

DISEASE, FOOD AND REPRODUCTION OF THE
MANED WOLF – *CHRYSOCYON BRACHYURUS* (ILLIGER)
(CARNIVORA, CANIDAE) IN SOUTHEAST BRAZIL

Cory T. de Carvalho¹
Luiz E. M. Vasconcellos²

ABSTRACT. The most frequent endoparasite of the Maned wolf - *Chrysocyon brachyurus* (Illiger, 1815) is the giant kidney-worm, *Dioctophyma renale* (Goeze, 1782). It has been responsible for the majority of deaths of captive animals. Twenty-six marked wolves have been followed in the field with ear-tags and radio-collar tagged (Tab. II) to investigate their interactions with the environment, their diurnal shelters, movements and habits, and their delivery sites. Ten years of life history data have been gathered. They are territorial and monogamous, and give birth to two or three young once a year, after a 63 days gestation, on average. Maned wolves inhabit the open areas and have omnivorous feeding habits.

KEY WORDS. Maned wolf, *C. brachyurus*, life history, disease, food, reproduction

The Brazilian or red wolf, also called Maned wolf or **guará** with the suffix **açu** or **guaçu** (the former is the indian word for canids, and the suffix means large) to *Chrysocyon brachyurus* (Illiger, 1815), which is the biggest and finest canine of our fauna.

Very little is known about its life history. And it is rare in Museums of Zoology and relatively frequent in a few Zoos of Brazil, it has been officially listed since 1815 in the catalogues of South American fauna.

The status of the Maned wolf is very vulnerable. They do not thrive in captivity and in the wild. People consider it a threat to domestic animals, which are usually kept free and without nocturnal shelter. Recently the utilization of wetlands by a governmental program called "Pro-varseas", eliminated a great part of wolf habitat and almost all of its privacy and shelters, refuges and delivery places (dens).

He was included in the official list of protected animals in Brazil by the legal decree #1210, on 12/Apr./1939 and Port. #1522/IBAMA, on 19/Dec./1989. It also receives global protection through the Red Book of IUCN/WWF (International Union for Conservation of Nature and Natural Resources/World Wildlife Fund) conservation program (Red Data Book 1: Mammalian 1978), and through the international agreement of Exportation Control (Conservation International on

1) Instituto Florestal, Secretaria do Meio Ambiente, Caixa Postal 26, 18780-000 Manduri, São Paulo, Brasil. Wildlife biologist.

2) Rua Senador Vergueiro 232, 22230-001 Rio de Janeiro, Rio de Janeiro, Brasil.

Trade in Endangered Species, CITES) - Washington convention, USA 1973/75.

There are several reasons for this rare status. He is misunderstood and killed for various reasons, his habitat is disappearing, and he suffers from illnesses and parasitic infections. Some of the maladies they bring from the wild habitat, others they get during transportation, or captive maintenance. Captive wolves have been diagnosed with bacteria illnesses (leptospirosis, salmonellosis), viral illness: it is necessary to vaccinate animals for rabies and parvovirus (SILVA & BRECKENFELD 1968; FLETCHER *et al.* 1979).

There are also cases of infestation by other common nematodes: *Ancylostoma caninum* Ercolani, 1859; *Uncinaria* sp., *Physaloptera praeputialis* Linstow, 1889; *Toxocara canis* Werner, 1782; *Trichuris* sp., *Molineus brachiurus* (COSTA & FREITAS 1967) and *Capillaria* (CURIAL 1954), teniasis (*Diphyllobothium*, *Spirometra*, *Taenia* sp.) causing espoliative or traumatic effects, hepatic capillariosis, coccidiosis (?), distemper or salmonellosis, leptospirosis (the Weil disease or canine enzootia of Stuttgart), etc.

More recently other diseases, the cystinuria or inherited metabolic disease have become common in captive and free-ranging specimens (JENSEN 1977; BRADY & DITTON 1979). In the United States, death has occurred by the obstruction of the renal pelvis and of urethra by stones of cystina (JENSEN 1977) and as well as infestation with the heart worm. At present in Brazil, one and two cases of each have occurred (wolf #05, 09 and 10, Tab. II).

