SMALL CARNIVORE CONSERVATION

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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.

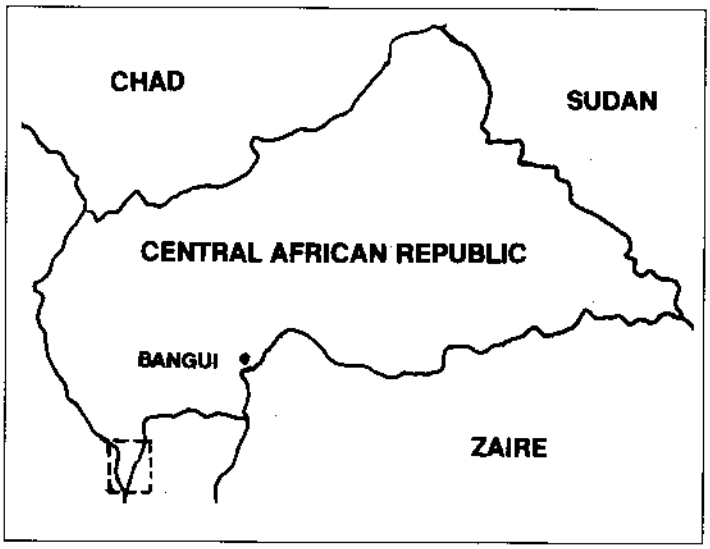
My purpose here is to summarize information from a trapping and radio-telemetry study conducted over a two-year period in the northern Congo Basin. The two species are very similar in size and overall appearance (in fact, neither BaMbuti nor BaAka pygmies distinguish the two species [pers. obs.]); however,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

The 35 km^2 study area (Kongana) was located in the southwestern 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*.



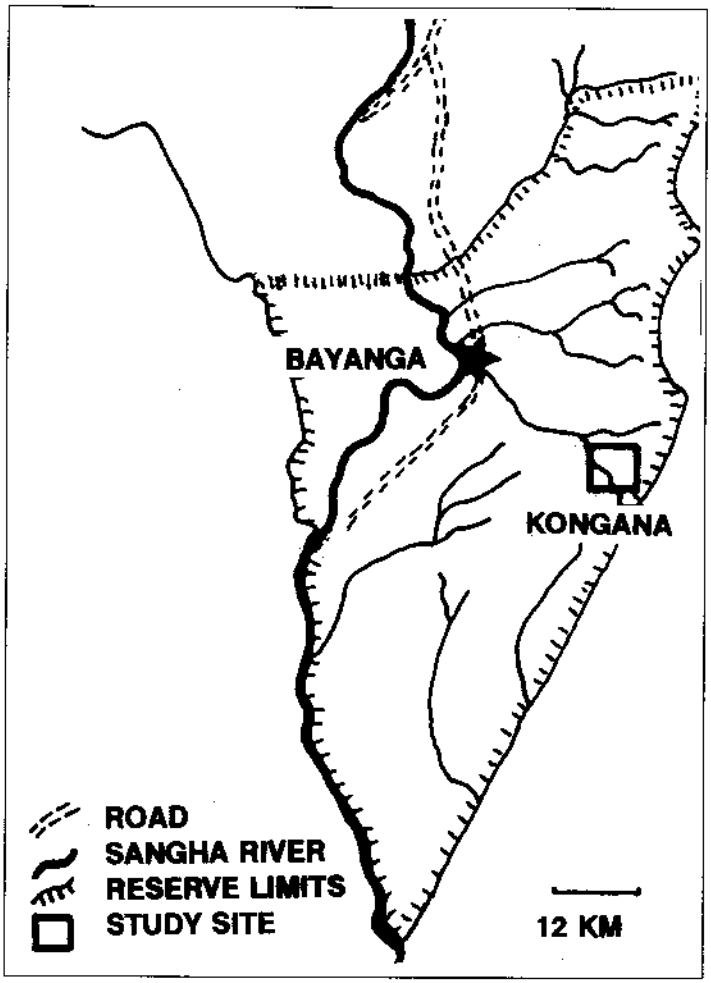


Fig. 1. The Central African Republic and Kongana Study Are.

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

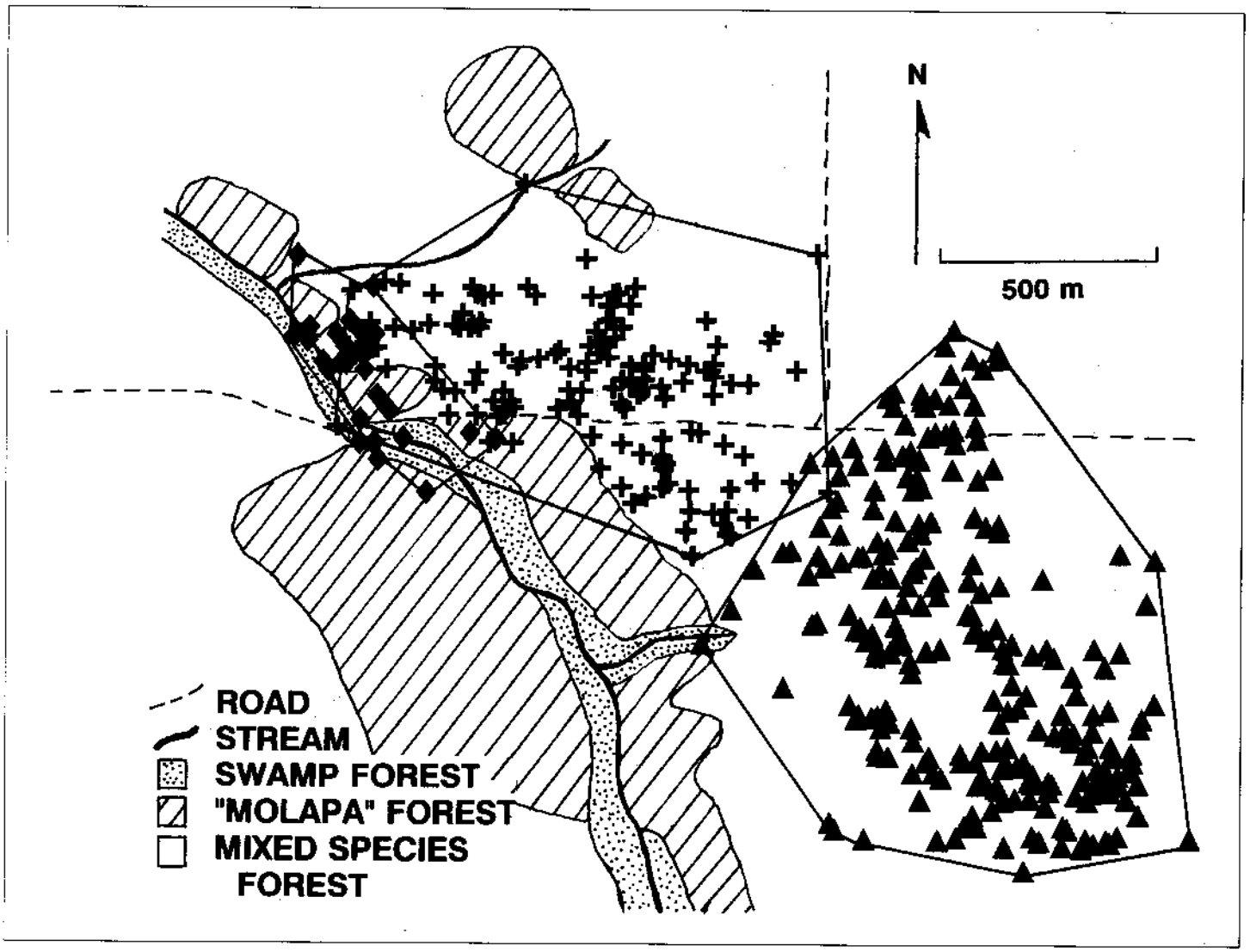


Fig. 4. Radio locations and habitat map of three male *Xenogale naso* home ranges. Diamond: adult, December-January 1993-94, n=146; Plus: juvenile/subadult, June-November 1993, n=337; Triangle: young adult, February-May 1994, n=596

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.

