SMALL CARNIVORE CONSERVATION

The Newsletter and Journal of the IUCN/SSC Mustelid, Viverrid & Procyonid Specialist Group

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African long-nosed mongoose (*Xenogale naso*) - Foto: C.B. Powell

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We are particularly grateful to Walter Rasmussen for reading the manuscripts and improving the English style.

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The aim of this publication is to offer the members of the IUCN/SSC MV&PSG, and those who are concerned with mustelids, viverrids, and procyonids, brief papers, news items, abstracts, and titles of recent literature. All readers are invited to send material to:

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The life in sympatry of *Xenogale naso* and *Atilax paludinosus* in a central African forest

Justina C. RAY

Introduction

The rain forest mongooses of Africa are very poorly known; the little information that exists comes from the museum collecting expeditions (Allen, 1924; Hayman, 1940; Schouteden, 1945). This paucity of information is highlighted for *Xenogale naso*, the Long-nosed mongoose, and *Atilax paludinosus*, the Marsh mongoose, whose distributions broadly overlap throughout central and west Africa. *Atilax* has been studied in southern Africa (Baker, 1987; Maddock & Perrin, 1993), but neither species has been the subject of systematic trapping or ecological research in the closed-canopy forests of the African tropics. As a result, there are few data from African forests to challenge assumptions concerning the rarity of *Xenogale* (Haltenorth & Diller, 1977; Colyn & Van Rompaey, 1994) and other aspects of the biology of the two species.

My purpose here is to summarize information from a trapping and radio-telemetry study conducted over a two-year period in the northern Congo Basin. The two species are very similar in size and overall appearance (in fact, neither BaMbuti nor BaAka pygmies distinguish the two species [pers. obs.]); however, their spatial and temporal use of the forest differs markedly.

The 35 km^2 study area (Kongana) was located in the south-western Central African Republic, between the borders of Cameroon and Congo (Fig. 1). It was located in the 4,500 km^2 Dzanga-Sangha National Reserve and Dzanga-Ndoki National Park established in 1990. Vegetation is semi-deciduous rain forest, and is highly seasonal; rain averaging 1,400 mm/year. Parts of the Kongana area were selectively logged (approx. 1 stem/ha) in the early 1980s.

During June 1992 to April 1994, eleven mongooses were captured: ten *Xenogale naso* and one *Atilax paludinosus* (Table 1). The animals were caught in one and two-door Tomahawk traps; most captures required pre-baiting (5-21 days). Captured mongooses were immobilized with ketamine hydrochloride (average dose for *Xenogale*, 0.28 ml/kg; *Atilax*, 0.16 ml/kg), and fitted with 51 or 20 g radio transmitters. The other known mongoose in the area, *Bdeogale nigripes*, was never captured.

Morphology

Although the hairs of *Atilax* and *Xenogale* are banded, both species have an overall black appearance, and are similar in size (Table 1), leading to the tendency to confuse the two in the field. In the trap however, their morphological differences are immediately clear. Indeed, these contribute to the justification for the different generic distinction of this species (Allen, 1924; Orts, 1970; Rosevear, 1974). The long-nosed mongoose is true to its name: its nose is relatively long and fleshy and is 'prolong(ed)...well beyond the usual limits determined by the bones and teeth' (Rosevear, 1974:332). The head is narrower and the muzzle sharper and longer than that of *Atilax*. Orts (1970) discusses the unusual cranial characteristics of *Xenogale*.

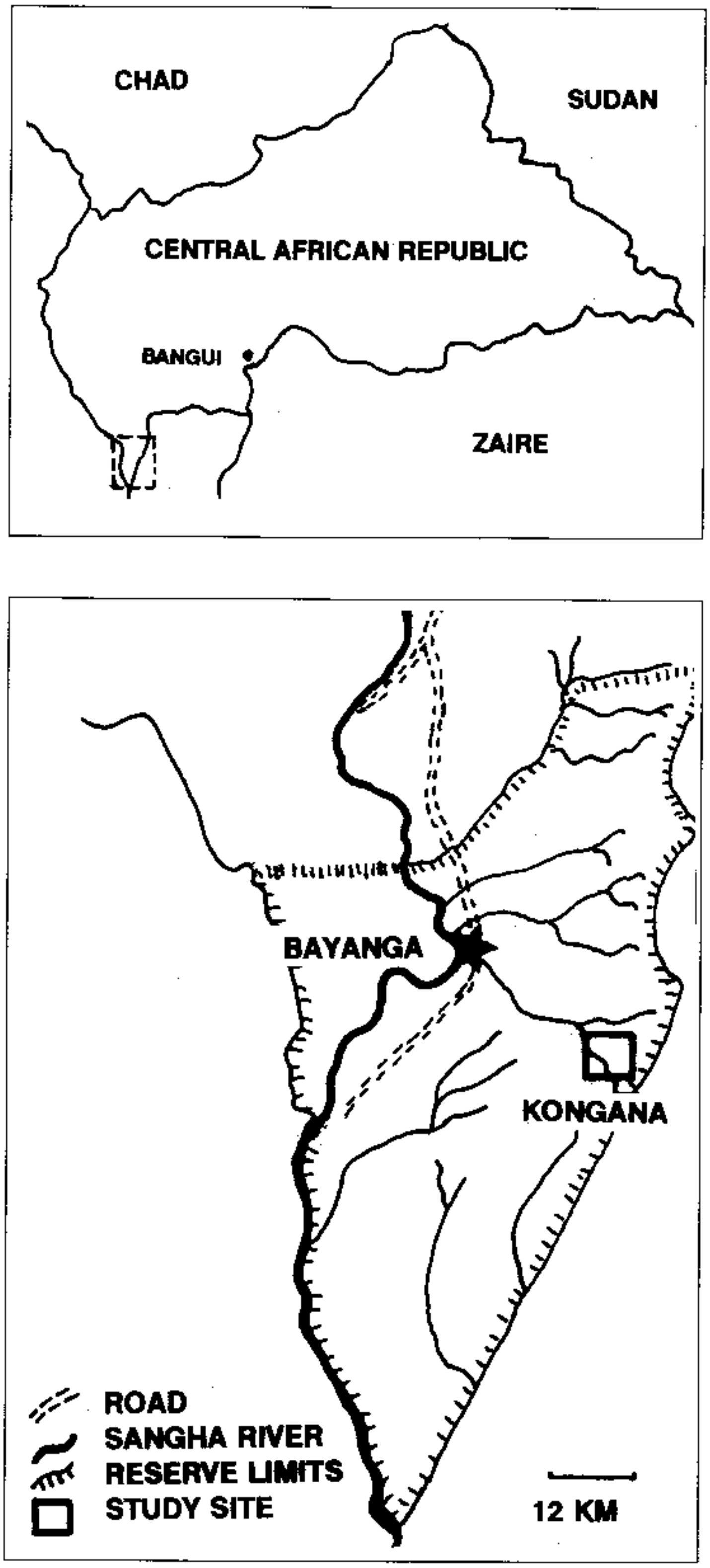

Fig. 1. The Central African Republic and Kongana Study Are.