Filariasis (*Dirofilaria* spp.) has also been found in some captive specimens, with different species of the parasite were found in local domestic dogs, too. It may have already existed in the animals before or has entered by means of the normal transmitters (horse-flies, mosquitos, fleas, gadflies, etc.).

This points to a serious disturbance in normal husbandry and captive maintenance, although the majority of the above diseases are common to the animals (in the wild too!). This seems to be more serious is the high loss of animals with enteritis or nephritis and variations or complications. In these cases the percentage of death is 70% to 80% (PUGLIA 1978).

These diseases are known from captive wolves only. It is simply easier to monitor the health and sanity in captivity, and the only wild disease information come from road killed animals. However, never has a feral wolf been found dead because of disease.

A large number of specimens carry the kidney worm in some "basins" or endemic regions, including the study area: Águas de Santa Bárbara (São Paulo). The method of infestation can occur through ingestion of fresh water fish and snails (CIUREA 1921; TRAVASSOS 1921; MORAES 1937; KRIEG 1940) or small crustaceans and terrestrial nematodes (WOODHEAD 1950; KARMANOVA 1959). The increasing parasitic infection in other mammalian species, some of them not even carnivores, emphasize the multiple paths of infestation (ROCHA *et al.* 1965).

The lack of a clinical symptom makes it difficult to recognize the problem. The parasite can only be diagnosed through radiology or the presence of the characteristic eggs in the urine (MIGLIANO & MATERA 1966; MATERA *et al.* 1968).

Wolves contract the giant-kidney worm as pups, and the worm settles in one kidney only. The other kidney develops without this nematode and compensates hypertrophically for the afflicted organ (usually the right kidney). The female worms are usually larger and live longer, and average about 40 to 50cm in length. They do not need males to fertilize the eggs and fertilization occurs in just 2% of the cases.

Those captive animals that do not die during the adaptation period to captivity usually succumb eventually to a common disease. That disease, diocetofimiasis, was introduced into South America by the hunting dogs brought from Europe, probably by the colonizers. This disease is caused by the giant nematode (*Diocetophyma renale* Goeze, 1782) - the kidney-worm. Here in the appropriate environment and equivalent hosts the grisons and dogs it prospers and occurs in many species; but more frequently in canines and mustelides, causing lesions and permanent atrophy by the pressure exerted upon the last host's renal tract, and disseminating itself continuously with its eggs which are expelled with urine. Because of the degenerative effect of the worm, it reduces the regulation and excretion of the parasited animal.

The Maned wolf houses worms of both sexes. One animal held 7 males and 12 females (GIOVANNONI & MOLFI 1960; LAMINA & BLACK 1966). This is a sign of the adaptation to the host (*cf.* LUTZ 1924; WOODHEAD 1950). Some only lodge in the kidney, others perforate it and fall into the peritoneal cavity or other organs without dying. The average life span of the parasite, when it does not kill the host, varies between one to three years. Sometimes the worm is expelled or dies, leaving the kidney cavity where it lodged full of a dark, cloudy liquid. There may be an empty capsule or scar in the peritoneal wall, when in autopsy.

There are also problems with reproduction in captivity. In the International Studbook of 1981, B. Matern version, there are around 70 males and 63 females registered in captivity with a birth rate of 28.5% or 21 males, 14 females and 3 unknown. Six males, five females and three others died producing a death rate of 36.8%.

Mating possibly occurs between March and April with a gestation period of 60 to 65 days. There after the births occur in June-July each year in Brazil and central South America, their zoogeographical area of occurrence.

Courtship (SILVEIRA 1968; ENCKE *et al.* 1970; BRADY & DITTON 1979) is said to be preceded by play between the couple including visible chasing, stopping forward (where the arms are placed in a canine manner at play) stamping the ground with the feet digging burrows, smelling everything and urinating with more frequency and at different places. The females show more activity in the presence of another animal or of the male. They pass over bushes and rub the ventral posterior part on the branches back and forth (maybe scent marking) impregnating the bushes with a characteristic sulphur odor (secretions or urinary pheromones). Breaking of branches is common and marking them with urine; too because the act is so repetitious. When the males pass by the same place, they smell and raise one leg to urinate.