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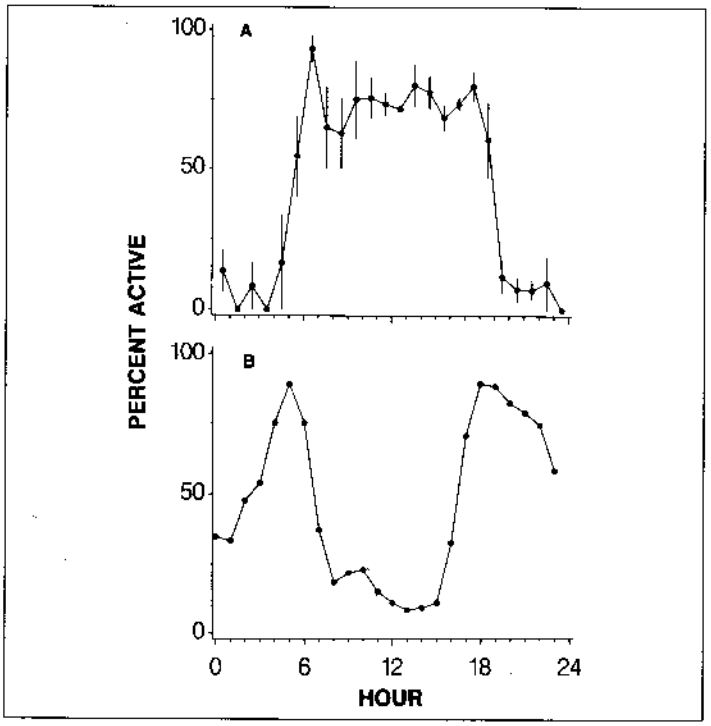

Fig. 5. Proportion of time (percentage of observations) radio-collared mongooses were active. A. The mean and standard errors of three male *Xenogale naso* (n=1,527). B. Male *Atilax paludinosus* (n=1,834)

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

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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.

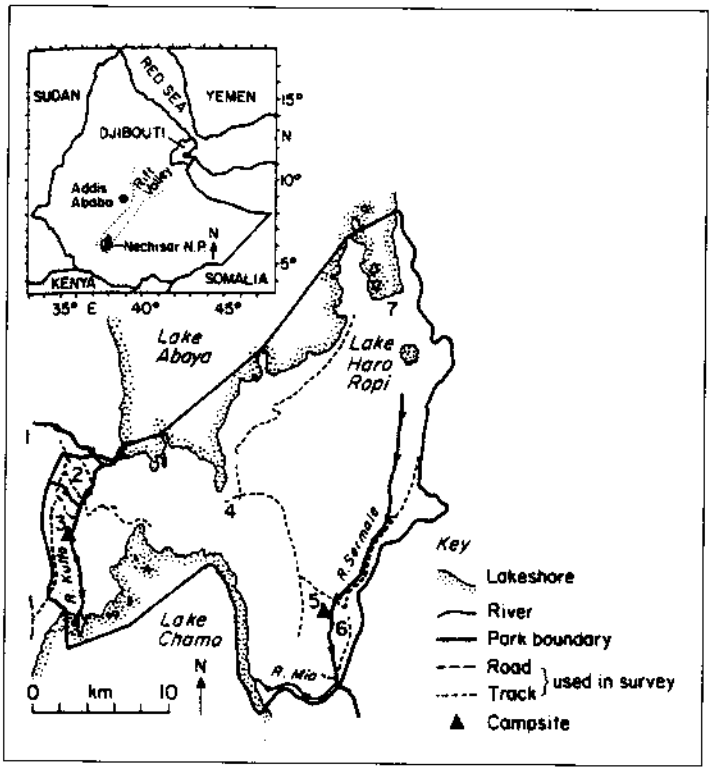

Fig. 1. Nechisar National park, showing localities visited and trails walked by night. 1, Arba Minch town; 2, Park Headquarters; 3, Eniramed; 4, Dagbulle; 5, Sermale River campsite; 6, Hot Springs; 7, Hitu. (after Duckworth, 1992)

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.

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

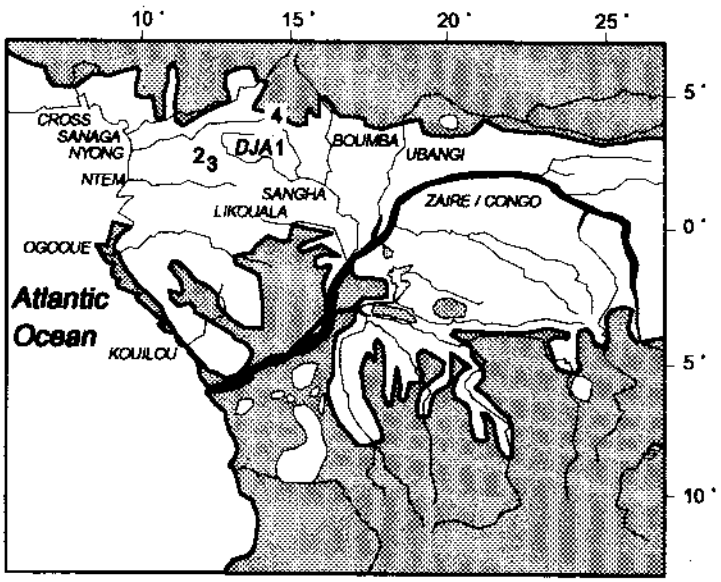

Fig. 1. Principal coastal basins of the Atlantic and of the Dja River in the Zaire/Congo fluvial system. 1: Ekom; 2: Ngam; 3: Kondéyébaé; 4: Bertoua.

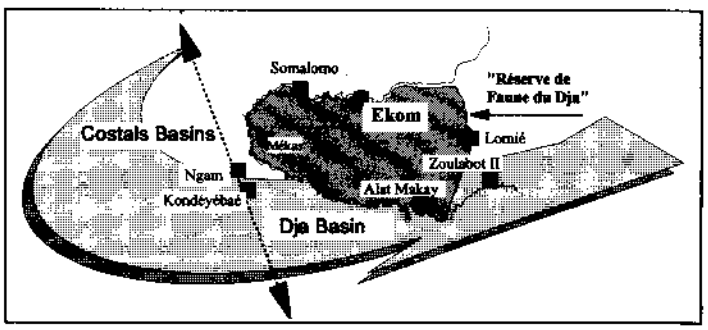

Fig. 2. First observation of *Crossarchus platycephalus* in the Zaire/Congo fluvial system and colonisation process from the coastal basins

Character	Holotype	Cameroun, Benin, Nigeria				Dja River (×2)	
	42284	*N*	*X*	Range	SD	748.1994	809.1994
GRLG	72,2	37	72,50	68,1-76,9	1,90	70,5	71,2
CBLG	71,3	31	70,79	65,2-75,5	2,45	69,1	69,3
ROSP	24,6	41	24,61	22,8-26,8	0,99	24,4	24,5
PALL	37,8	39	37,08	34,2-39,8	1,31	36,2	36,0
MAXT	25,7	35	25,39	23,2-27,5	0,94	24,0	23,8
TYMP	13,2	40	13,53	12,7-14,7	0,54	13,6	13,1
CUCU	13,7	38	13,52	12,6-15,1	0,55	12,9	13,3
ROSB	19,8	37	19,11	17,7-21,0	0,81	18,6	19,1
IORB	15,8	37	15,30	13,5-18,9	0,93	15,0	14,4
MUMU	23,2	37	23,32	22,1-25,3	0,72	21,4	22,0
ZYGO	37,0	35	38,30	34,8-41,7	1,35	38,3	37,2
BRBC	28,7	38	27,99	26,2-29,2	0,77	26,5	26,6
MAST	29,2	35	29,04	26,9-31,4	1,03	28,5	28,3
HBCA	23,7	35	23,39	22,0-24,7	0,58	21,3	21,4
GMAN	49,9	41	49,05	44,1-52,4.	1,64	48,8	46,9
MANT	29,0	37	28,54	27,1-30,4	0,77	26,5	27,5
MCAH	19,9	40	18,80	16,5-20,2	0,90	18,4	18,4