The most obvious external difference between the two species are the feet: Both *Xenogale* and *Atilax* are five-toed, but the latter is the only mongoose whose feet are completely unwebbed. The foot of *Atilax* is completely naked to the heel, whereas the foot of *Xenogale* is hairy up to the pads (Figs. 2 - 3). Finally, *Xenogale* has a longer tail relative to the body.

Distribution and habitat use

Trapping and monitoring of track-beds suggested high densities of *Xenogale*, and it appeared to be the numerically dominant carnivore in the area. *Atilax*, on the other hand, frequented only stream and swamp habitats within the forest. During thirteen months of tracking an adult male *Atilax*, he was never located outside of the narrow band of streamside habitat. The easily distinguishable tracks of this species were also never found in upland forest. Although all authors agree that the distribution of *Atilax* is confined to areas with permanent water (Kingdon, 1977; Rowe-Rowe, 1978; Stuart, 1981), some have reported sightings away from this habitat (Rosevear, 1974; Rowe-Rowe, 1978).

Exact locations of day-time resting sites for the radio-collared *Atilax* were found on 23 occasions. No two were in the same spot; however, they were often in the same 500 m^2 area. Rest-spots were always on islands of high ground surrounded by swamp or running water. They were characterized by varying degrees of cover: some were relatively exposed, others were beneath vine entanglements or exposed roots (although with accessible escape routes), and others were in holes.

Stream-beds were also important for *Xenogale*; trapping records indicated regions of overlap of home ranges there, and tracks were common. However, data from radio-tracking showed that most time was spent in upland forest, the dominant habitat-type of the area (Fig. 4). The mixed-species forests of the Dzanga region are characterized by a dense and tangled understory maintained in part by the unusually high density of elephants (Carroll, 1988). The cover thus provided may be an important factor governing habitat-use; this hypothesis is further supported by the tendency for collared *Xenogale* to avoid stands of mono-dominant *Gilbertiodendron dewevrei* forest, or "molapa", which have very open understories (Fig. 4). The few locations of *Xenogale* obtained in this habitat were recorded while the animal was travelling.

Home ranges

So far, I have used only the "Minimum Convex Polygon" method to analyze home range size. In Fig. 4, the home ranges of three male *Xenogale* are shown; the MCP areas were: 12.4 ha (adult), 92.7 ha (young adult), and 71.3 ha (juvenile/subadult). There is some evidence of little overlap between home ranges; however, none of these animals was followed simultaneously. It is clear that the MCP method is not adequate in describing the home ranges, as large areas that were apparently not used by the animals were included within the perimeter.

The shape of the home range of the male *Atilax* was quite different from that of *Xenogale*, and appeared to be dictated by the almost linear distribution of suitable streamside habitat. The home range was approximately 5,950 m long (the distance as measured along the stream between the average of six northern-most and six southern-most locations), and the animal was never located outside of the strip of streamside swamp. The average width of the stream and adjacent swamp habitat was 90.3 m (measured at 17 evenly distributed points along the stream); hence, the home range was approximately 54 ha. The MCP method of analysis gave an area estimate of 248 ha, but it was clearly unrealistic because it connected outermost points along stream bends, and enclosed large swaths of upland forest where the animal was never once located.

Utilization patterns within the home range are probably influenced by the shape of the home range. Preliminary results from these four males showed that while it took a *Xenogale* an average of six hours to traverse its home range, the *Atilax* took closer to 48 hours. Further analysis will explore temporal use of space in more detail.

Activity

One of the most interesting discoveries of this study was the diurnal activity pattern of *Xenogale* (Fig. 5). During two 24-hour follows of two different males, both spent very little time resting during the day, and spent 19.00-05.00 h largely in one spot, mostly inactive. Because it is a solitary forest-dwelling mongoose, several authors have suggested that it is nocturnal (Rosevear, 1974; Haltenorth & Diller, 1977).

The *Atilax* was crepuscular (Fig. 5), with peak activity early in the morning (04.00-06.00 h) and in the evening (17.00-20.00 h). Other authors have found them to be crepuscular or nocturnal (Rosevear, 1974; Smithers, 1983; Maddock & Perrin, 1993).

Fig. 2. Long-nosed mongoose, *Xenogale naso*. Note the partly webbed feet. Photo: C. B. Powell

Fig. 3. Marsh mongoose, *Atilax paludinosus*. Note the unwebbed feet. Photo: J. C. Ray