The male as a rule does not follow the female very often, but he smells all the cage urinating sporadically. He passes by her always as a dominant animal and for a closer approximation he is more careful, he keeps the tail slightly fluffy, with erected hair and extending it (Fig. 1a, b).

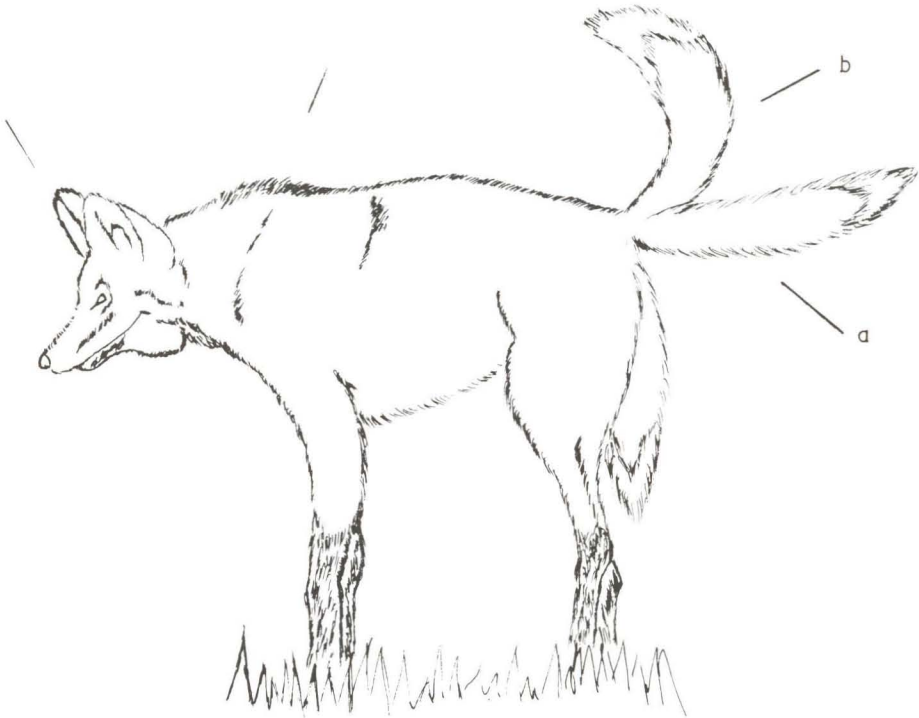


Fig. 1. A typical posture during encounters or defensive interactions (head, ears and tail) between male and female.

The female may remain lying down or in alert position.

Acceptance and copulation were not observed, but SILVEIRA (1968) and GARCIA (1983) describe it as fitting the mean canine pattern, with few details. The mount lasts ten to twelve minutes and the coitus takes one to two minutes each, repeated through the period for five or six times. The litter size usually varies from two to three young, but there are cases of five to seven in captivity (DINIZ *et al.* 1985). The number of pups seems to be related to the food supply and or the density in the area. Not all of them survive, the mortality is high as noted in animals kept in captivity (Fig. 2).

The habit of journeying in the swamps and neighboring open fields or "cerrados" adds diversity to its diet. AZARA (1802) suggested rats, wild-cavies, small birds and some vegetables if they find them and principally slugs, toads, frogs, reptiles and crabs. Others (CIUREA 1921; MORAES 1937; LAMINA & BLACK

1966) speak of the possibility of eating fish; also KRIEG (1940) examined stomach contents found: "rodent remains, especially wild cavies and partridges, chewed seeds of *carandá*" ("Fächer-palme *Copernicia australis* Becc.) adding: it is a known eater of grasshoppers, frogs etc. and believes that its also eats slugs (*Ampullaria* Lamarck, 1799). He believes it to be the reason for their journeys