Table 1. Comparison of craniometric data on *Crossarchus platycephalus* (after Goldman, 1984) with two specimens from the Dja Faunal Reserve, Cameroon. (Abbreviations: see Goldman, 1984)

south (Gabon), it seems that *C. platycephalus* (whose distribution is principally related to the coastal basins of Cameroon) is dispersing towards the centre of the 'West Central Faunal Region'. This phenomenon of colonization from the Atlantic coastal basins has also been observed by ourselves and our colleagues for other taxonomic groups, especially Cercopithecidae primates.

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Appendix. Recorded localities of *C. platycephalus* in Cameroon (Goldman, 1984)

Ambam: 02°23'N, 11°16'E; Bachuntai:05°40'N, 09°26'E; Batanga: 04°24'N, 11°01'E; Batoki: 04°03'N, 09°06'E; Bertoua: 04°35'N, 13°25'E; Bipindi: 03°05'N, 10°25'E; Bonge(=Mbonge): 04°33'N, 09°05'E; Buca: --; Buea: 04°09'N, 09°14'E; Dikuma: 04°55'N, 09°15'E; Ebolowa: 02°56'N, 11°11'E; Eséka: 03°38'N, 10°47'E;Fineschang: 05°35'N, 09°30'E; Isobi: 04°11'N, 09°00'E; Kondéyébaé: 02°58'N, 12°00'E; Kribi: 02°57'N, 09°56'E; Kumba: 04°38'N, 09°25'E; Lolodorf: 03°14'N, 10°44'E; Mainyu Bridge: 05°40'N, 09°35'E; Malende: 04°20'N, 09°26'E; Mamfe: 05°46'N, 09°17'E; Metet: 03°26'N, 11°45'E; Mueli: 04°23'N, 09°07'E; Ndoungue: --; Ngam: 02°47'N, 11°54'E; Nko: 04°27'N, 10°49'E; Okoiyong: 05°45'N, 09°22'E; Rumpi-Bergen: 04°50'N, 09°06'E; Sakbayémé: 04°02'N, 10°34'E: Victoria: 04°01'N, 09°12'E; Yaoundé: 03°52'N, 11°31'E

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New records of the rare Sokoke bushy-tailed mongoose, *Bdeogale crassicauda omnivora* in the coastal Shimba Hills National Reserve and at Diani Beach, Kenya

Thomas ENGEL & Harry VAN ROMPAEY

Introduction

The uncommon subspecies of Bushy-tailed mongoose, *Bdeogale crassicauda omnivora* Heller, 1913, known as the Sokoke bushy-tailed mongoose, has until now been suspected as occurring in the Shimba Hills National Reserve, south of Mombasa, Kenya (Schreiber *et al.*, 1989).

Pictures of a live specimen in its natural environment in the Shimba Hills NR were taken in June 1993 (Fig. 1). The animal was foraging on either queen termites or male driver ants (*Dorylus* sp.) along a cratered, rough road between a large, open grassland area (with bush and very small islands of forest) and a plantation of pine (*Pinus caribaea*), approx. 300 m from the Longomwagandi Forest. This indigenous relict forest is known to have one of the highest plant diversities on the East African coast.

After a few days of rain, emerged insects abounded and even the Silvery-cheeked hornbils (*Bycanistes brevis*) did not leave the forest area that evening, as is usual, but stayed catching insects in the air at sunset. The mongoose was spotted in car headlights at about 18.50 h. It was walking up and down the road, often rushing one or two meters up the road to catch crawling, wingless insects. Although the car engine was turned off and on several times so that the animal could be followed, and about 20 pictures were taken using a powerful flash at a distance of between approx. 6 and 20 meters, the mongoose was undisturbed, and continued to forage on the insects for about 20 mins, before disappearing into the darkness.

Description

Heller (1913) described the holotype from Mazeras as resembling *B. c. crassicauda* in its size and proportions, but with darker tail and feet (black rather than seal-brown), and a lighter body colour, due to the rarity of black-tipped hairs (the buffy underfur predominates, giving the coat a grizzled effect). Head and body: 420 mm, tail: 245 mm, hindfoot, 81 mm, and ear: 34 mm. Body weight averages 1.5-2 kg.

The bushy-tailed mongoose from the Shimba Hills NR had a very bushy, blackish tail, and short, black-haired legs. The rest of the body was more brownish, and not dark black. The eyes reflected silvery-white in the spotlight (Fig. 1).

The three male specimens known from Sokoke (now in the National Museum of Kenya, Nairobi) are comparatively paler and smaller, and their tails are less bushy.

Distribution

Kenya

The type locality of *B. c. omnivora* is Mazeras (03°58'S, 39°33'E), from which three specimens were collected in 1911 (NMNH-182699, 182275 [holotype], and 182281). Other specimens were collected in Kwale (04°10'S, 34°27'E; FMNH-85974), and the Arabuko-Sokoke Forest, ca. 20 km S of Malindi (03°14'S, 40°05'E; NMNH-318111; LACMNH-56749 and 56750, NMK-1596, 1597, and 290A). Taylor (1986) mentions having trapped three further specimens at Gedi, near Malindi (03°18'S, 40°01'E). The Los Angeles Museum holds at least one specimen each from Milmani (Boni Forest, close to the Somali border)(LACMNH-42940) and the Kipini area (02°31'S, 40°31'E). Both of these may belong to the subspecies *omnivora*.

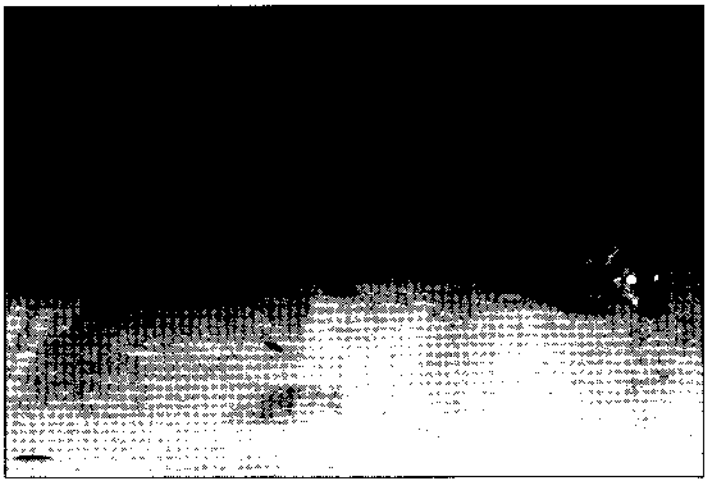

Fig. 1. Probably the first photo of a live Sokoke bushy-tailed mongoose, *Bdeogale crassicauda omnivora*. Photo: Thomas Engel.

Tanzania

Allen & Loveridge (1927, 1942) collected two specimens: one in Philipshof in the Usambara Mts. (MCZ-22615) and one in Magrotto (05°02'S, 39°06'E) (Fig. 2). In their 1927 paper they state that, according to the natives (Wakami), exactly the same species occurs in the Uluguru Mts. The Tanzanian specimens are blackish and may belong to *B. c. crassicauda* (Kingdon, 1977).