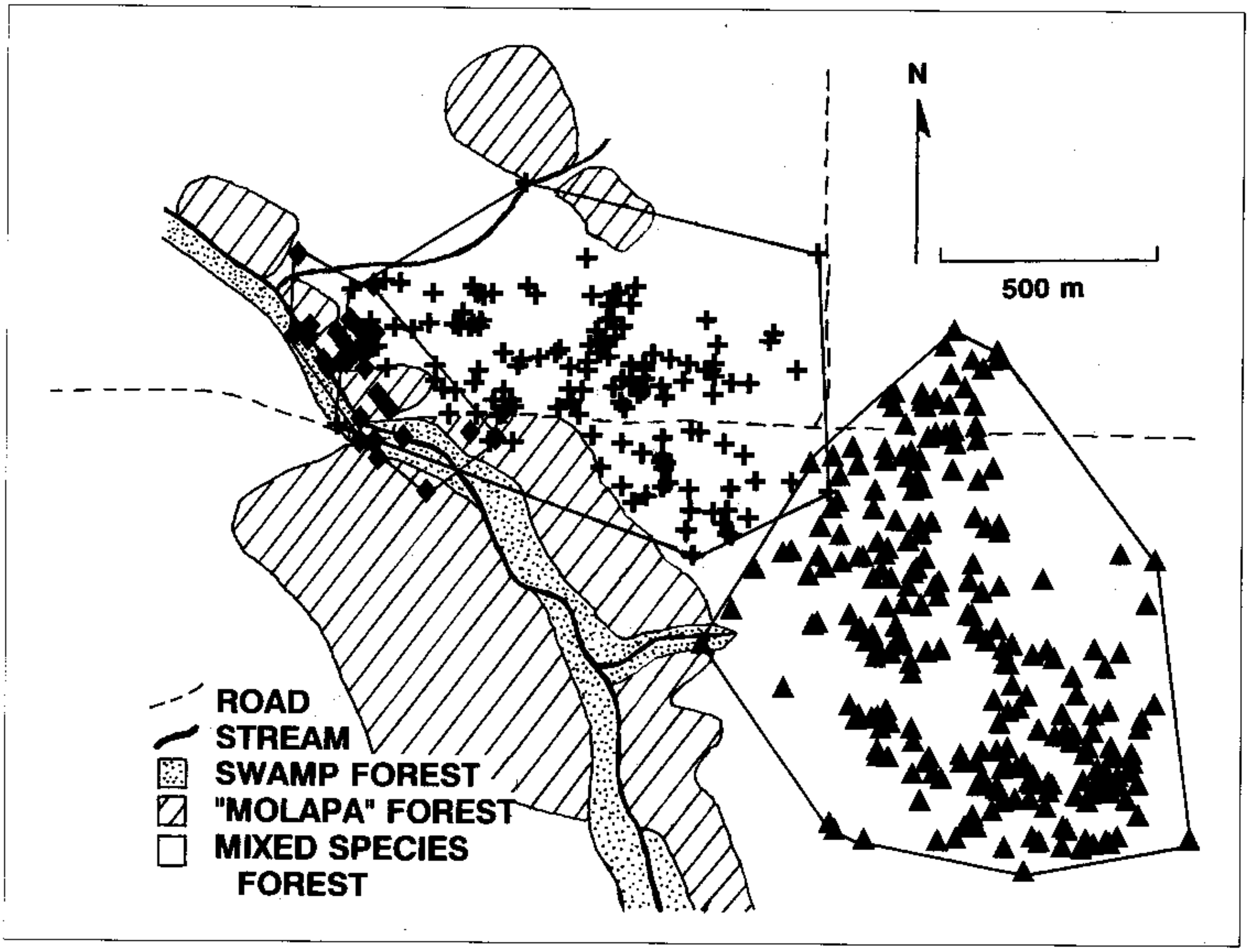

Fig. 4. Radio locations and habitat map of three male *Xenogale naso* home ranges. Diamond: adult, December-January 1993-94, n=146; Plus: juvenile/subadult, June-November 1993, n=337; Triangle: young adult, February-May 1994, n=596

Food habits

Preliminary results from food habits analysis indicated that while arthropods formed a significant part of the diet for both species, small mammals were less important for *Atilax* than for *Xenogale*. Remains of lizards and snakes occurred in the scats of both species, but fish and crab were found only in those of *Atilax*. Frogs were present in most *Atilax* scats, whereas *Xenogale* ate frogs only occasionally.

Atilax latrines were found on exposed rocks near streams and on sandy beaches. There was no evidence of latrine-use for *Xenogale*; however, scats were occasionally found in the same spot where one had been found previously. However, it has not been determined whether this occurred significantly more often than expected by chance.

Acknowledgements

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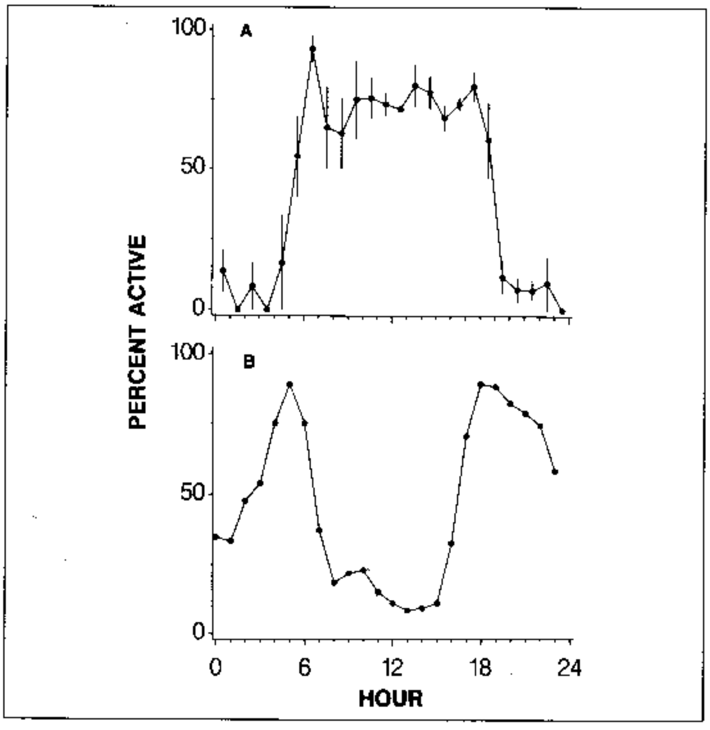

Fig. 5. Proportion of time (percentage of observations) radio-collared mongooses were active. A. The mean and standard errors of three male *Xenogale naso* (n=1,527). B. Male *Atilax paludinosus* (n=1,834)

Table 1. Measurements of *Xenogale* and *Atilax* captured at Kongana study site 1992-1994 ([1]Source=1) and in the literature ([1]Source: 2=Rosevear, 1974 (West Africa); 3=Allen, 1924 (eastern Zaire); 4=Orts, 1970 (eastern Zaire); 5=Baker, 1992 (summarized for southern Africa)

Genus	Sex	Relative Age	Weight (kg)	Head-Body (mm)	Tail (mm)	Hindfoot (mm)	Ear (mm)	Canine-avg. (mm)	Source[1]
Xenogale	female	subadult	1.70	449	385	105	32		1
Xenogale	female	yg. adult	2.15	530	361	100	36	11	1
Xenogale	female	yg. adult	2.15	500	370	101	34	9	1
Xenogale	female	adult	2.55	500	410	111	35	10	1
Xenogale	female	old adult	2.25	530	420	110	30	10	1
Xenogale	female	old adult	1.97	519	378	104	34	8	1
Xenogale	male	juv/s.adult	1.15	404	252	91	25	6	1
Xenogale	male	yg. adult	1.88	430	365	96	33		1
Xenogale	male	adult	3.40	609	419	112	40	10	1
Xenogale	male	old adult	2.75	550	410	111	36	10	1
Xenogale	both	unspecified	c. 3.00	550	378	101	35		2 (n=12)
Xenogale	male	unspecified		548	405	103	37		3 (n=2)
Xenogale	female	unspecified		504	398	100	36		3 (n=2)
Xenogale		unspecified	2.13	520	365	105	35		4 (n=1)
Atilax	male	adult	3.10	475	355	112	33	14	1
Atilax	male	unspecified	2.00-5.45	514	341	106	35		5 (n=31-40)
Atilax	female	unspecified	2.00-5.45	487	322	101	33		5 (n=31)
Atilax	both	unspecified		501 (442-553)	322 (250-355)	96 (84-102)	33 (28-40)		2 (n=20)