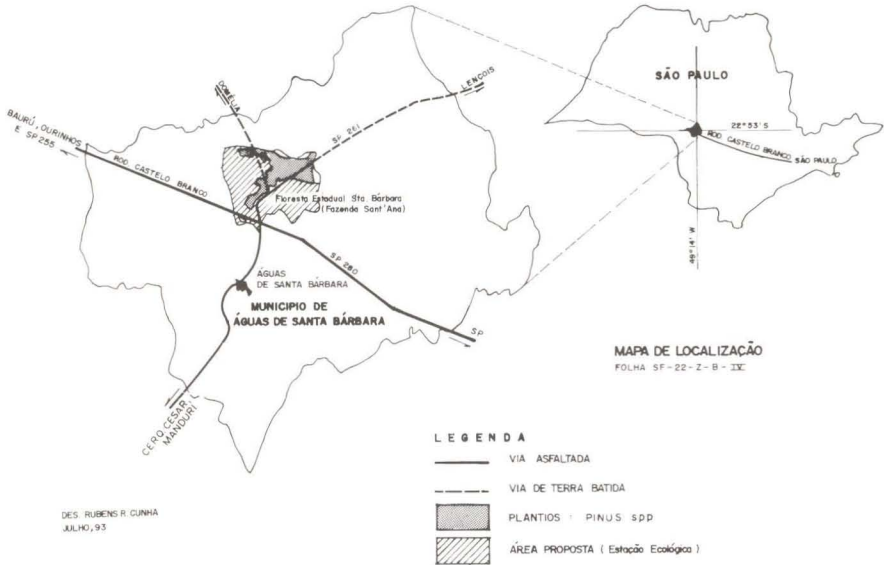


Fig. 2. Map of localization and ways system of the Ecological and Experimental Forestry Stations (4384,97 ha), Águas de Santa Bárbara (São Paulo).

deep into the swamps or *alagados*.

KRIEG (1940) in addition, talked about the frequency of preying on domestic chicken, even during the day time; SILVEIRA (1968) declared that in the wild the maned wolves eat small and medium sized animals, birds and turtles (*Hydromedusa* spp. ?), honey and vegetables parts such as sugar cane, fruits, bulbs, roots and rhizomes, everything of the kind.

GOELDI (1893) and WITTE (1930) commented that being a field and shy (*arisco*) animal it would hunt "pacas, agoutis, hares, partridges" and would not refuse vegetable food including the *Solanum lycocarpum* St.-Hil., with fruits of the size of a closed fist, or bigger.

In captivity wolves are kept easily on as diet of small rodents, chicks, pieces of beef, rice or grains and a variety of fruit, eggs and vitamins (SILVEIRA 1968; ENCKE *et al.* 1970; KÜHME 1975; FAUST & SCHERPNER 1967). KLEIMAN (1972) in a comparative paper with other canines of smaller size declared they were more

Table I. Shelters localized with numbers in list; Cf. charts of the IBGE, ed. 1973 fls. ZF-22-Z-B-IV-2 & 22-Z-B-IV-4 and, aerial-photos of Terra-Foto S/A., semi-controlled.

Number	Coordinates	Location in grid (See Fig. 3)
1	F.8	Upper end stream of the pump, close to plot number 164
2	J.5	Upper end stream of Rodeio, limit farm Ag. Marinha
3	J.6	Upper end stream of Rodeio others (wetlands)
4	G.5	Upper end stream of Guarantan/Capivari A.B
5	C.9	JONAR/Ecological Station, SP-280, km 287. L (dry)
6	I.13	Upper end stream Lavapés/Capão Rico, limit
7	F.9	Upper end stream Bugre, SP-261, km 61 to Erva A.
8	L.11	Upper end stream Areia Branca, affluent sup. Duraflora
9	J.9	Upper Areia Branca, affluent inf. farm Tombo (gate)
10	F.14	Swamps of the Capão Rico (FESB plot # 147 A.B.C.)
11	K.7	Upper end of brook Capivari, farm Clóvis/Erva
12	K.12	Upper end stream Boa Vista Domélia (Eucal.) A.
13	F.2	Upper end of Mandassaia, close to SP-280, km 295, L. A.B.
14	I.5	Upper of Niágara, middle Capivari (paddocks) A.
15	A.8	Refuse/landing-field close to SP-261, km 55 (dry)
16	D.2	Swamps of junctions streams S. Benedito/Mandassaia
17	E.14	Swamp of stream (farm of Benedito Aires/Bertolani)
18	J.15	Swamp of stream Capão Seco/dam Duraflora limits
19	P.13	Swamp of stream Passarinho/junction Capão Rico A.B.C.
20	I.16	Junction of stream Paineiras (dos Leite)/Divinéia