Museum abbreviations:
FMNH: Field Museum of Natural History, Chicago, IL, USA; **LACMNH**: Los Angeles County Museum of Natural History, Los Angeles, CA, USA; **MCZ**: Museum of Comparative Zoology, Cambridge, MA, USA; **NMK**: National Museums of Kenya, Nairobi, Kenya; **NMNH**: National Museum of Natural History, Washington, D.C., USA.

Status and competition

Bdeogale crassicauda is uncommon to rare and patchily distributed; the causes of this rarity are unknown. Kingdon (1977) suggests that its distribution is the result of a drying of the environment, and that its previous habitats were more forested. Thus, as the forests of East Africa receded, *B. crassicauda* became isolated and evolved from *B. nigripes*. Taylor (1986), on the other hand, argues that, if this model of speciation is true, one would expect either a much wider distribution of the species in isolated forests or, since it also occurs in rocky outcrops and bushy areas, a greater colonization of these types of habitat. As this has not been the case, he suggests that *B. crassicauda* may be an inherently rare species, and a rare component of the carnivore community.

In the Shimba Hills NR the bushy-tailed mongoose co-exists with the African civet (*Civettictis civetta*), the White-tailed mongoose (*Ichneumia albicauda*), the Marsh mongoose (*Atilax paludinosus*), the Slender mongoose (*Galerella sanguinea*), the Large-spotted genet (*Genetta rubiginosa*), and the Honey-badger (*Mellivora capensis*). All these species have been observed in the field by one of the authors (TE), who also sighted and photographed the Two-spotted palm civet (*Nandinia binotata*) in the Shimba Hills for the first time.

Little is known of the diet of *B. c. omnivora*. Allen & Loveridge (1927) baited a trap with meat. They found beetle remains in the stomach, and droppings, believed to belong to the species, contained crab remains. According to Ewer (1973) *Bdeogale*'s wide blunt-cusped molars and molarised carnassials suggest the predominance of vegetable foods in the diet. Although named '*omnivora*' (from *omnivorus*: eating everything) it would seem that the bushy-tailed mongoose is chiefly insectivorous, but may also take crabs, rodents, and other small prey.

Further observations

On the 2nd of February 1990, Dr. K. Bock found a dead mongoose on the road at Diani Beach (ca. 04°18'S, 39°33'E). Only hair samples were taken, but after microscopic examination, Dr. Bock noted that the 'banded hairs conform with illustrations in Kingdon' (1977) and identified them as coming from *B. c. omnivora*. Diani Beach is the region's main tourist resort. There are hotels along the beach, only a few small, natural patches of forest and bushland remain, and there are numerous local settlements between Diani and the Shimba Hills NR situated 20 km away in the hinterland.

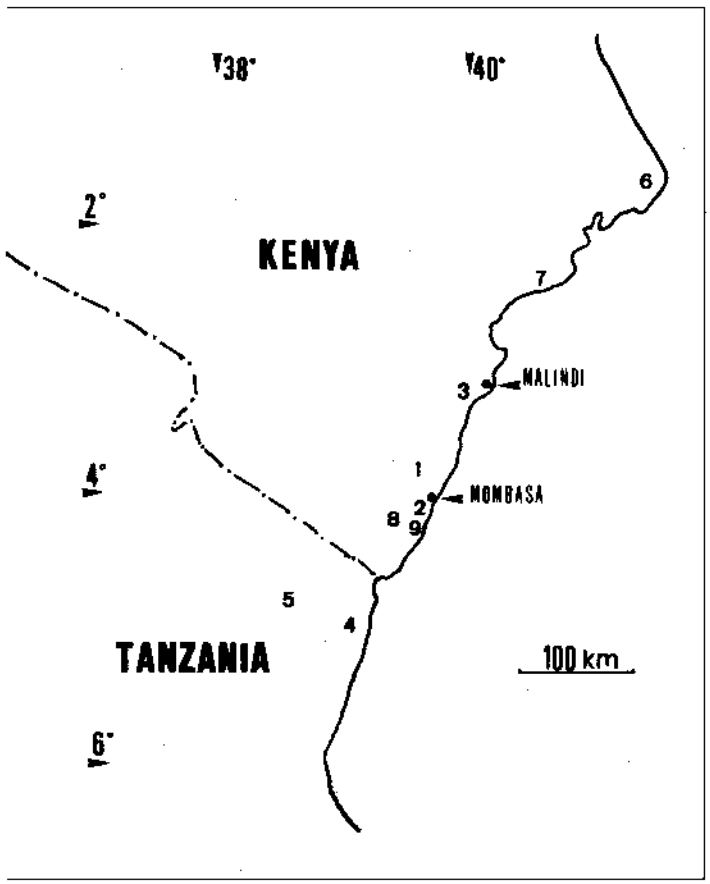

Fig. 2. Known records of *bdeogale crassicauda omnivora*.
1: Mazeras; 2: Kwale; 3: Arabuko-Sokoke Forest; 4:Magrotta; 5: Usambara Mts.; 6: Boni Forest; 7: Kipini; 8: Shimba Hills NR; 9: Diani Beach

According to the warden of the Shimba Lodge, Ishmail Kafuna, a bushy-tailed mongoose was noted on one of his game drives at Marere within the Shimba Hills NR ca 1992. Of the many mongoose observations made by TE during 1993-95, three may have been of *B. c. omnivora*. One of these was of an adult followed by a youngster. Another recent sighting was of a specimen, very similar to the one in Fig. 1, in the Longomwagandi Forest.

Conclusions

Few specimens of *B. c. omnivora* have been collected and, since it is endemic to the rapidly decreasing narrow coastal belt of forest, it is almost certainly endagered. Moreover, there are no records of it being kept in captivity (Schreiber *et al.*, 1989). The Shimba Hills NR is most important as the last major refugium for more than 1,100 higher plant species and an unknown number of animal species.

The discovery of the Sokoke bushy-tailed mongoose in the Shimba Hills increases the urgency of attempts to stop *Pinus* afforestation, which is replacing the natural vegetation in this important reserve (Schreiber *et al.*, 1989). Some of the plantations are established on former man-made grassland. Regeneration of natural forest in the plantation undergrowth is obvious, and would definitely take place on the grassland if burning to favour antelope grazing was stopped (the Sable antelope, *Hippotragus niger rooseveltii*, is now endemic in Kenya).

No further afforestation inside the Reserve should be permitted, and old plantations should slowly be transformed into natural forests.

Full protection, and probably an upgrading of the Reserve to National Park status, coupled with political stability, population and settlement control, increased awareness and moral sensibility among Kenya Wildlife staff, and a better equipped Forest Department (to stop illegal wood collecting) are the main essentials for the survival of the local fauna and flora, amongst which is the rare Sokoke bushy-tailed mongoose.

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Some data about the European mink *Mustela lutreola* distribution in the Lovat River Basin in Russia and Belarus: Current status and retrospective analysis

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Introduction

Research on the current distribution and numbers of the European mink plays an important role in assisting the survival of a species which is in danger of vanishing from the wild. The eastern part of the present range of the European mink is mainly in Russia. Whilst summarizing Russian research on the distribution of the European mink (Tumanov & Zveryev, 1986; Ryabov *et al.*, 1991; Tumanov, 1992; Rozhnov, 1993), it became clear that the centre of the eastern part of its range now lies mainly in the Tver, Smolensk and Vologda regions of Russia, and in the adjacent areas of the Novgorod, Pskov, Yaroslavl, Kostroma, and Ivanov regions. According to these workers, the extant European mink populations can be found in the upper parts of the basins of the Rivers Volga, Western Dvina and Northern Dvina, and along the entire lengths of the Rivers Msta and Lovat. The highest density of European mink was reported from the Tver region: here exist approximately 1.95 specimens per 1,000 ha (Tumanov, 1922).

