

## ON THE SOCIAL BEHAVIOUR OF MANED WOLVES (CHRYSOCYON BRACHYURUS).

**Agnaldo Garcia**

Departamento de Zoologia

Instituto de Biociências

Universidade de São Paulo

C.P. 20.520 — São Paulo — Brasil

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### RESUMO

O presente trabalho analisa o desenvolvimento do relacionamento social entre um casal de guarás em cativeiro, apresentando também algumas informações gerais sobre o seu comportamento nessas condições. Os animais foram observados no Parque Zoológico de São Paulo de fevereiro a junho de 1979 por cerca de 70 horas, aproximadamente duas vezes por semana, num recinto de 120 m<sup>2</sup>. De fevereiro a meados de março a fêmea foi observada só no recinto, quando então o macho foi introduzido. No dia que o macho foi introduzido a fêmea foi mantida presa no abrigo, sendo o macho observado só no recinto. O restante do tempo macho e fêmea foram observados juntos. Com base nos dados coletados eu apresento a hipótese de que uma situação inicial na qual os animais se comportavam como "dono de território (fêmea) e intruso (macho)" foi finalmente substituída por uma organização do tipo "dono de território/dono de território". Os aspectos analisados foram a forma de depositar urina, a variação dos locais marcados com urina pelos animais, as mudanças na frequência de urinação, as mudanças dos pontos onde os animais se esfregavam, os locais onde defecavam, as variações na agressividade e as regiões preferencialmente ocupadas pelos indivíduos.

### ABSTRACT

The present paper analyses the development of the social relationship between a male and a female captive maned wolves and also presents some notes on their general behaviour in captivity. The observations were conducted at the São Paulo Zoological Park from February to June of 1979. The animals were observed for about 70 hours, approximately twice a week in a 120 m<sup>2</sup> enclosure. From February to the middle of March the female was observed alone, then the male was introduced. The day this happened the female was kept in a shelter, so that the male was observed alone in the enclosure for a day. The rest of the time male and female were observed together. Based on the data recorded I present the hypothesis that an initial situation in which the animals behaved as territory owner (female) and intruder (male) was finally replaced by an organization of the kind territory owner/territory owner. The aspects analysed were the way of depositing the urine, the variations of the places marked by urine, the changes in urination frequency, the changes in the points where the individuals rubbed their body, the places where they defaecated, the variations in aggressivity and the regions preferentially occupied by each individual.

## INTRODUCTION

The maned wolf is an exceedingly marked and distinct species (Mivart, 1890) and nowadays it is considered the only species of the genus *Chrysocyon* (Clutton-Brock et al., 1976; Van Gelder, 1978). It is easily recognizable due to its long limbs, long and large ears and conspicuous coloration (Mivart, 1890), besides the presence of a mane on the neck and shoulders (Smith, 1856). Despite the name wolf, the bright color, large ears and sharp nose are more suggestive of the fox (Crandall, 1964) and also its behaviour patterns such as hunting alone and by stealth and surprise or digging its quarry from burrows make it resemble a fox rather than a true wolf (Di Sabato, 1977). It is the largest wild South American canine (Smith, 1856), inhabiting marshy places (Azara, 1801) and savannahs (Liais, 1872). The maned wolf is a nocturnal and solitary animal (Azara, 1801). It is not common anywhere (Ihering, 1917; Vieira, 1946) being seldom seen in the wild (Merritt, 1973). Very little information about its behaviour in nature is available. In Brazil Carvalho (1976) and Puglia (1978) have recently published data about the animal in the wild. The maned wolf has sometimes been considered an endangered species (Carvalho, 1968; Coimbra-Filho, 1972). The species is rare in zoos (Gijzen, 1958; Crandall, 1964), its survival in such conditions being always delicate (Silveira, 1969). It seems to have first bred in captivity in 1953, in San Diego, California (Crandall, 1964). The cubs are difficult to raise in captivity. Some zoos have chosen to hand-rear them and accounts of the methods employed are presented by Acosta (1972) and Hora et al. (1975).

According to Cabrera (1957) this species occurs in Brazil, from the state of Piauí down to the state of Rio Grande do Sul and Mato Grosso, possibly up to the eastern extreme of Bolivia and also Paraguay and the northeast of Argentina. Goeldi (1893) reports its northern limit as being the river Parnaíba (PI), while Vieira (1946) considers the state of Pernambuco as the north limit.