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Viverrids in an Ethiopian Rift Valley national park

J.W. DUCKWORTH

Introduction

Nechisar National Park (05°51'-06°00'N, 37°32'-48'E) covers 75,200 ha from 1,108 to 1,650 m ASL in southern Ethiopia. Most of the centre consists of gently undulating grassland with scattered bare rocky and bushy areas. Extensive bushlands fringe these plains while the two rivers are lined with riparian forest; a small ground-water forest (a rare habitat) is supported by the high water table associated with numerous springs in the west of the park. The park is bounded to the east by the Amaro mountains, to the west by the town of Arba Minch and to the north and south by lakes Abaya and Chamo respectively (Fig. 1). Peripheral regions of these lakes are included in the park area, as are at least two smaller water bodies. The two main rivers, the Sermale and Kulfo are both less than 10 m across and rarely deeper than 1 m. The town of Arba Minch is the capital of the North Omo administrative region. It expanded greatly during the 1980s; however there were still extensive areas of semi-natural bushland adjacent to the park, meaning that these animal populations were not isolated. The nearest similar forests and plains are extremely distant; both rivers fringed with riparian forest start and end within the park, thus there are no linking corridors to similar forests outside.

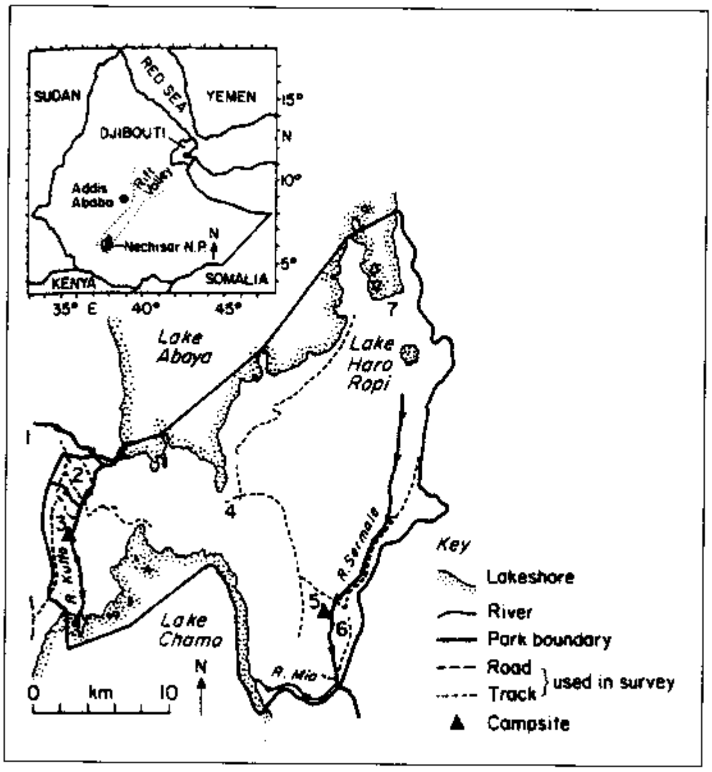

Fig. 1. Nechisar National park, showing localities visited and trails walked by night. 1, Arba Minch town; 2, Park Headquarters; 3, Eniramed; 4, Dagbulle; 5, Sermale River campsite; 6, Hot Springs; 7, Hitu. (after Duckworth, 1992)

The temperature fluctuates seasonally: January to March is the hottest period, with mean daily maxima of 35°C. November and December are typically the coldest monts; even then, the mean daily maximum is about 28°C. The main rains are in March to May and there is a smaller peak in September to November. The annual rainfall is usually between 800 and 1,000 mm. The survey period thus started some time after the long rains and extended into the short rains.

Nechisar, as well as containing a diverse selection of Rift valley habitats in a beautifully scenic setting, supports a viable population of the critically threatened Swayne's hartebeeste *Alcelaphus buselaphus swaynei* (a subspecies now restricted to Ethiopia). For these reasons, it has been under development as a National Park since 1972, is fully staffed and contains 177 km of vehicular dirt tracks.

Prior to 1990, biological work in the park concentrated largely on the grassland and associated ungulate populations. Nocturnal mammals are often poorly recorded in comparison to the diurnal species in an area; Waser (1980) stressed how nocturnal African carnivores were virtually unknown and rectified this situation for the Serengeti, Tanzania. During July to September 1990 a team of five British biologists collaborated with the resident park staff to survey the wildlife of Nechisar (Duckworth *et al.*, 1992); one major aim was to investigate nocturnal mammal communities. Duckworth (1992) presented information on status for nocturnal mammals but did not cover the ecological and behavioural data collected for these species. This note details all information collected concerning the viverrids of the area (no mustelids were observed, though some doubtless occur).

Study areas

Fieldwork was based at two sites within Nechisar: Eniramed and beside the Sermale River. Eniramed (05°20'N, 37°35'E; 1,192 m ASL) was occupied from 17 July to 23 August. It was in Kulfo Riparian Forest (KRF) immediately adjacent to the Kulfo River, with easy access to Kulfo Bushland (KB) and Groundwater Forest (GWF). A major vehicle track ran from park HQ through KB (crossing the GWF part way) to Eniramed and then followed the Kulfo River (through KRF) to the Kulfo crossroads. This track was used for most observations, although all other possible vehicle and foot tracks through the KB and GWF between Eniramed and HQ were walked at least once. The vehicle tracks afforded excellent views of all habitats and, being almost clear of vegetation, allowed observers to walk almost silently. Most work was within 5 km of Eniramed. A return visit from 15 to 17 September allowed intensive reassessment of the area following work around the Sermale.