Despite these assertions, our inventory of the status of European mink numbers along the courses of nine rivers (a total of 200 km) in the upper part of the Western Dvina River Basin undertaken in August-September 1993, revealed that the species has also become rare here, with an average density of between 0.5 to 2 specimens per 10 km of river (Sidorovich & Kozulin, 1994). This population density is typical of those populations in the north-west of Belarus (the Vitebsk region), where the species is known to be decreasing at present.

This observation underlines the need for European mink conservation organisations and specialists to pay special attention to monitoring decreases in the number of this species, as well as the rapid decrease in its distribution. However, questionnaires sent to hunters and field zoologists cannot be relied on as the main means of population monitoring, as is often the case in Russia (Tumanov & Zveryev, 1986; Tumanov, 1992; Rozhnov, 1993). Despite the huge size of the territory of Russia, mink monitoring requires regular inventories along specially selected rivers in the various river basins occupied by the species.

Based on the personal inventories made by the authors, the present paper attempts to give an overview of the current distribution of the European mink, and its abundance, in the basin of the River Lovat (the upper part of which is in north-east Belarus, and the rest in north-western Russia). Studies of the distribution and dynamics of the European mink in Belarus were carried out within the framework of the Nature Conservation Programme of the Institute of Zoology of the Belarus Academy of Sciences. Inventories for clarrifying the distribution of this vanishing species were initiated and financed by the European Mink Conservation and Breeding Committee (EMCC).

Study areas and terms

Within the territory of Russia (Fig. 1), the following rivers and glacial lakes in the basin of the River Lovat (running from south to north) were examined:

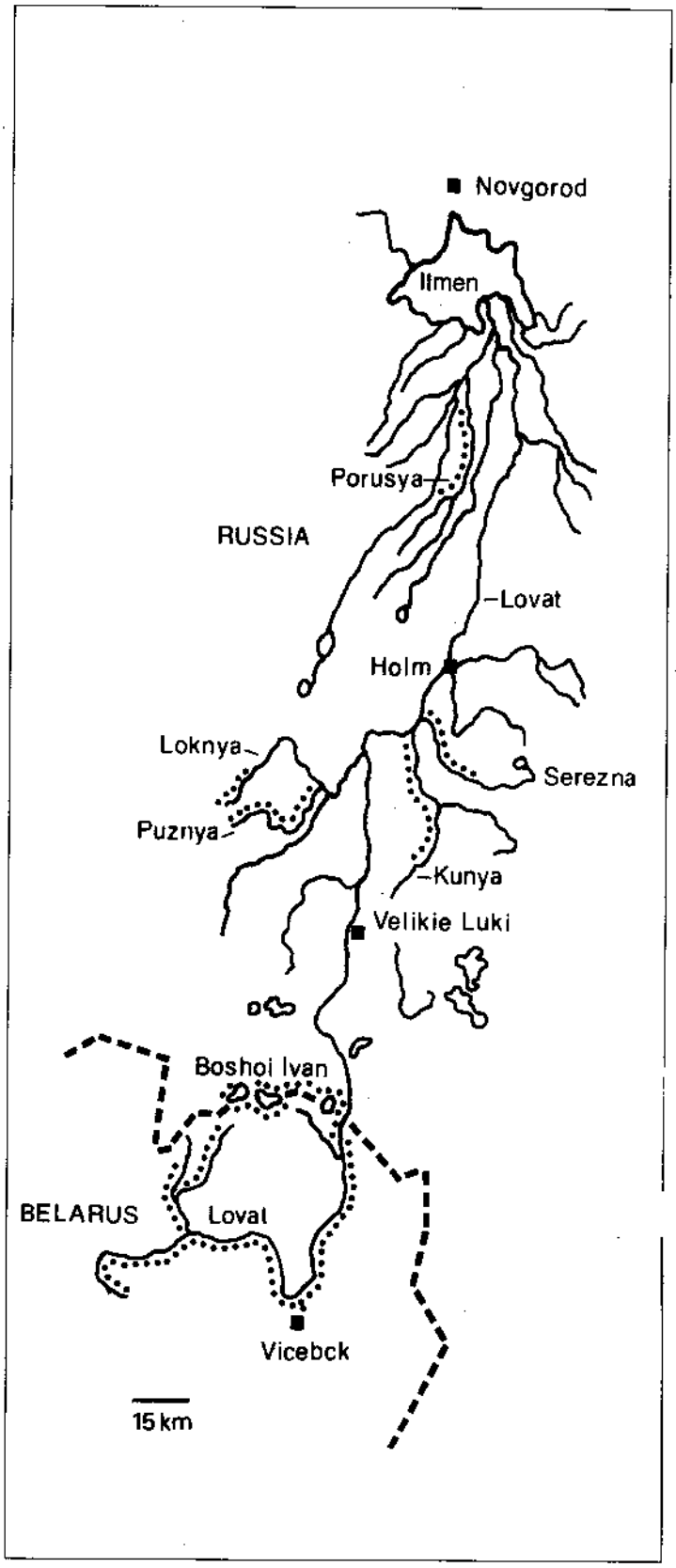

Fig. 1. Map of the waterbodies investigated in the Lovat River Basin (Russia, Belarus).
• • • • • • • • • • • • • • • • = investigated stretches of river.

1. The glacial Lake Sennitsa (9 km) and the small River Sennitsa (9km) in the Usvyat district of Pskov region, 26-29 July 1992;
2. A stretch of the River Lovat from the border of Belarus to the bridge on the Nevel-Velikije-Luki highway (85 km) in the Usvyat and Velikije-Luki Districts of Pskov region, 20-30 June 1990 and 30 July-6 August 1992;
3. The small River Zherstivitsa (19 km), the glacial Bolshoy Ivan and Karatay Lakes (combined area = 16 km) in Nevel district of Pskov region, 22-28 December 1993;
4. The glacial Lake Loknya (4 km) and the upper course of the River Loknya in Loknya district of Pskov region, 29-30 November 1993;
5. The small River Puznya, from its source to the village of Sinihhino (36 km), the glacial Lake Uzho (5km) and Lake Miritnitskoye (3.5 km), together with four more small glacial lakes on the River Puznya in Loknya district of Pskov region, 24-28 November 1993, 5-9 May 1994;
6. The small River Serezha from the village of Ploskosh to its mouth (44 km), and the medium-size River Kunya from the mouth of the River Serezha to the River Lovat (38 km) in Toropets district of Tver region, 24-29 June 1994;
7. The small River Porusya between the two bridges on the Holm-Staraya Russa highway (70 km) in Poddorsk and Staraya Russa districts of the Novgorod region, 1-5 July 1994.

In the territory of Belarus, regular studies have been undertaken on different aspects of the biology of the European mink (Sidorovich, 1992a, 1993) in the upper course of the Lovat River (Fig. 1) from December 1986 to May 1994. In case of snow-cover during the period from the end of November to the beginning of April, a census of the species was performed annually.

Census methods, and procedure for calculating the population densities of the European mink

If there was a snowcover in winter, censuses of mink (European mink and American mink) on waterbodies and in bank biotypes were based on methodologies suggested by Teplov (1952) and Ternovski (1973), taking all respects into account of the specific ecological character of the territories examined. On waterbodies where an ice sheet usually appears in the second half of winter, a census was carried out before the formation of this, as the animals are willing to use cavities under the ice as their permanent habitat, and thus rarely show on the snow surface; this would lead to deficiencies in the census results. Waterbodies and bank biotopes with a high density of mink were usually examined 2-3 days following snow-fall. We also attempted to avoid censusing mink after a sharp fall in air temperatures, as then the animals are usually inactive. In case of route censuses, trails were registered after brief tracking, so as to distinguish between the tracks of conspecifics. Mink population density was calculated per 10 km of watercourse length and, in case of stagnant waterbodies, per 5 km of bank length.