According to Liais (1872) this species is more frugivorous than carnivorous, hunting small mammals and gallinaceans but it prefers large insects, sometimes even snakes, but first of all fruit and tree barks, looking specially for the fruit of the *Solanum lycocarpum* which the Brazilians call "fruta de lobo" ("wolf fruit").

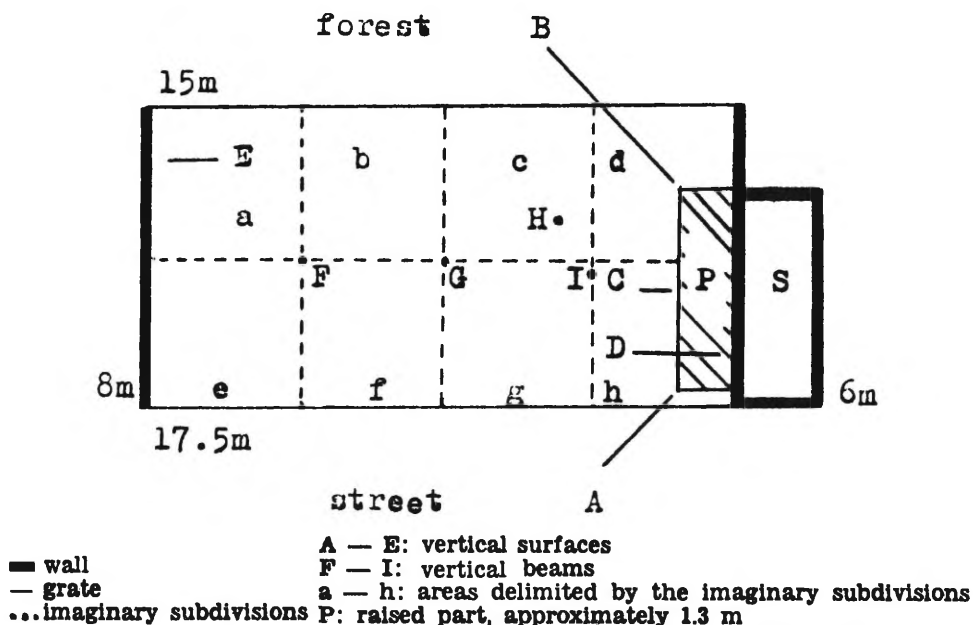
A few authors have studied the behaviour of this Canidae in captivity. Silveira (1968), Encke (1970), Kleiman (1972) and Kühme (1975) have recently published papers on this matter.

The objective of this paper is to report the development of the relationship between a male and a female maned wolves in captivity. The aspects analysed are the way of depositing urine, regions marked by urine, urination frequency, body rubbing, defecation, aggressivity and regions occupied. Some notes on the general behaviour of the species in captivity are also presented.

## MATERIAL AND METHODS

The observations were conducted at the "Fundação Parque Zoológico de São Paulo" from February to June of 1979. From February 8th

to March 12th the female was observed alone in the enclosure. Then on the 15th of March the male was introduced. On this day the female was kept in the shelter, and this enabled me to observe the male alone for a day. From March 21st to June 25th male and female were observed together. The animals were exposed to the public throughout the study period in a 120 m<sup>2</sup> enclosure (open area) plus 15 m<sup>2</sup> (shelter). (See figure 1). The ground was half sand (posterior part) and half cement (anterior part). The shelter was divided in two so that male and female had separate dens, where they received food. Some fruit was also given them in the anterior half of the open area. They were kept out of the shelter by day, but they were free to remain in the shelter or in the open area at night. All observations were conducted by day.



The animals observed were a male and a female adult, wild caught maned wolves. The female had entered São Paulo Zoo in August, 1973, coming from the "Parque Educativo de Goiânia", state of Goiás, where she had probably been captured. The male arrived at São Paulo Zoo in December, 1976, coming from Cristais Paulistas, state of São Paulo, where he had been captured. By that time he was approximately six months old. The female had already reproduced several times, but the male had not. Before the male was put together with the female, he was housed together with another male.

As the animals did not appear to be disturbed by the observer presence, no especial device was used to record the observations.

The following is a list of the days and duration of the observation periods in minutes. Data about each individual's activity period are also presented. (The word active means that the animal was not lying down, regardless whether it was moving or not).

Month: February		
Day	Time (min.)	
8	240	
12	240	
14	60	
15	240	
19	270	
22	45	

Total: 1095 min.