omnivorous, preferring victims of smaller size excluding agoutis and "pacas" naturally of their menu.

MATERIAL AND METHODS

The majority of the animals were captured in the wild (Tab. I). Most were adults of various ages, which were trapped in areas of the Instituto Florestal (São Paulo): Itirapina (male), Itararé (two males), Moji-Guaçu (female) and Águas de Santa Barbara (seven males and eight females). There were a total of 26 specimens captured from the end of 1977 to 1987 (Tab. II).

The captures were made using a box-trap (wire 5mm) and they were anaesthetized with hydrochloridrat of ketamine+xylacine ("Ketalar & Rompun, Bay Va 1470") injected by syringes through a blow pipe. Some specimens (10 animals) were kept in special enclosures for management and testing proposes, for the most of the 10 years.

Animals were radio located diurnally for one week each month (Fig. 3) around the enclosure of "Pampas Deer" with 200ha in a circle of 8 to 10km. Some road killed animals were found in that area, usually between the waters of the

Table II. List of animals worked on/in captivity and free-ranging specimens from 1977 to 1987.

Tag	Sex	Worked in captivity (experimental set)	
1	Female	ad.a Sta. catch 11-IV-77	escape in 22-IV-92 (+ <i>D.ren.</i>)
2	Female	ad.b. Moji catch 01-VI-77	loan Soroc., SP 10-XI-82 (+ "
3	Male	ad. ltp. catch 07-VIII-77	dead, uremia 17-X-79 (- ")
5	Female	ad.v Sta B. catch 16-IX-77	dead 16-X-81 (+)
6	Female	juv. Sta B. catch IF. 10-XI-77	to PR Zoo in III-87 (+)
7	Female	ad. DF. IF. 26-XII-78	loan Guarulhos Zoo XI-86 (-)
8	Male	ad.a Sta B. catch 23-III-79	to PR Zoo III-87
9	Male	ad. Ita. catch 29-IV-79	dead, crisis 17-XII-79 (+)
10	Male	ad. Ita. catch 23-I-80	dead 15-I-82 (+)
11	Male	ad. Rib. P. Zoo 04-III-80 (?)	dead, tame 03-IV-84 (-)

Tag	Sex	Worked but free-ranging (ear tagged)	
13	Female	ad.a Sta B. catch, 15-II-81, 20.0 Kg	point/spot map G.08
14	Male	ad.a Sta B. catch, 01-III-81, 23.5 Kg	point/spot map F.12
15	Female	ad.a Sta B. catch, 25-VI-81, 25.0 Kg	point/spot map E.10
16	Male	ad.a Sta B. catch, 27-VI-81, 23.0 Kg	point/spot map I.11
18	Male	ad.a Sta B. catch, 10-IX-81, 26.0 Kg	point/spot map E.10
19	Female	ad.b Sta B. catch, 20-I-82 & 02-XI-83	spot F.06; Rd. # 5
20	Male	ad.b Sta B. catch, 04-VII-82, 26.0 Kg	dead 02-XII-83, hole, # 4
21	Female	ad.b Sta B. catch, 10-XII-83, 26.5 Kg	road 15-VIII-86, # 4a and 3
22	Male	adl. Sta B. catch, 06-XII-84, 13.5 Kg	desappear 26-VI-85, # 10
23	Female	adl. Sta B. catch, 30-I-85, 17.0 Kg	spot G.08, # 4b
24	Male	ad. Sta B. catch, 16-III-86, 28.0 Kg	spot G.14, #5a
25	Female	ad.a Sta B. catch, 17-VI-86, 24.0 Kg	spot G.14, # 4c
26	Male	ad. Moc. donated 18-IV-86, ?	to PR Zoo in III-87
27	Female	inf. Sta B. catch 30-VII-86 & 25.VII.86	with 2,8 and 4,0 Kg, # 7
28	Male	ad. Sta B. catch 08-XI-86, ?	no tagged, spot G.14
29	Male	ad. ? transfer IBDF 86 & PR Zoo	Curitiba in III-87