Fieldwork around the Sermale was based at an un-named site (06°00'N, 37°43'E; 1,140 m ASL on 17 September, 1,095 m), occupied from 26 August to 23 September. The forest and bushland (SRF and SB) were much more open than those around Eniramed but the distance to the Plains and the varied terrain meant that it was important to cover a large area, even to Hitu (21 km distant). The presence of small eminences overlooking the plains and open bushland, in conjunction with a full moon and cloudless nights allowes static searches (this was important in case shy species were habitually missed during walked observations). The occasional use of a vehicle (with high-power spotlamps) allowed further searches.

Again vehicle tracks were the main routes used for observations, but because most areas were so open observers were much less restricted than around Eniramed. However, the Riparian Forest (SRF), which was much narrower and less sharply differentiated from the surrounding bushland than the KRF, was some distance away from tracks for much of its length; in its thicker areas there were long-established (but illegal) plantations.

Methods

From both study sites, nocturnal walks of up to 21 km were conducted, and all mammals seen or heard recorded. Much of the centre of Nechisar consists of open grassy plains with very few scattered single trees or small bushy clumps. Animals seen within these bushy areas (some were 50 m across) have been classified as Plains species.

Nocturnal mammals were counted by walking established trails at a steady pace with a continuously-running headtorch. Animals were detected by their rustling sounds, their reflective eyes or occasionally from vocalisations. Frequent brief stops were made to listen. The headtorch beam was set to maximum diameter to facilitate detection of eyeshines over as wide an area as possible. The slow walking pace (about 1-2 km per hour) allowed careful searching of the vegetation adjacent to the trail, at all heights. Animals were immediately illuminated with a high-power Nitech X-cell spotlight (100,000 cp). This bright beam, in conjunction with 10x binoculars, allowed identification of even the most distant animals found except on the Plains.

Observer noise was minimised by counts being conducted either singly or with the second observer trailing the first by about 100 m, and only advancing when signalled (using a torch) by the first. Several animals were flushed by the second observer's approach, emphasising the importance of observations being made singly. Very few animals were seen to flee the light itself; thus almost all eyeshines located were identified and many were watched for considerable periods of time, though it is questionable how natural their behaviour was. This is, however, a strong indication of how little hunted they were, which was confirmed in other ways (Duckworth *et al.*, 1992).

Times of start, stop and change of habitat were recorded. When animals were watched for more than two minutes the watching period was substracted from searching time, allowing precise quantification of effort in each habitat. The following details were taken for each encounter: species, group size, basis of identification for difficult species (*e.g.* genets), time, reaction to observer, height in vegetation, and any interesting behaviour.

Work went on throughout the night with a concentration in the mid-evening. Time distribution was unfortunately not particularly similar in each habitat. When the same path was used outward and return, observers waited 30 minutes before returning, allowing the distribution of animals to change (animals seen on return bore no relation to those on the way out). Because of the distribution of existing trails, some areas were walked many times, while others were covered only once or twice.

An unusual but frequently-walked trail could bias the results. In frequently-walked areas, a number of individually-identifiable animals were seen (*e.g.* a one-eyed African civet and a White-tailed mongoose with a black tail); these were found only once (even though the species were common in these areas), allaying worries about individuality of data. Eniramed is popular with local visitors and regularly visited by scavenging animals. To prevent these animals inflating the contact frequencies, all encounters within five minutes' walk of Eniramed were discarded from calculations. The more remote Sermale study site was rarely visited by other people.

The time spent searching in a given habitat was divided by the total number of individuals seen there, to give contact frequencies as hours per animal for each species. Frequencies were also calculated for groups; any reference henceforth to "group" includes single animals (as groups consisting of one individual only). The contact frequencies were not converted to population densities for the reasons discussed in Duckworth (1992). Glanz (1982) concluded that this needed a large measure of subjectivity coming from comprehensive knowledge of the area and species in question. In the absence of this information, presentation here of contact frequencies is more useful as fewer assumptions are involved in their calculation.

Tests of statistical significance are by Chi-squared applied to group contact frequency (individuals are not statistically independent). Expected numbers were calculated from the total of groups found across all test categories, divided in proportion to the amount of time in each category.

Casual records (including animals seen from vehicles and those seen from viewpoints by night) have not been considered during calculation of contact frequencies, but have been incorporated for comments on group-size and behaviour.

During daylight, mammals were noted opportunistically while observers searched for birds (Safford *et al.*, 1993). Two mink traps were set most nights at Eniramed and infrequently at the Sermale site. Searches for footprints were made, but no viverrids left prints identifiable by us.

Species notes

African civet *Civettictis civetta*

This species, only observed at night, was commonly seen in KRF, but much rarer in adjacent KB and GWF (KRF tested against GWF: X^2_1=6; P<0.02); in KB and GWF the white-tailed mongoose was very common (see below). The apparent scarcity of both species in all habitats around the Sermale compared with the Kulfo is not easily explicable. Kingdon (1977) states that the species occupies numerous habitats, particularly moist and densely vegetated ones.

All 27 sightings away from camps were of single animals; civets usually are solitary (Kingdon, 1977). Once two animals were seen to meet; one animal gave a hoarse, sharp exhalation, upon which the other ran off. Animals (at least two) scavenged nightly around Eniramed; they were seen together thrice. One appeared duller, greyer and 15-30% smaller than the other. Foraging animals moved relatively quickly between areas of thick leaf-litter which were investigated intensively by uneven side-to-side sniffing. They frequently foraged in dense undergrowth but none was seen to climb. Most animals apparently ignored the observer, or actively approached and investigated. One which came very close to the observer panicked and ran off grunting nasally. One animal may have been partially blind as only one eye reflected.

Common genet ***Genetta genetta*** (referred to as ***G. felina*** by Schlawe, 1980 & 1981)

Never seen in forest, this species was relatively frequent in bushland (usually in more open areas); of four singles in the Plains, three were near small clusters of bushes, and the other was resting on a bough 5 m up an isolated 8 m tree. This attachment to bushes even on the Plains echoes Waser's (1980) Serengeti findings. All animals were single and observed at night.

After field experience of both species in the area, it was easy to identify genets without seeing the tail tip (in this species, usually pale; occasionally, some dark hairs right to the tip gave a slightly shaded appearance, as confirmed by reference to skins at the BMNH). This species was less richly coloured overall (as stated by Yalden *et al.*, 1980) than was Large-spotted genet and its spots were smaller, but more importantly the ears appeared much longer. Collectors' measurements on Ethiopian skins at the BMNH suggest that this is a real difference (four common genets had ears of 50, 54, 47, and 45 mm; five large-spotted genets measured 34, 32, 42, and 38 mm).