Female active: 390 min.

Month: March		
Day	Time (min.)	
1	250	
5	250	
12	245	

Total: 745 min.

Female active: 215 min.

15 75

Total: 75 min.

Male active: 75 min.

21 60  
22 150  
26 10  
28 120  
29 120

Total: 460 min.

Male and female active: 170 min.

Male active: 160 min.

Female active: 15 min.

Male and female inactive: 115 min

Month: June		
Day	Time (min.)	
13	45	
18	55	
21	100	
25	60	

Month: April		
Day	Time (min.)	
4	120	
5	250	
9	120	
11	120	
16	90	
19	30	
23	40	
25	100	
26	35	

Total: 905 min.

Male and female active: 390 min.

Male active: 290 min.

Female active: 40 min.

Male and female inactive: 185 min.

Month: May		
Day	Time((min.)	
2	65	
3	130	
7	60	
9	15	
10	20	
16	20	
17	35	
21	60	
24	60	
28	60	
31	25	

Total: 550 min.

Male and female active: 410 min.

Male active: 5 min.

Female active: 20 min.

Male and female inactive: 115 min

Total: 260 min.  
Male and female active: 250 min.  
Male active: 5 min.  
Female active: 5 min.  
Male and female inactive: 0

General total: 4090 min.

## Results

### 1 — General social and sexual behaviour

The animals observed showed a very low rate of body contact, not touching each other even when sleeping together. When both were active the male walked preferentially along the enclosure back part and the female along its anterior half, although not rarely they changed sides. Sometimes they met whilst walking or when one was walking and the other lying down, but they generally remained impassive. When there was a reaction, this consisted most of the times in the female's opening the mouth to the male when they approached. Otherwise she flattened the ears back against the head and also opened the mouth to him, sometimes snarling. She rarely bristled the mane, snarled and flattened the ears. The male seldom displayed any of these attitudes. The last patterns occurred mainly at feeding time. The other animal reacted by recoiling, displaying a similar pattern or then remained indifferent. Scarcely ever did they start fighting. When this happened the male raised a forefoot and put it between his snout and the female's. Different intensity threat displays preceded the combat, with each animal attempting to bite the rival, unsuccessfully though. Nevertheless effective grips did occur, but not preceded by any kind of observable threat display. For instance, when they were walking side by side, the female simply turned back and gripped the male's muzzle. Occasionally they carried food to eat it somewhere else, frequently after having behaved aggressively. Data concerning their aggressive behaviour are presented in table I.

Table I — Aggressivity of male (M) and female (F) maned wolves. The time refers to the period that one or both were active.

	N. <sup>o</sup> of threat displays		Threat displays/hour		Time (min.)
	M	F	M	F	
March	3	22	0.5	3.8	345
April	10	83	0.8	6.9	720
May	8	9	1.1	1.2	435
June	—	—	—	—	260

At the end of March for the first time the male approached the female with his tail slightly raised horizontally. The female reacted by also raising her tail, but they soon went away. The male behaved like that once and again in April. Then the female threatened him, causing his withdrawal. At the end of the month however they met with tails raised horizontally again. This encounter was followed by the male's sniffing and licking the female's genital region, which induced her to twist the tail sideways. The male went ahead, touching the female's side with one of his forefeet, when she turned back and threatened her companion.

In the beginning of May copulation acts were observed. The male approached the female, put the forefeet on her back and started copulating. The female squatted a little and spread the hind feet, but the

male soon dismounted. By the middle of June the male was again observed sniffing and licking the female's genital region. He proceeded attempting to put a forefoot on her back, but she walked away.

## 2 — Scent marking

With relation to scent marking, three procedures were observed, namely urination, defaecation and body rubbing.

Regarding urination, three diferent postures were observed in the male:

1. He lifted one of the hind feet to urinate on a vertical surface;
2. He urinated on the ground standing up with the four feet on it;
3. He urinated on the ground lifting a hind foot, as when urinating on vertical surfaces.

Before urinating on the ground the male sometimes dugged a hole. To do so he scratched the ground with one or both forefeet repeatedly. Using both forefeet he digged first with one and then with the other, but never alternately. Next he sniffed the dug out place, moved the body forward and then urinated, raising the tail slightly.

The female urinated standing up with the genital region next to a vertical surface, lifting a hind foot under the body and turning the tail sideways. Only three times she was observed to urinate squatting, twice when called to enter the shelter and once coming back from it. Twice she squatted lifting a hind foot under the body, but resting the lifted foot on the ground before finishing to urinate. The third time she only squatted and spread the hind feet slightly.