*. Sta B. = Águas de Santa Bárbara, Moji = Moji-Guaçu, ltp. = Itirapina, Ita = Itararé, Rib. P = Ribeirão Preto, Moc. = Mocóca, DF = Distrito Federal, PR = Paraná.

Bugre and Mandassaia rivers (brooks), between km 284.W to 295.L (SP-280, Castello Branco highway).

DISCUSSION

The principal aspects of the Maned wolf natural history are the result of a few field observations with regional variations and some personal deductions. KRIEG (1940) in his book "Im Lande des Mähnenwölfes" (p. 257) said: they do

not have serious enemies, apart from intestinal parasites. He described the offsprings and gave some details of the "great roamer of the savanna" as he called

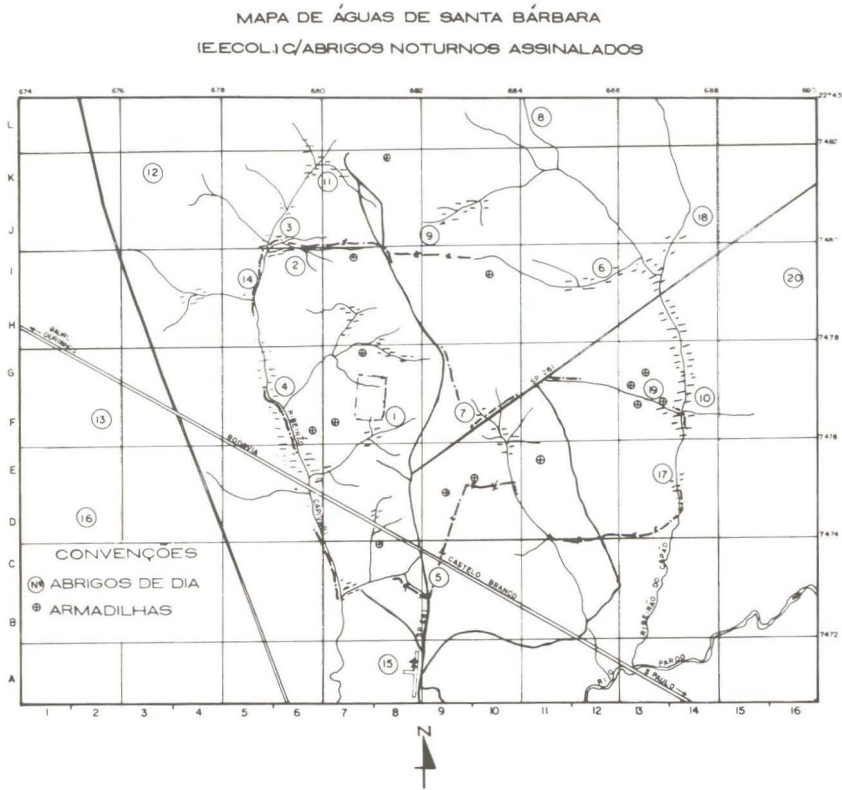


Fig. 3. Map of the reserve and the areas all round of the Ecological and Experimental Forest Station of Santa Barbara, São Paulo with 4384,97 hectares (EESB and FESB). The diurnal shelters marked with numbers in circles (see Tab. I).

it, going even to its diet. He registered some items and commented on the wolf's canine teeth wear, speculating that it's peculiar because of their habit of digging the ground with the muzzle and teeth to catch the "Kammratten" (*Ctenomys* Blainv., 1826) and lizards (Teiidae).