Unfortunately, it is very difficult to undertake precise censuses of mink in the snow-free period. For this reason, the population density data collected during such periods must be regarded as approximate. In the ice-free period, rivers of sufficient depth and the banks of glacial lakes were surveyed by kayak or by inflatable boat, allowing examination of all the parts of the bank that are favourable for mink. Shallow rivers and brooks were surveyed on foot, allowing observation of both banks and the recording of the presence and abundance of mink tracks. River stretches of 1-1.5 km in which a concentration of mink tracks were observed were considered to represent the home range of a single adult mink (if the tracks were not very abundant) or of a family group consisting of a female with kits (if the tracks were abundant and of various sizes). This is in full accordance with the literature on the relative extension of mink home ranges (Heptner *et al.*, 1967; Danilov & Tumanov, 1976). According to the results of Danilov & Tumanov (1976) and our own personal data (Sidorovich, 1993) it can be assumed that an average mink litter will consist of approximately 3.5 kits by the time of their dispersal. Based on this approximate information collected during the snow-free periods, we attempted to estimate the density of mink in the pre-reproductive period (March-April), as well as the probable density in the post-reproductive period, i.e. by the beginning of the hunting season (November). Such an approach can be considered as being suitable for expressing estimates of the number of mink on waterbodies during the snow-free period.

As far as possible, we attempted, using different information sources, to find out whether the American mink inhabits a particular waterbody, and what proportion of the population includes American mink. Information sources included: the questioning of local hunters, examination of mink pelts held by local hunters and fur purchasing organisations in district centres, the examination of mink skulls collected by local hunters for bounty payments, and calibrative live-trapping and visual observations. Existence of a white area on the upper lip, and the possesion of only one root on the first upper premolar were considered to be diagnostic features of European mink. In total, 104 (in Russia, 61) hunters were questioned, 227 (63) mink furs examined, and 149 (13) skulls. In addition, visual observations of 53 mink weres made at a sufficiently close distance. From these 53 animals, 11 American and 15 European mink were photographed or video-taped (in Russia, 23, 3 and 8, respectively).

We also attempted to use mink footprints to diagnose the presence of the two species (Sidorovich, 1994). The main character used was that the total area of the foot print of a European mink is considerably more filled by the prints of the digital and heel pads; this is because the pads are relatively larger in the European mink than in the American mink. Sidorovich (1994) also presents a methodology for differentiating between the tracks of mink and the polecat.

These sources of information allowed conclusions to be made on the presence of the American mink and, in cases of occurrence of the two species together, on the relative proportions of the two species. The degree of precision of the latter estimates ranges from sufficient to very approximate. The present paper assumes that if at least 15-40 mink are counted on a hydrographic system, and the specific identity of at least 10-25 individuals of these are determined accurately, these data can only be considered to be suitable for estimating the distribution of European and American mink within the region, but not for determining mink demography.

Ecological parameters of significance for the European mink were estimated for several of the waterbodies investigated. These parameters include the structure of the waterbody, its bank and flood-plain, and the population densities of other semiaquatic carnivores which interact with the European mink. Estimation of ecological parameters was carried out from topographic maps on a scale of 1:50 000, from special hydrological publications, and on the basis of visual estimates and measurements in the locality. The methodology for censusing the otter is presented by Sidorovich & Lauzhel (1992) and Sidorovich (1992c). The inventory of the beaver follows Kudryashov (1973).

Results and discussion

Current range and abundance of the European mink in the Lovat River Basin

The results of inventories of mink populations and clarification of their species composition, undertaken on the waterbodies in the basin of the Lovat River in Russia and Belarus in 1992-1994 are presented in Table 1 (where the studies were performed during snow-cover) and Table 2 (results obtained in the snow-free period). The data reveal that the European mink is currently distributed throughout the entire basin of the River Lovat. Larger populations of the species occupy the basins of small rivers in the central part of the Lovat Basin. These small rivers are: Nasva, Puznya, Loknya, Smerdelj, Serezha, Small Tuder, Big Tuder, Dobsha, Nosha, and the upper course of the medium-sized Polistj River. The population density of the European mink is still relatively high on these rivers; for example it is 3-5 individuals per 10 km during the post-reproductive period on the River Puznya and River Serezh. In the upper and lower parts of the basin of the Lovat River the population density of the European mink is considerably lower, from 0.5 to 10 individuals per 10 km.

From our data, the distribution of the American mink appears to be the inverse of that of the European mink. Whilst in the central part of the Lovat River Basin either only a few isolated American mink can be found (on the Rivers Loknya, Puznya, and Smerdelj) or the density of the species is still rather low (0.5-2 specimens per 10 km on Serezha and Kunya Rivers), a much higher density (2-8 individuals per 10 km in the pre-reproductive period and 3-13 in the post-reproductive period) can be seen in the upper and lower parts of the river basin.

Retrospective analysis of European mink distribution in the Lovat River Basin

According to Danilov & Tumanov (1976), between the years 1968 to 1972, the density of European mink on the River Porusya in Novgorod region was 5-8 individuals per 10 km of waterbody length, whilst the American mink was not yet present. About 25 years later (in 1994) the approximate density of the European mink was estimated at 0.5-2 individuals per 10 km and the river was mainly inhabited by American mink (about 80% of the mink population). The same paper (Danilov & Tumanov, 1976) also refers to a very high population density of the European mink (7-12 individuals per 10 km) in the basin of the River Loknya in Pskov region in 1968-1972. At present, the relevant characteristic for the Loknya and Puznya rivers is 3-6 individuals per 10 km. The first American mink appeared here only in 1993. The most probable reason behind this decline in the number of the European mink is excessive hunting, mostly by poaching. At the end of 1993, an average of 8 mink traps and 17 mink dens dug open by hounds and destroyed by hunters could be found per 10 km of the River Puznya. This was particularly noticeable near the villages of Kamenka and Sinihhino. Furthermore, evidence of mink poaching could also be observed in spring, i.e. in the reproductive period, which is particularly destructive for a population.

According to personal communications from a Russian mink researcher, Mr. Yevgeni Sautski (Novosibirsk), who visited a great number of fur-purchasing organisations in the Pskov, Novgorod, and various other regions of Russia in 1990, examining the furs purchased from local hunters (10-40 furs per administrative region), only European mink pelts were registered in the Usvyat, Velikije-Luki and Novosokolniki districts whilst there was a small proportion of American mink pelts in Nevel district. In 1992-1993, the proportion of European mink was 25-40% in Nevel district, but only 15-20% in the districts of Usvyat and Velikije-Luki.

In the case of the River Lovat in Belarus, where regular field research on the number of European mink has been carried out, the information needed is available from December 1986 onwards. Until 1989 this region was only inhabited by the European mink, living at a high density:

- between the glacial lakes on the River Lovat, near the village of Mezha: 3.3 individuals per 10 km of waterbody length;
- on small rivers: 4.0-10.0 (average 7.3) individuals per 10 km;
- on glacial lakes: 1.2-4.2 (average 2.2) individuals per 10 km.

Here, the first American mink was caught at the end of 1988. By the winter of 1989/1990, American mink pelts formed approximately 10% of the furs purchased (n=44). By spring 1991 they had risen to approximately 60% (n=82), and approximately 80% (n=66) by the spring of 1992. Currently, the proportion of European mink in the mink population of the region is smaller: different sources estimating it at between 6% and 17% (Table 1). The density of American mink has increased, with, for example, 5-14 specimens per 10 km on small rivers.