Quantitative data about the male's and female's way of urinating are presented in the tables II and III.

Table II — Female's way of depositing urine.

	Vertical surface Standing	Horizontal surface Squatting
N.º of times observed	84	3

Table III — Male's way of depositing urine.

	Vertical surface Lifting a hind foot	Horizontal surface			
		4 feet on it		3 feet on it	
		With digging	With no digging	With digging	With no digging
N.º of times observed	188	14	8	2	4

The tables IV to X contain quantitative data concerning urine marking, relating places and number of times each animal urinated.



Table VIII — Urine marking by male and female together during the period from May, 2 to 31. Places and number of times each sex urinated. Time they were active, in minutes (T); urination frequency in number of times the animal urinated per hour when it was active (F). See Fig. 1 for the abbreviations A, B, D, E, F, G, H, I, a, b, d and P.

	A	B	D	E	F	G	H	I	a	b	d	P	T = 410
M	1	21	—	12	3	3	6	1	2	2	2	2	F(M) = 8.0
F	3	—	12	3	1	—	—	—	—	—	—	—	F(F) = 2.8

Table IX — Urine marking by male and female together during the period from June, 13 to 25. Places and number of times each sex urinated. Time they were active, in minutes (T); urination frequency in number of times the animal urinated per hour when it was active (F). See Fig. 1 for the abbreviations A, B, D, E, F, H and I.

	A	B	D	E	F	H	I	T = 250
M	—	23	—	4	1	4	1	F(M) = 8.0
F	3	—	1	—	—	—	—	F(F) = 1.0

Table X — Urine marking by male and female during the period from February, 8 to June, 25. Places and number of times each sex urinated.

	A	B	C	D	E	F	G	H	I	a	b	c	d	P
M	16	58	2	—	19	10	7	49	12	12	6	2	4	3
F	22	5	—	29	3	1	—	—	—	—	—	—	—	—

Table XI — Urination frequency in number of times the animal urinated per hour when it was active. Two first lines: both active. Third line: only male active. Fourth line: only female active.

	March	April	May	June	Average
M	4.6	4.9	8.0	8.0	6.4
F	3.5	3.7	2.8	1.0	2.8
M	3.8	11.8	—	—	—
F	4.0	3.0	—	—	—

The second kind of scent marking observed was the body rubbing. The procedure employed in this kind of marking consisted in rubbing the side of the neck and shoulders against vertical surfaces. The individuals could either rub once or more times. In the latter they generally rubbed both sides alternately, although they could rub only one side repeatedly, but always sniffing the place before rubbing. Sometimes the male urinated where he had rubbed, and this was never observed in the female. Several times the female rubbed immediately after the male and in the same place, however the male would generally return to rub again later on.



Table XII — Body rubbing. Date, sex and place. (Both active, but 22/3 and 5/4: only the male active).

Date	Sex and place
22/3	MA — MA
4/4	MA
5/4	MB
9/4	FB
11/4	MA
7/5	MB — FB — MB/FB — MB — MB — FB — MB/FB — MB — MB — FB — MB
10/5	MB
16/5	MA
21/5	MB
13/6	MB/FB
18/6	MB/ FB/MB — MB
21/6	MB — MB — MB — MB

(The bar indicates immediately after).

Table XIII — Body rubbing. Places and number of times each sex rubbed the body.

	A	B
M	5	19
F	—	8

Finally, the third kind of scent marking observed was the defaecation. Posturally speaking male and female do not differ in the way they deposit faeces.

Table XIV — Defaecation. Places and number of times each sex defaecated. First line: female alone in the enclosure. Second line: male alone in the the enclosure. Third and fourth lines: male and female together.

	p	b	d	e	f	g
F	3	—	—	4	—	—
M	—	—	—	—	2	—
M	3	1	1	5	5	3
F	8	—	—	—	—	—

## Discussion

The present paper analyses the development of the relationship between a male and a female maned wolves housed together in the São Paulo Zoo. The female had been living alone in the enclosure for some time when the male was introduced. Before male and female contac-

ted the male was allowed to spend some time alone in the enclosure. Having observed them together for about three months and a half I concluded that they initially behaved as territory owner (female) and intruder (male), however there was a redistribution of the space, with the male demarcating a territory and the female restricting hers. The territories were marked by urine.

