-fearful-excited expression. From Chevalier-Skolnikoff (1973).

Fig. 1f. Teeth-chattering expression, teeth parted. From Chevalier-Skolnikoff (1973).

sion, signifying an excited, affectionate, but slightly fearful emotional state (see Figs. 1e and 1f). The solicitor would then mount the second animal, but the mounter would climb on top of the mountee, grasping the mountee's shoulders with her hands and her hips with her feet (Fig. 2a), rather than assuming the common heterosexual mounting position (Fig. 2b). The mounter would then rub her genitals on the rump of her mountee. In this way, the mounter was stimulated but the mountee was not. Despite the unilateral stimulation, both females generally made the same positive affect expressions during this rubbing and thrusting phase of the homosexual interactions that are displayed during the first phases of heterosexual copulation. Female homosexual mounts were of about the same duration as heterosexual copulations, and during the first phase females made about the same number of thrusts as the males generally made during copulation. Figure 2c shows a supine position observed both during female-female homosexual interactions and heterosexual coitus.

Female Orgasm

Observations of fractions of the orgasmic pattern during heterosexual copulation (Zumpe and Michael, 1968) and during artificial stimulation (Burton,

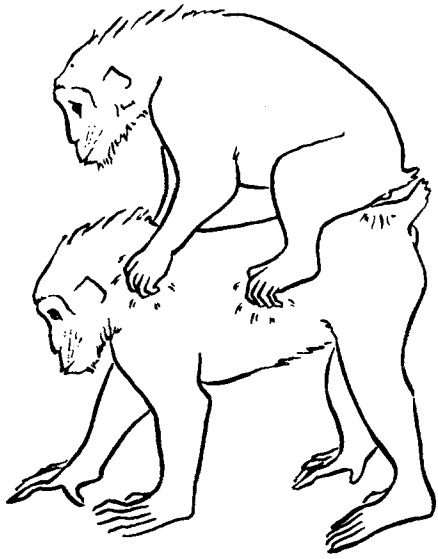

Fig. 2a. The female-female homosexual mounting position.

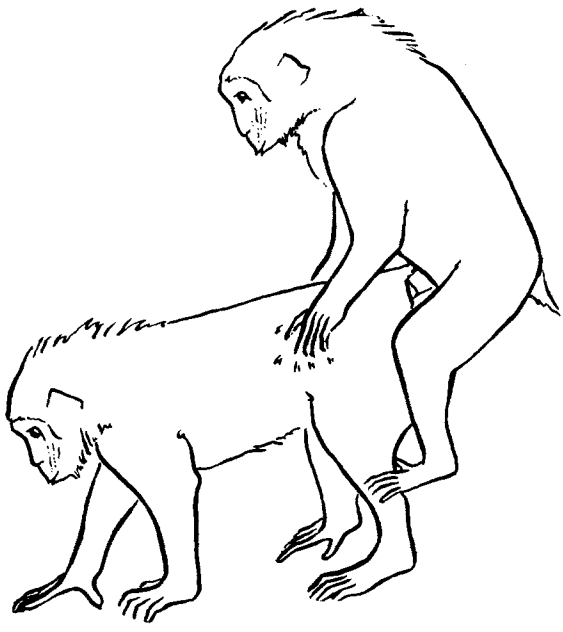

Fig. 2b. The common heterosexual coital position.

Fig. 2c. A supine position observed during both heterosexual coitus and female-female homosexual interactions.

1971) have led other investigators to speculate that female macaques experience orgasm. The homosexual encounters observed in the study reported here clearly show a naturally occurring complete orgasmic behavioral pattern for female stumptails.

On three recorded occasions, the female mounter displayed all the behavioral manifestations of orgasm generally displayed by males: a pause followed by muscular body spasms accompanied by the characteristic frowning round-mouthed stare expression and the rhythmic expiration vocalization. The mountee never made the characteristic orgasmic facial expressions or vocalizations. The mounter remained mounted during the few seconds of orgasm, but no mounted postorgasmic phase was observed. The females generally embraced and made more teeth-chattering expressions accompanied by squeaks for several seconds after the mounting had terminated. The embraces were generally followed by mutual grooming.