A brief analysis of European mink habitats in the Lovat River Basin

During the course of our studies in the Lovat river Basin we have been able to distinguish the following main European mink habitats:

- **Small rivers with lengths of <100km** (more often 10-50 km), usually with rapid flow, relatively high banks, and a narrow, non-waterlogged flood-plain. Small rivers or stretches of these with slow flow, low, waterlogged banks, and a wide marshy flood-plain are less common. Small rivers are the main habitats of European mink.
- **Brooks with a length of up to 10 km**, mainly with rapid flow and relatively high banks. European mink often inhabit quite small brooks (less than 2 km) throughout the year, whilst American mink only rarely inhabit such brooks, and then only for shorts period.
- **Medium-sized or large rivers**, mainly with moderate flow, high banks and a flood-plain characterized by medium width, a small degree of waterlogging, and a small number of floodplain waterbodies. Despite the abundant food sources, European mink less frequently inhabit such habitats. This is evident both from our data, but also from several other publications (Novikov, 1938; Novikov *et al.*,1970; Danilov & Tumanov, 1976).
- **Glacial lakes** are also permanent habitats of European mink in the upper and central parts of the Lovat Basin. In the lower, northern part of the basin, as well as in other northernly regions of Russia, European mink occur only infrequently on glacial lakes, and only during the ice-free period (Danilov & Tumanov, 1976).

From the data available for the Lovat River Basin, the disappearance of the European mink and the expansion of the American mink take place in the following sequence of the habitats described: medium-size to large rivers, small rivers with a length of over 10 km, brooks of 2-10 km, glacial lakes, brooks less than 2 km long. These brooks represent the last refuge of the European mink.

Data characterising populations of European mink on different waterbodies outside the area of significant co-occurrence of the American mink (the upper Lovat until 1989; Loknya

Tabel 1. Some data of mink census on waterbodies in the basin of the Lovat River (Russia, Belarus), winters of 1992 - 1994

Name and type of waterbody	Length of census Route, km	Number of minks	Density of minks	Approx. share of European mink in the population (%)
Glacial lake Uzho	5.0	2	2.0	100
Glacial lake Mirtnitskoye	3.5	1	1.4	100
Small river Puznya from Uzho Kamenka village (incl 3 small glacial lakes)	16.0	10	6.3	90 (1 Am. mink was found)
Puznya from Kamenka to glacial lake Nadvinskoye	10.0	3	3.0	100
Puznya from Nadvinskoye to Sinihhino Village	10.0	3	3.0	100
Whole Puznya river basin:				
our data				95
information of trappers				100
Glacial lake loknya	4.0	0	0	0
Smal river Loknuya	10.0	3	3.0	100
Glacial lake Bolshoy Ivan	11.0	3	2.7	67
Glacial lake Karatay	5.0	2	2.0	0
Small river Zherstivitsa up to Bolshoy Ivan	19.0	12	6.3	25
Zherstivitsa after Bolshoy Ivan	5.0	3	6.0	0
Whole Bolshoy Ivan waterbody system				
our data (n=20)				20
information of trappers				40
Upper lovat:				
Lovat from riverhead to Mahalovo village	20.0	16	8.0	7
Lovat from Mahalovo to mezha village	11.0	15	13.6	7
Small river Servaika	18.0	8	4.4	25
Small river Peschanka	14.0	12	8.6	8
Small river Shisha	11.4	6	5.5	33
Uzhovskiy brook	9.0	4	4.4	25
Sklyanka brook	6.0	2	3.3	50
Glacial lake Zavesno	2.0	1	2.5	100
Glacial lake Zadrach	3.0	2	3.3	0
Glacial lake Chernyasto	8.0	4	2.5	25
Glacial lake Sesito	10.0	3	1.5	67
Whole Upper Lovat				
our census data of 1992 - 1994 (n=76)				17

Tabel 2. Some data of mink census in Lovat River basin (Russia, Belarus), springs and sumers of 1992 - 1994

River name (length of census route)	number of mink home ranges (incl. family home ranges)	Average distance between home ranges	Approx. density of minks		Approx. percentage of the European mink in the mink population on the base of our data (trapper reporter)
			pre-repre. period	post-repr period	
medium-size river Porusya (70)	22 (12)	1-2	3.1	9.1	21%, n=24 (50%)
medium-size river Kunya (38)	8 (5)	2-3	2.1	6.7	82%, n=34 (90%)
small river Serezha (44)	18 (9)	1	47.1	11.3	82%, n=34 (90%)
small river Puznya (27)	14	0.5-2	5.2	?	93%, n=14 (100%)
medium-size river Lovat (85)	40 (22)	0.5-2	4.7	13.7	13%, n=40 (30%)
small river Sennitsa (9)	5 (2)	0.5-1	5.5	13.5	20%, n=5
Glacial lake Sennitsa (9)	2	4	1.1	1.1	20%

NOTES

1. Density of minks is given in individuals per 10 km of watercourse length, and in individuals per 5 km of bank length for non-flow waterbodies.
2. Only the most recent data are give.

Basin, 1993-1994; n=19), correlate some habitat factors and European mink population densities. Correlations were revealed between European mink population densities and (a) the rate of water flow in small rivers (r=0.76; P<0.01), (b) the degree of winding of the river (r=0.32; P>0.05), (c) current rate (r=0.30; P>0.05), (d) diversity of bank structures (r=0.58;P=0.01), among which high, steep overgrown banks, are the most important (r=0.46; P=0.05), and the existence of a waterlogged flood-plain (r=0.30; P>0.05). Clear correlations exist between European mink population densities and those of the beaver (r=0.74; P<0.01), as the latter species improves habitat conditions for European mink as well as for other semi-aquatic carnivores (Sidorovich, 1988, 1991). In addition, the following data refer to the importance of these ecological factors for European mink. Of the 78 individual European mink home ranges recorded on the Upper Lovat during the winters of 1986-1988, 59 (75.6%) coincided with the location of beaver lodges, and 68 (87.2%) were located on river stretches with relatively high, steep, forested banks. From the 67 animals counted on rivers and brooks, 47 (70.2%) were recorded near rapids (current >0.6 m/sec) and 41 on river stretches with strongly winding beds.

Conclusions

This study reveals that European mink are still relatively abundant on the tributaries of the River Lovat in the central part of the Lovat Basin. However, the process of the expansion by the American mink, which is already almost complete in the lower and upper parts of the basin, can also be observed. The competitive exclusion of the European mink by the American mink is proceeding very rapidly (within 5-10 years for a medium-sized river, as was observed on the upper Lovat, Sidorovich, 1992b). This rapid exclusion of the native mink is not only caused by the competitive advantages of the American mink (Danilov & Tumanov, 1976; Henttonen & Lahti, 1978; Maran, 1989; Sidorovich, 1992) but also, to a great extent, by effective reproductive regulation by the expanding American mink population (Sidorovich, 1922b, 1993). When subject to competitive expansion, European mink find their last refuges on glacial lakes and, in particular, on small brooks, whilst various types of small rivers serve as its main habitat when populations of the species are relatively stable.

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An innovative and selective live-trap for raccoons (*Procyon lotor*)

Gilbert PROULX

The Raccoon (*Procyon lotor*) is a well-known procyonid found in North America where it is indigenous (Kaufmann, 1982), and in Europe and Russia where it has been introduced (Redford, 1962; Beaufort, 1968; Roeben, 1975). It is an adaptable and successful species that inhabits forests near water, and areas of high human density where it finds abundant food and shelter (Kaufmann, 1982).

Raccoons often are subject to biological investigations aiming at developing proper conservation programs. Although ample information has been gathered on the raccoon's life history, there is need for further research on the species' social structure, and the animals' behavior and reproductive biology (Kaufmann, 1982). The cumbersome and relatively expensive box traps (25 x 81 x 81 cm and larger) are commonly used to capture, mark, and transport raccoons (Meyer, 1991; Endres & Smith, 1993; Taulman & Williamson, 1993). The animals may damage their feet and teeth on traps made out of wire mesh but these injuries can be minimized by constructing traps out of wood or plastic. However, a visible and odorant bait is often used to entice raccoons to enter box traps (Meyer, 1991) and this commonly results in the capture of "unwanted" animals such as cats (*Felis catus*), small dogs (*Canis familiaris*), rodents and birds. These "unwanted" animals often get hurt during their escape attempts and this is a source of concern for the general public (Defenders of Wildlife, 1984).