Large-spotted genet ***G. rubiginosa*** (referred to as ***G. maculata*** by Schlawe, 1980 & 1981)

The most commonly encountered animal by night in heavy forest, but extremely rare outside (KB and SB tested against KRF and GWF: X^2_1=58; P<0.001). The only two bushland animals (both seen well) were 250 and 150 m from KRF and SRF respectively. Surprisingly, this species seemed rare in SRF (one in 10.25 hrs, and one seen a few times in the camp); although the forest band was much narrower and less differentiated from the surrounding bushland than the KRF, it contained an impressive array of forest specialist birds (Safford*et al.*, 1993). The understorey of SRF was denser than in KRF, perhaps hampering detection of predominantly terrestrial species. Animals, always single, scavenged nightly at Eniramed. The peak count in the 2.4 km from Eniramed to the Kulfo crossroads was five (although normally only one or two were seen, re-emphasising the dangers of calculating population densities from contact frequencies). All sightings were by night.

Yalden *et al.* (1980) found this species to predominate in more humid areas of Ethiopia, with common genet in drier regions; Kingdon (1977) suggested that when more than one genet species occurs in an area, their niches are fairly distinct, though overlap extensively. Thus, the exclusive distribution of this species and the former on such a local scale is noteworthy. Waser (1980) found these two species not to overlap in distribution in four study areas in the Serengeti. He saw insectivorous small carnivores more frequently than those (including genets) taking small vertebrates. This was also true in Nechisar, except in forest areas, where this genet was the most commonly-encountered animal; it appears that Waser made few observations in the forest.

Most (36 of 41) animals were found on the ground; several (8 of 36) when illuminated climbed saplings or lianes up to 2-4 m (and then sometimes descended a few minutes later). Some stems climbed with ease were less than 5 cm in diameter. Five of 41 animals were initially found above the ground; the highest was 6 m up. Three were on lianes or saplings and two on main tree-trunks. This seems less arboreal than suggested by Kingdon (1977).

Foraging genets freely climbed over fallen wood (in marked contrast to mongooses and civets) and moved on a faster, straighter path than did these other two species, *contra* Waser (1980), whose description however probably refers principally to *G. genetta* and perhaps specifically to stalking animals. The only actively hunting individual observed, in thick leaf-litter in KRF, made about six pounces (all unsuccessful) within one minute over about 6 m. It reared up like a Red fox (*Vulpes vulpes*) before pouncing. The faeces of an individual caught in a wire cage trap were mainly fish fins and scales. One ran off with a rotting banana from the camp; this same animal may have learned to check the pitfall traps (set for small mammals; Duckworth *et al.*, 1993) as faeces were regularly found within and around the traps.

Habitat	KRF	GWF	KB	SB	SRF	P
Total hours work	37.5	29.5	56.25	41.75	10.25	13
African civet (g/i)	2.75	14.75*	14*	-	5.25*	-
Common genet (g/i)	-	-	11.25*	10.5*	-	13*
L.-s. genet (g/i)	1.25	1.75	56.25*	41.75*	10.25*	-
Slender mongoose (g/i)	-	-	56.25	-	-	-
W.-t. mongoose (grp)	18.75*	2.25	3	10.5*	-	c
(ind)	18.75*	2	2.75	10.5*	-	c

Table 1. Nocturnal sighting frequencies of viverrids in Nechisar National Park. Figures represent the time (to the nearest quarter-hour) per sighting (of either groups or individuals). For example, in KRF, a Large-spotted genet was seen every 1.25 hours of fieldwork. These figures are the reciprocal of the encounter rate expressed as sightings per hour. *Abbreviations:* KRF, Riparian Forest by Kulfo River; GWF, Ground-Water Forest; KB, Kulfo Bushland; SB, Sermale Bushland; SRF, Riparian Forest by Sermale River; P, Grass Plains; W.-t. mongoose, White-tailed mongoose; L.-s. genet, Large-spotted genet; grp, sighting frequency per group; ind, sighting frequency per individual; g/i, sighting frequency per group or individual (used with largely solitary species showing no differences between grp or ind); *, assessment based on fewer than six contacts; c, casual nocturnal record.

Of 71 encounters, only two involved certain association between animals. In one case, two animals shot past the observer; 30 seconds later one returned, while the other lurked where it had been chased for a couple of minutes, then quietly moved off. In the other, one animal sat 3 m up in a tree fork while the other foraged on the ground below. All others appeared single, but four times two animals were seen only 30-40 m apart and may have been together (during analysis, these eight animals were treated as separate contacts). Ikeda *et al.* (1982) found that although several individuals visited a feeding station, they invariably traveled separately. Although very approachable, many animals ran off at the noise of footsteps; some reared up on their hindlegs, though this seemed less common than in white-tailed mongooses.

There was wide variation in the tail pattern of this species. Most had 7-9 dark bands of approximately equal thickness and an extensive dusky tip, itself containing up to two black bands.

Dwarf mongoose sp. ***Helogale parvula/H. hirtula***

Two together in a frequently-visited area of GWF on 5 August about noon could not be identified to species.

Slender mongoose ***Galerella sanguinea***

One in KB at 20.00 hrs complemented five by day (four in KB: three near the HQ and one near Eniramed; the other in SB below Dagabulle). One by day was probably with a second, judging by the concentrated mobbing of Slate-coloured boubous (*Laniarius funebris*) and Grey-backed camaropteras (*Camaroptera brevicaudata*) 10 m away; this species is frequently mobbed by birds (Kingdon, 1977). All were on the floor, although the species is frequently arboreal (Kingdon, 1977). The balance of nocturnal and diurnal activity seems to vary markedly in different areas (Kingdon, 1977); during the survey it is clear that nocturnal activity was unusual, as the species was not shy.

Egyptian mongoose *Herpestes ichneumon*

One close to the Hot Springs in SB in mid-afternoon. This species is apparently scarce throughout Ethiopia (Yalden *et al.*, 1980).

White-tailed mongoose *Ichneumia albicauda*

Common in bush and some forests; the only Plains record was in a bushy area. It was much rarer in KRF than in GWF (X^2_1=11; P<0.001). This result was the converse of the pattern shown by African civet; possibly these species compete as no habitat had both commonly, although food is unlikely to be the cause of this as the mongoose is an insectivore and the civet an omnivore (Waser, 1980). The frequency in GWF (not rarity in KRF and SRF) seems surprising, as Waser (1980) found them prefer relatively open areas. There was no indication of the decrease of activity stated by Kingdon (1977) to occur between midnight and 04.00 hrs: considering the two major habitats, GWF and KB, there were 17 in 45 hrs between 20.00 and 24.00 hrs, compared to 14 in 31.5 hrs between 00.00 and 04.00 hrs.