This conclusion is based mainly on an analysis of scent marking. Kleiman (1966) defines scent marking as urination, defaecation or rubbing of certain areas of the body which is oriented to specific objects, elicited by familiar conspicuous landmarks and novel objects or odours, and repeated frequently on the same object.

### 1 — Way of depositing urine

Both male and female urinate preferentially on vertical surfaces. With this procedure they mark conspicuous objects and also mark them at the species' snout height, a presumable adaptation for intra-specific communication through urine marking. When the male urinates on the ground standing up with the four feet on it, he preferentially digs the ground previously, making the place conspicuous. This connection visual/olfactive stimuli might also contribute to the use of urine marking in intra- or even inter-specific communication. Urinating on the ground lifting a hind foot is probably an intermediate pattern between the other two observed. The animal's digging or not before urinating this way is also probably an intermediate pattern. In fact as he never scratches the ground when he urinates on vertical surfaces by lifting one leg and he always did it when he urinated on the ground with the four feet on it, then one should expect in average that half the times he urinated on the ground lifting a hind foot he would dig and the other half not. But when he urinates on the ground without lifting any foot he does not always dig, therefore the intermediate pattern of digging is not so frequently observed as expected (less than 50%).

To dig the ground to urinate the male scratches it several times with one forefoot and then several times with the other, when using both forefeet. This differs from the way they dig to cache food, when they scratch the ground alternately with the forefeet (Kleiman, 1972). A duality of actions to reach the same objective occurs here, but each pattern is intimately linked up with the total action of the animal and is not used indiscriminately in any situation.

The female only urinated squatting three times, when she was somehow relating to human beings. Silveira (1968) observed a male also to urinate squatting, when the keeper entered the enclosure. Such a procedure is probably a kind of submissive behaviour, a probable re-take of the cub's posture to urinate, an individual naturally submissive.

### 2 — Regions urine-marked

The female during the time she was alone urine-marked the enclosure anterior and posterior halves (points A and B). The male

when introduced alone in the same enclosure urine-marked the central beams and also its anterior and posterior halves (points A and B). They would be demarcating their territories whose extension covered all the enclosure area.

When they were introduced together a tendency to continue to urine-mark the same points was observed. This was clearer when only one of them was in activity. They would insist in maintaining the primitive territories, demarcated when they had been alone. The inactivity of an individual seems to stress this tendency in the other one because he would find it easier to retake all the primitive territory.

The points more frequently urine-marked were situated near to the shelter. The territorial marking was intensified close to the place where the animal slept, ate and where the female gave birth.

After some time of living together the female stopped urine-marking the enclosure in the posterior region (point B) and the male ceased urine-marking its anterior part (point A). The primitive territories marked when they had been alone would become overlapped territories when they started living together, and this would have given rise to a dispute for the area, forcing them to demarcate different regions.

The female stopped urine-marking a point (B) in the posterior part of the enclosure and started marking another point (D) in the same direction, but in its anterior half, and this came to be her more urine-marked point at the end of the observation period. The female was recognizing the territory conquered by the male and was probably bringing that point inside her own territory, restricting her territorial area.

From May onwards the male started urine-marking a point far from those more frequently marked (point E) (he had marked it only three times in the previous months) and it was the point with the highest female interference from then onwards. Once when the male urinated on that point, immediately after the female also came and urinated there and the male again immediately after the female. This point was probably being disputed by the animals, finally being gained by the male. The behaviour of the animals with relation to the point E suggests again a territorial dispute.

Finally in June I observed no more coincidence of points urine-marked, what I see as the achievement of a situation of territories finally delimited, established.

### 3 — Urination frequency

The male, after having been introduced into the enclosure previously urine-marked by the female, urinated with a very high frequency, a kind of familiarization with the environment, showing the importance of the relationship animal/space, and suggesting tendency to territoriality.

Having been introduced together the male diminished his urination frequency while the female increased hers. The female in a would-be position of territory owner would be reacting to an intruder in her territory increasing her urination frequency and the male as a pos-

sible intruder was diminishing his. However from May onwards she resumed urinating with low frequency and he with high, just like when they had been alone. This would be the result of the end of a relationship of the type territory owner/intruder and the beginning of a relationship of the kind territory owner/territory owner. (The fall in the female's urination frequency from May to June may be also related to the fact that she was pregnant and would bring forth four cubs in the beginning of July).