DIETZ (1984) added to the already known and mentioned endoparasites, exoparasites such as ticks (*Amblyoma cayanensis* Fabr., 1787 & *A. tigrinum* Kook, 1844) principally in the ears. He also reported on the location and rearing the offsprings, as well as the consumption of food in the Serra da Canastra (National Park), Minas Gerais State, in table form including 740 collected samples (tables 12, 13, 15 in DIETZ).

From that material collected and analyzed he believed that the **guará** is a generalist or omnivorous animal, and details of 41 items: 20 of animal origin,

other 20 vegetal and one inorganic. From the 2056 occurrences, 49% was of animal origin and 51% vegetal.

Few attempts were made to identify the remains of the every day diet found

Table III. List of plants or fruits consumed by wild Maned wolves and comparison between Santa Barbara (São Paulo) and Serra da Canastra (Minas Gerais) (FESB/PNSC).

Food items	Samples (FESB x PNSC)		Proportion (%)
Fruit wolf	31	375/304	0.340
Fruit others *	6	50/76	0.085
Small mammals	28	306/204	0.228
Small birds	12	120/124	0.139
Vegetables, grass	9	147/70	0.078
Insects	7	43/61	0.068
Armadillo, rests	1	29/35	0.390
Others	2	-	-
Total	96	1070	0.970

*. *Syagrus*, *Annona*, *Campomanesia*, *Eugenia*, *Anacardium*, *Chrysophyllum*. FESB = Floresta Sta Barbara, PNSC = Parque Nacional Serra da Canastra.

in their droppings, apart from those of LUND (1843) and more recently SCHALLER's collections, DIETZ (1984) and the authors. Here was dreg samples were collected and analyzed, and the components were compared with plants in fructification and to the main items or components of the diet by availability (Tabs III, IV).

In places with some vegetation, spaced bushes and grass it is common to observe the wolves biting off soft grass shafts and branches and chewing them. ALTMANN (1972), KÜHME (1975) and BRADY & DITTON (1979) have commented already on this habit and established a time of 7 to 20 minutes for the passage of the grass through the digestive system. Sometimes, the animal was actually eating grass and eliminating another portion previously ingested. This could easily be verified in places free of vegetation or with marked grass. We believe that the grass amount ingested during some periods of the year works as a greenery wad because it is eliminated together with mucus and later with remains of parasite rings or "proglotes" (the segments of a taenia *Spirometra* Muller, 1937 or *Diphyllobothrium* sp.).

DIETZ (1984) reported on the home range of isolated couples in Serra da Canastra National Park (PNSC) in special conditions, because they lived on an elevated plateau and went down along the valleys to more forested as sheltered areas, where they delivered their young. In the swamp of the "Ribeirão Capivari" for three consecutive times there was rearing of young (1984, 1985) and in 1986 was marked one offspring (31/07' and 25/08'86). During the first month, both male and female took care of the young (s), this was reported from captivity too, some time ago at Dortmund Zoo, Germany (BARTMANN & NORDHOFF 1984). Capture of young (AZARA 1802; MERITT 1973) were registered at the end of September and December in Paraguay, but possibly they were born in July or were primipares.

The diet affects many aspects of the animal's life. Animals repeatedly leave

Table IV. Analysis of the fruits very commons in scats: *Solanum* sp. and *Annona* sp., cf. laborats. ITAL, Campinas (São Paulo, SP) and Minas Gerais (MG).

	<i>Solanum</i> sp. (SP)	Percentage (MG)	<i>Annona</i> sp. (SP)
Protein	2.60	19.47	3.08
Fat	0.76	3.16	3.98
Starch	trace	-	1.06
Fibers	12.70	35.85	7.62
Humidity	76.50	11.31	63.0
Sugar total	6.36	4.83	10.04
Sugar redut.	3.23	4.83	9.54
Pectine *	410.00	-	1.59
Others	-	25.38	2.97

*. Invertasis, peroxidasis, etc.

fecal samples along certain trails and crossings, ground elevations, termite mounts and "macega" or grass bushes an the trail edges. One particular kind of seed of a so called "wolf's fruit or lobeira bush" (*Solanum lycocarpum* St. -Hilaire, or *S. grandiflorum* Ruiz & Pav.) is found very frequently in the samples (Tab. IV).