Animals were usually alone, *contra* Kingdon's (1977) assertion that pairs or families are usual. There were 38 singles, one group of two and one of three (of which one soon left the other two). In the group of two the leader was about 10% larger and carried its tail straight and horizontal, while the follower kept its tail arched; Kingdon (1977) states that the leader often holds its tail erect and fluffed out. All were on the ground, though one climbed over some 60 cm high boulders. Reaction to the observer varied greatly, some approached very closely to investigate, while others fled immediately. Animals often reared up on their hindlegs. One animal walking along the trail to the observer halted at 2 m distance, made several 'false starts' accompanied by otter *Lutra lutra*-like "hah!" calls, then dashed noisily past through the leaf-litter, rejoining the path after 3 m. Most showed no obvious reaction.

Animals foraged by slow and methodical investigation of leaf-litter while walking, often in a slightly zig-zag path, as described by Waser (1980). The only identified food was when one animal came upon a few termites, snorted and licked them up rapidly. One, when urinating, squatted like a young dog.

Of the 43 seen, 42 had the typical whitish tail, and one had a black tail (its body and leg pelage was as normal); this latter morph is much commoner in some areas (Kingdon, 1977).

Other species

The short time scale prevented further work, which would probably have allowed the detection of further species. Among the mustelids and viverrids, Ratel *Mellivora capensis* (T. S. Allen-Rowlandson, pers. comm., 1990) and Banded mongoose *Mungos mungo* (Kirubel Tesfaye, 1985) are both known from the park.

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Recovery of the European polecat *(Mustela putorius)* in Britain

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There is growing evidence that the European polecat *(Mustela putorius)* has been recovering from the 19th century decline which very nearly led to its extinction in Britain. Polecats were apparently common and widespread in the early 1800s. Their subsequent decline, reconstructed by Langley & Yalden (1977) through a search of local natural history literature, left the species confined mainly to a single stronghold in central Wales (in the far west of mainland Britain) by 1915. By this date the polecat was either extinct or nearly so over the whole of Scotland and England (the species has not been recorded in Ireland).

The main cause of this major contraction of the polecat's range was heavy predator control, especially trapping, associated with game shooting. However, this pressure has been easing since the early decades of the 20th century (Tapper, 1992). It is not surprising, therefore, that the polecat has for some years been showing a significant expansion from its Welsh stronghold (Walton, 1964, 1968).

Whilst there is evidence that the polecat's welcome recovery is continuing (Birks, 1993; Blandford, 1987) it does raise several issues which should be addressed if its conservation in Britain is to be guaranteed:

1. There are concerns about the genetic integrity of the polecat arising out of the widespread occurrence of domestic, escaped and feral ferrets (*Mustela furo*) in the British countryside. There is thus a need to clarify the phylogenetic links between *M. putorius* and *M. furo*, to assess the extent of introgressive hybridisation between the two, and to determine its significance for the future conservation of genetically pure *M. putorius*.

2. Ecological information on the polecat's use of lowland farmland in Britain is very sparse. This hinders land managers and conservation bodies wishing to make informed decisions about practices which may influence the health of polecat populations. There is thus an urgent need to gather basic ecological data on numbers, diet, and habitat selection of the species. Recognising that the situation is a dynamic one, there is also a need to monitor the changing distribution and status of the polecat as its recovery continues, so that we can understand the factors which influence this process.

3. Although partly protected under wildlife legislation in Britain, the polecat is still regarded by some people as a pest and is killed in growing numbers (Tapper, 1992). There is a need to understand and monitor possible conflicts between polecat behaviour and human activities such as game-rearing and poultry-keeping, with a view to finding ways of resolving or minimizing such conflicts. It is also important to assess the significance of all forms of man-induced mortality, both deliberate (such as trapping) and accidental (such as road traffic accidents and secondary rodenticide poisoning).

4. Cultural influences may have an important bearing upon the conservation of small carnivores such as the polecat (for example the otter *Lutra lutra* was widely regarded as a pest in Britain until it became rare; now it is revered and heavily protected). There is a case for engendering positive attitudes towards the polecat among the general public and key interest groups such as landowners. There is also a need to raise awareness about the appearance and behaviour of the species as it returns to those areas (covering most of Britain) where it has been absent for about a hundred years.

In order to ensure that the issues listed above are properly addressed, the Vincent Wildlife Trust is currently undertaking and co-ordinating research and conservation action involving a number of organisations, including museums, wildlife trusts, university departments, and research institutes.

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Bovine TB and Wildlife

One of the saddest aspects of the badgers and tuberculosis saga in England, is that the idea that wildlife causes TB in cattle has now gone abroad, and in New Zealand investigations are proceeding even into hedgehogs and feral stoats, and cats as a source. Cattle TB has also spread to buffalo in South Africa's Kruger Park and to endangered bison in America.

And yet it now seems that the pivotal reason for claiming that badgers give cows TB, and not vice versa, is quite simply because the 'experts' have not read the classic study Francis. 1947. *Bovine TB*, Staples Press, London, p. 124:

"The complete healing of lung lesions which so often occurs in man seldom takes place in cattle. **This is a fundamental difference** and in practice **all** tuberculin positive cattle are regarded as **infectuous** to other cattle". And he cites M'Fadyean & Knowles (1915): probably **all** TB cattle produce infected faeces (hence transfer to badgers via dung beetles). The pivotal point that all cattle lung lesions stay 'open' is reaffirmed by the centenary paper celebrating Koch's discovery (1882) of the TB bacillus, by Collins & Grange. 1983. *J. Applied Bacteriology* 55:13-29.