#### 4 — Body rubbing

The places rubbed by the animals were points frequently urine-marked. The result of the individuals rubbing where they urinated was that they marked themselves with urine scent and also marked the place where they rubbed with body scent. As the Canidae have no scent glands in the regions rubbed (shoulders and neck) (Hildebrand, 1952), and the urine is undoubtedly an element used in scent marking it seems much more plausible that what mainly happens is the marking of the own body with the scent of the place where they rub, instead of the contrary.

During the first two months the male predominantly rubbed in the place where the female urinated more frequently than himself. As for those two first months the male would be in a position of intruder in the female's territory, his marking the body with her urine scent would decrease the female's aggressivity towards him. It seems quite reasonable that an animal meeting another one with its own scent will hesitate in attacking it. On the other hand for the two last months, both of them rubbed the place where the male urinated more frequently. From May forth the territories would be practically established and so the female marked her body with the male's urine scent, probably to enter the male's territory pacificly. This might be necessary because she used to sleep in the area established by the male as his territory. The male rubbed it to reinforce the ownership of the area recently conquered, indentifying himself with his territory by sharing the same scent, his urine scent.

#### 5 — Defaecation

According to the definition of scent marking presented by Kleiman (1966), the male's defaecation should not be considered a kind of scent marking. On the other hand, the female's defaecating almost always in the same conspicuous place, near to where she urinated, was probably a kind of scent marking. Kühme (1975) observed captive maned wolves preparing the place where they would defaecate, a way to make conspicuous the site they deposited scent, with the objective of marking.

#### 6 — Aggressivity, amicable behaviour and regions occupied

The female was clearly more aggressive than the male for the

two first months together. She reacted aggressively to the presence of an intruder in her territory, since she had already been living in that enclosure when the male was introduced. From May onwards however, there was some balance between the aggressivity of the two. By May the territories would probably be established and so the male was not seen as an intruder any more. Both animals would be in the same social status and would consequently behave alike. In June no more aggressive attitudes were observed, what could be due not only to the establishment of individual territories, but also to their sharing of similar social status (territory owners).

The more intense the threat display, the less frequently it occurred. A few times an animal was observed bristling the mane, snarling and flattening the ears, but most of the times they would only open the mouth to the other. The low sociability of this species is reflected in their highly aggressive behaviour when fed, even carrying food to eat anywhere else far from the other animal sometimes. Kühme (1975) also observed in Cologne, in a far larger enclosure, that the maned wolves used to carry their food to another place, far from the others, to eat it.

The threat displays are very effective to prevent the animals from engaging in fights. Really, the few times they managed to grip their companion were not preceded by any threat display, and on the other hand, no threat display resulted in successful bites or grips.

Another behaviour pattern observed and predominantly displayed by the male was his approaching the female with his tail raised horizontally. This occurred during the first two months and is perhaps an attempt of the male to establish an amicable social contact. Kleiman (1972) describes self-confident maned wolves greeting conspecifics and reports that they may raise the tail vertically to a J-position on this occasion. However, in the present study, they were observed only to raise their tails horizontally. As the male was probably in a submissive position, seen as a would-be intruder of territory, this would work as a way to diminish the aggressivity level of the female. Only after this behaviour pattern had been displayed the male was able to touch the female, establishing a snout/genital region contact, and even copulate. Encke (1970) observed in Krefeld that it was very common for the couple to play, nevertheless no kind of play was recorded in the present study.

The male preferentially walked along the back part and the female along the anterior half of the enclosure. In this way each one remained in its own territory.

## 7 — Conclusion

The maned wolves observed were markedly solitary and territoriality-prone. The points discussed above, beyond their low rate of body contact and the mutual avoidance fully support this conclusion.

Kleiman (1967) reports the case of a male and a female maned wolves which had had several months experience of one another through sound, smell and vision but no physical contact, and had not as yet been introduced successfully. From my point of view this event shows

this species' trend to solitude and territoriality in captivity. An intrusion of territory must have occurred and it does not matter if the intruder is a strange animal or an acquainted one, a would-be sexual partner or a rival of the same sex.

To know that this species tends to be solitary and territorial in captivity is important for its successful keeping and breeding. This should be remembered mainly when maned wolves are introduced into the same enclosure, even if they are male and female about to copulate and chiefly when dealing with a female and her cubs. For instance, problems of introduction of strange individuals can be easily solved by allowing the animals to spend some time alone in the enclosure in which they will be housed together.

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