Besides being behaviorally homologous to the orgasmic behavior of the male, the orgasmic response of the female stumptail monkey is essentially identical to the behavior reported by Masters and Johnson (1966) in the human female. At orgasm, involuntary muscular tension occurs throughout the human female's body: the muscles of the arms and legs contract spasmodically; if the hands are not already grasping something, they, as well as the feet, display involuntary grasping-like spasms; and the muscles of the face contract into a characteristic grimace. In addition, a number of other physiological changes (which could not be detected during this observational study) occur during orgasm: the uterus and the rectal and urethral sphincters contract, and respiration rate and blood pressure often increase.

Male Homosexual Behavior

Thirteen incidents of male homosexual behavior were recorded in the Stanford group during the study. Male homosexual interactions were more varied in form than were female encounters. Eight different methods of stimulation were observed. They included extensive manual genital stimulation (which was often mutual), oral genital stimulation or fellatio (also often mutual), as well as dorsal mountings with pelvic thrusts and anal intromission (observed occasionally but recorded only once). No orgasms were observed during male homosexual encounters.

Manual genital stimulation was observed to occur in two ways. It occurred in association with mountings, in which case the mountee reached back and manipulated the mounter's genitals (Fig. 3a). It also occurred during mutual presentations, in which the two monkeys stood rump to rump and reached back and simultaneously manipulated each other's genitals (Fig. 3b).

Oral genital stimulation was observed to occur in three fashions. One monkey might present his rear and the second animal would orally stimulate the first as he stood behind him. Or the second monkey might mount the first in a fashion from which he could orally stimulate his partner (Fig. 3c). Mutual oral stimulation was effected by one animal mounting another in the above manner, with the mountee simultaneously bending his head under his own body, thereby contacting the genitals of his partner (Fig. 3d).

Dorsal mounting with anal intromission was essentially the same position assumed in the common heterosexual pattern. Homosexual mountings also in-

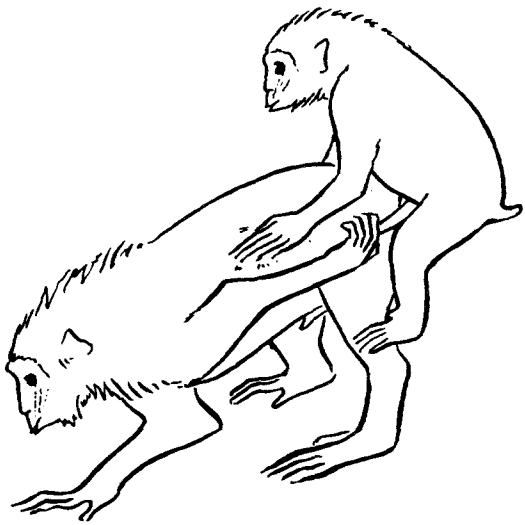

Fig. 3a. Mounting with unilateral manual genital stimulation between two males.

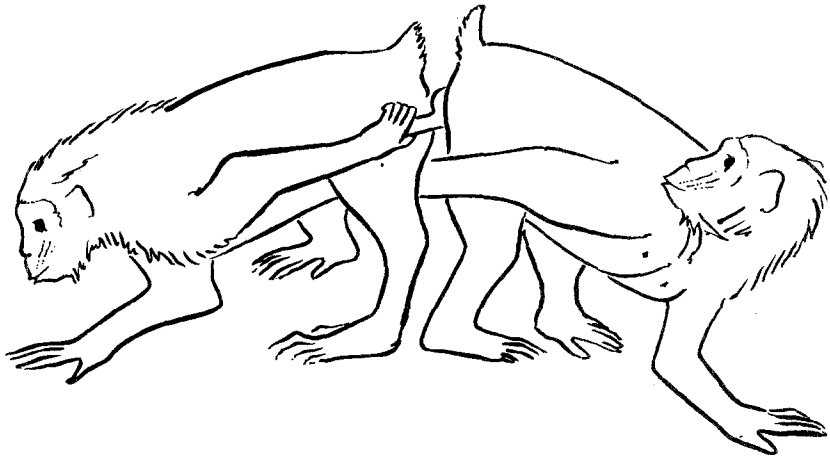

Fig. 3b. Mutual presentations with manual genital stimulation between two males.