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First observations of *Crossarchus platycephalus* (Goldman, 1984) in the Zaire/Congo System (Dja River, southeastern Cameroon)

Marc COLYN, Marc DETHIER, Paul NGEGUEU, Olivier PERPETE, and Harry VAN ROMPAEY

Cusimanses, small carnivores (Herpestidae) of the lowland forest, have a wide distribution in tropical Africa. Thus far four species have been described (Goldman, 1984; Colyn & Van Rompaey, 1994):

Crossarchus obscurus F. Cuvier, 1825
: found from Sierra Leone to Ghana

Crossarchus alexandri Thomas & Wroughton, 1907
: known from both banks of the Zaire/Congo River in Zaire, Uganda, and possibly Zambia

Crossarchus ansorgei
: known from the left bank of the Zaire/Congo River in Zaire and from Angola

Crossarchus platyceplalus
: known from Benin, Nigeria, and Cameroon

This taxonomy is generally accepted, except that Wozencraft (1989) considers *C. platycephalus* to be a subspecies of *C. obscurus*.

The geographic distribution of three of these species is well-known: populations of *C. obscurus* are isolated in the forests west of the 'Dahomey Gap' (Goldman, 1984), whilst both *C. alexandri* and *C. ansorgei* principally inhabit the forests of that part of the Zaire/Congo Basin delimited to the east and the north by the Ubangui River (Colyn & Van Rompaey, 1994). Our knowledge of the geographical distribution of *C. platycephalus* is more vague; this species is only well-known in the coastal basins of the Cross River (Nigeria), in south-western Cameroon (Ntem, Nyong, and Sanaga), and from Equatorial Guinea where it was recently observed in the Monte Alen Park (C. Lasso, pers. comm.). Its presence is uncertain in the coastal basins of Gabon and the Congo (Brosset, 1979; Goldman, 1984; Dowsett-Lemaire & Dowsett, 1991). Likewise, studies of the distributional patterns of the three typically central African species (*C. alexandri*, *C. ansorgei*, and *C. platycephalus*) make it clear that the immense forested area to the west of the Ubangui River, and made up of the numerous western tributaries of the Zaire/Congo River (Lobaye, Sangha complex, Likouala...), is not inhabited by cusimanses. Recent work (Colyn, 1994, Colyn & Van Rompaey, 1994) effectively shows that *Crossarchus* is not present in the Lobaye system in the Central African Republic, nor to the west of the Ubangui River. Neither did Carpaneto (1994) observe *C. platycephalus* in the Odzala region of the Congo. Further west, the presence of *C. platycephalus* in Cameroon is mentioned by Perret & Aellen (1956), 6 km NNW of Sangmelima and in Ngam and Kondéyébaé. The last two localities are situated near the sources of the Rivers Lobo and Libi, small tributaries at the western periphery of the Dja River, and near the ridge line of the coastal basins (Ntem, Nyong). To the northeast, a museum specimen (AMNH) is known from the Bertoua region (30 km W of). This locality is situated on the ridge line between the basins of the Sangha, Sanaga, and Nyong.

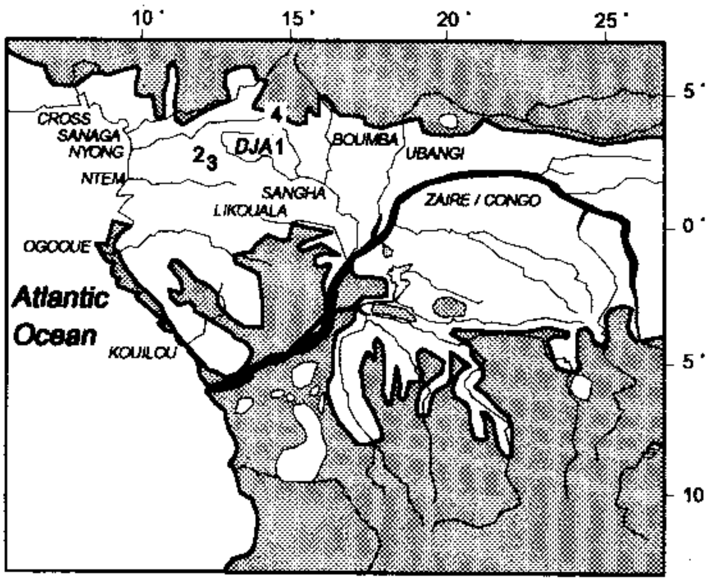

Fig. 1. Principal coastal basins of the Atlantic and of the Dja River in the Zaire/Congo fluvial system. 1: Ekom; 2: Ngam; 3: Kondéyébaé; 4: Bertoua.

Faunal inventories, made between September 1994 and February 1995 in the major part of the Dja Faunal Reserve, allowed us to examine several hundreds of bones originating from 'consumed game' at Ekom (Dethier, 1995). These contained five skulls of *C. platycephalus*. Unfortunately, we have not been able to observe a live animal in the wild nor a dead one in one of the village markets. Nevertheless, both the villagers and the Baka are well acquainted with this small carnivore, although it is obviously uncommon when compared with the results of our observations of *C. alexandri* and *C. ansorgei* in Zaire (Colyn *et al.*, 1988; Colyn & Van Rompaey, 1990).

Two skulls amongst the new material are adult, and undamaged. Comparing their measurements with those reported by Goldman (1984) shows that the two specimens of *C. platycephalus* from Ekom fall within the range of craniometric variation of 41 specimens from the Atlantic coastal region (Table 1).

We may conclude that the geographical distribution of *C. platycephalus*, contrary to data in the literature, does not seem to be limited to the Atlantic coastal basins. The discovery of this species in the Dja Faunal Reserve confirms its presence in the Zaire/Congo Basin. Although little-known in the Reseve, and unknown in the more easterly regions (CAR, Congo) and the

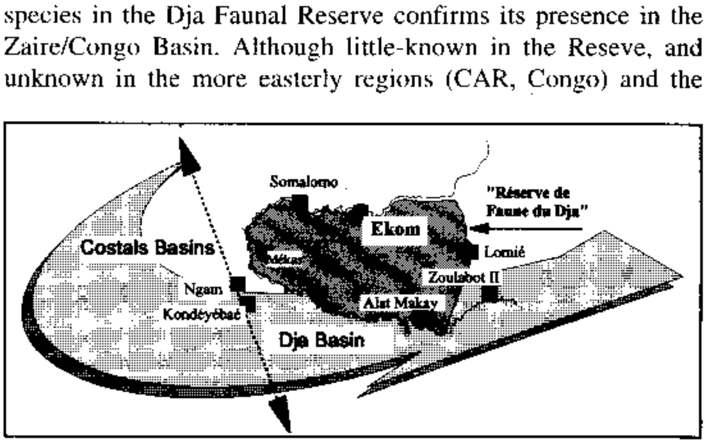

Fig. 2. First observation of *Crossarchus platycephalus* in the Zaire/Congo fluvial system and colonisation process from the coastal basins