This paper reviews the characteristics of an innovative and harmless live-trap that selectively captures raccoons.

The EGG Trap

The EGG trap (EGG trap Co., Dr R. Thompson, Wagner, South Dakota, USA) consists of a 9 cm wide x 11 cm long plastic housing (Fig. 1). Through a 4 cm diameter opening, animals can reach with their paw the trigger situated mid-way within the housing. However, in order to fire the trap, animals must be able to grasp the trigger and pull on it. Therefore, digitigrade animals usually are unable to fire the trap. When the trigger is pulled, it releases a 5.7 cm long bar moving laterally within the housing that blocks the animal's paw. The EGG trap **is not** comparable to the highly controversial leghold trap where an animal's paw is clamped by two jaws closing on each other. Because the trap's plastic housing completely covers the blocked limb, the animals cannot damage their toes by scratching the ground, a common happening with box traps. The trap also protects the blocked limb from wrist torsion injuries.

Assessment studies

Proulx *et al.* (1993a) tested the EGG trap in simulated natural environments by setting it at an angle (to avoid the capture of small rodents) on a tree trunk and baiting it with marshmallow at its opening and on the trigger (Fig. 1). Their tests were first carried out with nine raccoons for a 12h capture period. In a second series of tests, nine raccoons were held captive for 24 consecutive hours. In all cases, the animals did not suffer any serious injuries. EGG-captured raccoons can easily be darted with an anesthetic or immobilized with a snare pole.

In Canada, Proulx (1990) found that the EGG trap baited with marshmallow and set on a tree was as efficient as the box trap to capture raccoons. Contrary to the box trap, it did not capture any "unwanted" species. In the United States, Proulx *et al.* (1993b) found that when the trap was baited with meat, it was also remarkably efficient in capturing raccoons. However, the bait attracted several carnivores and a few dexterous Virginia opossums (*Didelphis virginiana*) were captured. A cat also succeeded in firing the trap by pawing the trigger. A sweet non-meat bait such as marshmallow is therefore more appropriate in maintaining the high selectivity of the EGG trap for raccoon.

Conclusion

The box trap undoubtedly is a valuable means to capture raccoons. However, whenever there is a risk of capturing "unwanted" wild animals or peoples's pets, consideration should be given to the use of the EGG trap. The EGG trap is relatively inexpensive (approximetaly 10 US$) and, because of its small size, it can be set wherever a raccoon may live. Since it can efficiently capture raccoons without causing serious injuries, and reduce the number of "unwanted" species, the EGG trap is a valuable tool to use in any raccoon conservation program.

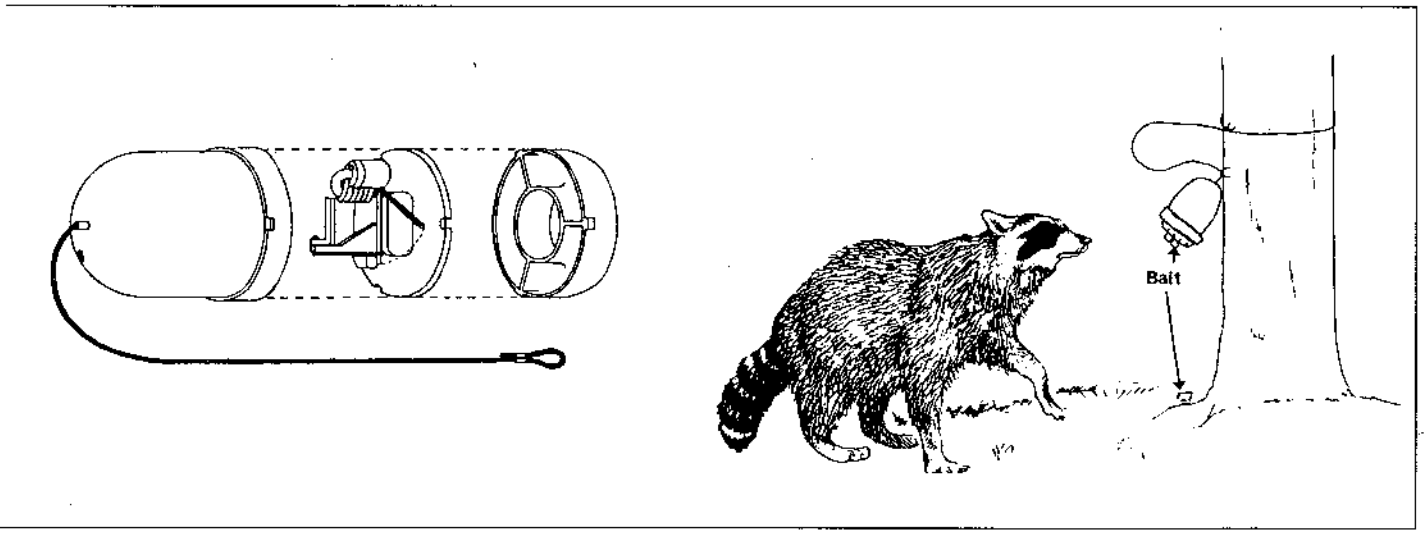

Fig. 1. Diagram of the EEG trap and its tree set.

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Small carnivore observations in Way Kambas National Park, Sumatra, Indonesia

From 20/10/94 until 26/10/94 I stayed at the Way Kanan Ranger Station in Way Kambas National Park. Way Kambas is a 130,000 ha park located in Lampung province in southeastern Sumatra. My purpose in the reserve was to evaluate the tourist potential of Way Kambas for the Philadelphia Zoo's travel program. During my stay I made following observations of small carnivores.

Oriental small-clawed otter *Aonyx cinerea*

One individual observed swimming in the Way Kanan River at 1500 on 21/10. One adult and four youngsters observed leaving the river and moving as a group through the forest after being disturbed by me at 0715 on 22/10. Otters were also heard on several occasions when I canoed down the Way Kanan.

Masked palm civet *Paguma larvata*, Common palm civet *Paradoxurus hermaphroditus*, and Banded linsang *Prionodon linsang*

All three species observed at 1830 on 23/10 foraging within 15 meters of each other around a tourist bungalow.

Small-toothed palm civet *Arctogalidia trivirgata*

I believe that I saw an individual cross a road at 0950 on 24/10. Payne *et al.* (1985) list this species as being usually nocturnal and arboreal. It was a reddish brown color with a very long tail in proportion to its body and had a very lean appearance. Joanne Reilly and Guy Spedding of the Way Kambas Elephant and Rhino project, stationed at Way Kanan told me that they often encounter banded linsang and on occasion binturong *Arctictis binturong* at night on the road from the Way Kambas Park entrance to Way Kanan station.

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Martens

Marterpassen I and *II.* 1993 and 1994. Werkgroep Boommarter Nederland van de Vereniging voor Zoogdierkunde en Zoogdierenbescherming, Apeldoorn, Holland.

This publication sums up the activities of the members of the 'Workgroup Pine Marten Holland' of the 'Society of Mammalogy and Mammal Protection'. It is at the same time a yearly report and a yearly newsletter. The publishers do not consider it as a journal, but more likely as an internal source of information. Each number contains at least ten notes/short papers on *Martes martes* as well as a literature list. All the texts are in Dutch.

Information and orders: VZZ, Emmalaan, 41, 3581 HP Utrecht, Holland.

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Large-spotted civet (*Viverra megaspila*). Photo by R. Wirth.

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