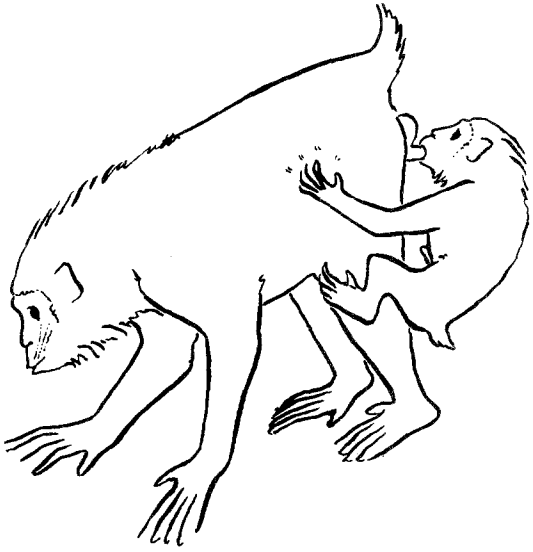

Fig. 3c. Mounting with unilateral oral genital stimulation between two males.

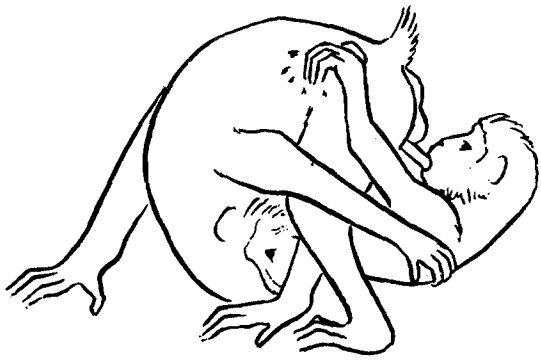

Fig. 3d. Mounting with mutual oral genital stimulation between two males.

volved pelvic thrusts, but the number was extremely variable and no orgasms, ejaculations, or genital ties were seen. As in the case of female homosexual encounters, males generally embraced and teeth-chattered after homosexual interactions.

Behavioral Variability

Stumptail monkeys show considerable variability in the positions assumed in coitus and in homosexual activity.

Although the common heterosexual copulatory pattern is the position most frequently assumed during coitus, a dorsoventral position, in which the dominant animal lies supine, pulling his partner down on top of him, has been observed (Kling, 1972) (Fig. 2c).

Kling also observed stumptail females taking the same two positions during female homosexual encounters. When the supine position was assumed during female homosexual encounters, the soliciting, active female took the supine position assumed by the male during heterosexual coitus (Kling, 1972).

As described above, male homosexual behavior is even more varied in form than female homosexual behavior or heterosexual coital behavior, and eight different methods of stimulation have been observed, involving the assumption of six different positions, or interanimal orientations.

DISCUSSION

Similarities Between Male and Female Sexual Behavior

The observations made during this study on stumptail monkeys show that males and females have much more similar behavioral potentials than previously

supposed. Females as well as males can experience orgasm, and the orgasmic patterns of the two sexes are very similar—both showing body rigidity followed by muscular body spasms accompanied by the same facial expression and vocalization.

It is also likely that females as well as males experience orgasm during heterosexual coitus. This suggests that male and female sexual behavior is more than *potentially* similar, that in fact the two coital patterns *are* more similar than previously thought.

Masters and Johnson (1966) have found that the intensity of the human female orgasm is variable, mild orgasms being hardly distinguishable behaviorally or physiologically, while intense ones involve dramatic behavioral and physiological changes. They have also found that the more intense clitoral stimulation tends to produce a more intense orgasmic response than vaginal coitus. In view of this variability in the human female orgasm, it is conceivable that in stumptail females less intense and less easily identifiable orgasms than those observed during homosexual interactions might occur during heterosexual copulation.

An examination of stumptail females' behavior during coitus reveals two indications that orgasm does occur: the reaching-back and clutching behavior, and the postejaculatory phase. The reaching-back and clutching behavior resembles the spasmodic hand grasp noted by Masters and Johnson in human females during orgasm. The postejaculatory phase of copulating stumptail monkeys indicates that a "tie" or genital lock probably occurs between the male and female after ejaculation. In other mammals in which genital locks occur, they are caused by both enlargement of the penis within the vagina and simultaneous constriction of the muscles of the vagina. Masters and Johnson have noted that in the human female, vaginal muscular contractions occur during the orgasmic phase of coitus and are in fact one of its most distinctive features. It is likely that the vaginal muscular spasms that evidently occur in female stumptail monkeys—and other mammals which tie—are manifestations of orgasm (Chevalier-Skolnikoff, 1971b). Thus it is likely that female stumptail monkeys also experience orgasm during heterosexual coitus.