RESULTS

The Maned wolves are opportunistic animals. He was observed them visiting regularly, every two to five days, bushes or fruit trees on their nocturnal journeys, which seemed to be part of a regular program or daily routine (CARVALHO 1976). This behaviour is more conspicuous on the number of routes and trails clear of vegetation (break-fire) between plots of *Pinus* spp. trees and the surroundings of the swamps in the Instituto Florestal dependencies (reserves and experimental station). This makes nocturnal travel easy, when searching for fixed food of vegetal origin, during the night. Following their tracks at day-break, we could confirm this.

Food is offered by the adults to the young in the birth dens, which are initiated to eat solid food. The food is offered directly or left near by. The parents lie down in the immediate area, smashing the vegetation and here by making nest-shaped beds. The offspring, as well as the adults, walk underneath the tall grass, leaving tunnels and tracks behind where they played or warmed themselves. This is probably the place where they get the more common diseases, the "diocofimiasis" and also get initiated in the hunt to rodents and amphibians (frogs and toads) the lively and common infectants.

Frogs (*Leptodactylus ocellatus* L., 1758, *L. gracilis* Duméril & Bibron, 1841) are common in that region and are easily hunted in the swamp depending on the season. The offspring may be born coincidentally with the phase of higher activity of those amphibians (?). Birth is also coincidental with the cycles of the parasite and its way into the definitive host - the female number 6, captured when

two to three months old was X-Rayed and its urine was analysed periodically. The young animal showed the parasite at the end of the year, *i.e.*, after five to six months of age.

Reproduction was only observed a few times when two sets of animal tracks appeared together. They live separately but always travel along the same paths inside their home range.

In the "cerrados" the condition is different: there are more swamps and a wider diversity of high vegetation, altering this behavior a little (according to DIETZ's paper). The areas are larger and polygonal in shape, but the animal travels more frequently in the lowlands, accompanying the waters and marshes or their neighbouring sites. The neighbours avoid the same scent marked area and respect it, perhaps evaluating the occupancy and the convenience of trespassing. Some errant animals, males and females, sometimes trespass those territories searching for unoccupied regions.

Based on the observed animals it was noticed that the males occupy bigger areas (M. #20, w/11500ha; F. #21, 5625ha & F. #19, 5385ha, with "Planix 6, Tamaya Digital Planimeter") and include, into their home range, more than one female. However they keep their monogamic condition and possibly take care of the offspring. Females reuse reproductive areas if not disturbed. When released from the traps, females do not go straight to their shelter when they have pups there.

When one animal disappears, another one soon occupies the abandoned space. The females keep themselves more restricted in smaller areas, being trapped frequently, but not so the young. This may be so because the parents take food to them in the shelter and, gradually make them search food away from the parents home range. This was observed, in unmarked animals were not marked, on one or two capture sites (near streams Água Ze Vita and Água do Passarinho or dos Leme).

CONCLUSIONS

From the work done, and with the restrictions imposed by time, material, and personnel it was able to establish that:

- Maned wolves are territorial animals (in the sense of BURT 1943) that keep independent home ranges, with the males' areas bigger than the females; in spite of the males being monogamous in habits;
- they belong to open areas, frequenting more swamps and their neighbourhood, and it is there where they give birth and also contact the initial infestation of the constantly present dirofilariosis because of the feeding habits and the disponibilities;
- the parasites, including those of the digestive tract are not the greatest problem for wolf survival and neurectomy is not necessary (surgery) for them to survive either;
- Maned wolves need space, because of their body size, structure and the food

habits being rather more frugivorous than carnivorous (preference), thus it is an omnivore;

- the population is not as scarce as it is believed, but needs protection where it occurs because of the area which it occupies and the number of individuals necessary for the exchange of genetic material;
- more studies must be made in other areas to understand their needs better.

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