It should be emphasized that in other species which do not have the striking orgasmic pattern of *M. arctoides,* or in species which do not manifest genital locks, such strong behavioral evidence for female orgasm probably could not be found. However, the unmistakable observation of orgasm in female stumptail monkeys during homosexual interactions and strong evidence for the occurrence of female orgasm in this species during heterosexual coitus, plus the coital behavior of females in other macaque species, suggest that females of at least some of these species also experience orgasm. In 1942, Carpenter noted that female rhesus macaques (*M. mulatta*) reach back and clutch at the male during most copulations that lead to ejaculation. Zumpe and Michael (1968) further examined the coital behavior of rhesus females. They found that 97% of

the 377 mounts of three females culminating in ejaculation (in rhesus, a series of several mounts leads to ejaculation) were associated with what they termed a "clutching reaction." The onset of this behavior occurred just prior to the male's ejaculation. In its weakest form, the reaction consisted of turning the head backward toward the male and lip smacking. More typically, the behavior also included reaching back and grabbing at the male with one hand. Occasionally, females were also observed to simultaneously bite the male. Zumpe and Michael noted that when females showed the clutching reaction early in a copulatory series, the male abruptly ceased thrusting, as though he were unable to continue, even though he had not yet reached ejaculation. As Zumpe and Michael noted, these data suggest that in rhesus macaques, also, the reaching-back behavior is associated with vaginal contractions and is a manifestation of orgasm.

An experimental study by Burton (1971) gives further evidence of orgasm in female rhesus. In an attempt to produce female orgasms through artificial stimulation, two animals were tested five times. They were restrained in harnesses attached to a countertop, and electrodes for monitoring heart rate were attached to the skin of the back. The animals were fed and groomed in order to quiet them. They were then stimulated with a simulated penis for 5 min clitorally and 5 min vaginally. Burton found that heart rate fluctuated throughout the experiment with no consistent relationships to state of excitation. However, behavioral and genital examinations during stimulation suggested that the females passed through at least three of Masters' and Johnson's four copulatory phases: (1) the excitement phase, characterized by vaginal dilation, mucus secretion, labial engorgement, and deepening of perineal coloration; (2) the plateau phase, characterized by clitoral tumescence, further widening and deepening of the vagina (Burton also noted reaching back and clutching at the experimenter—sometimes accompanied by grunting vocalizations and vaginal and anal contractions); and (4) the resolution phase, characterized by clitoral detumescence, fading of perineal coloration, and, sometimes, escape reactions. Burton suggested that the reaching-back and clutching behavior and the vaginal and anal contractions may have represented orgasm, for the behaviors were similar to those of the human female in the orgasmic phase 3 described by Masters and Johnson (1965). Thus the evidence strongly indicates that rhesus females, like stumptails, often experience orgasm during heterosexual coitus.

Few data are available on the copulatory behavior of other macaque species. During my own observations and those of de Benedictis (1972) on *Macaca fascicularis,* it has been noted that females often reach back and lip smack at the male near the end of coitus. Occasionally, they also make loud staccato grunting vocalizations near the end of copulation. The resemblance of these behaviors to the coital pattern of *M. arctoides* suggests that they may also be manifestations of orgasm. Kaufman and Rosenblum (1966), Bernstein (1967), and Nadler and Rosenblum (1973) report that female pigtail monkeys (*M. nemestrina*) often make "chu-chu" vocalizations at the end of copulation.

These vocalizations, like those of female *M. fascicularis,* are repetitive gruntlike vocalizations. Again, these data suggest female orgasm, and further observations on this species are likely to reveal reaching back or muscular spasm, again drawing a pattern similar to that of *M. arctoides* and *M. mulatta.* I would predict that similar coital patterns will be found in all the other macaques and that female orgasm is prominent in the coital behavior of all macaque species.

Besides emphasizing the similarities between males and females in orgasmic pattern, homosexual interactions also demonstrate a potential for interchangeability of sex roles. All homosexual interactions recorded in the study reported here involved sexual inversion, that is, the taking on of the role generally taken by the opposite sex in reproductive coitus. In some male homosexual interactions, both monkeys took on inversed (female) roles.

The observations made during this study indicate that in macaques female sexual behavior involves active participation in coitus which, for her, often culminates in orgasm. Furthermore, coitus and other sexual behavior are far more variable than has been thought, with both males and females having the potential for changing roles.

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