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Mustelid, Viverrid & Procyonid Specialist Group

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Red panda *(Ailurus fulgens)* - Photo: Ian Pryce

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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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Assessment on the current status of the Red panda in China

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The Red panda (*Ailurus fulgens*) is considered as a rare animal in China and, as such, is listed in Category II of the Wild Animal Protection Law. At the international level this species is listed on Appendix I of CITES.

The red panda is confined to the southern slopes of the Himalayas (Roberts & Gittleman, 1984; Glatston, 1989, 1994; Yonzon, 1989) and in China is endemic to the Hengduan and Himalayan mountains. Both subspecies, *A. f. fulgens* and *A. f. styani* can be found in China, however, subspecies *styani* is more typical of the region. *A. f. fulgens* is found through the Himalayas, in Tibet and the Gongshan area of northern Yunnan Province, as well as to the southern Nujiang River. *A. f. styani*, on the other hand, is confined to the Hengduan Mountains, in Sichuan and the eastern Nujiang River of Yunnan Provinces (Wei & Hu, 1993).

Radio-collaring the red panda. Photo: Fuwen Wei.

For a long time, there was not much exact information available on the red panda's status in China. At the request of the Endangered Species Scientific Commission and Endangered Species Import & Export Administrative Office, P. R. China, a survey was conducted about the "Assessment on Resources and Management Status of Red Panda in China" for the period 1994-1996. The possible range of red pandas was investigated during both years.

Current distribution

The red panda was distributed in China over a larger area than today, including western Sichuan and Yunnan, southern Shanxi and Gansu, northern Guizhou, and southwest of Tibet and Qinghai Provinces (Expedition Rare Animals in Sichuan, 1977; Feng *et al.*, 1986; Hu & Wang, 1984; Gao *et al.*, 1987; Kunming Institute of Zoology, 1989; Northwest Plateau Institute of Biology, 1989). However, its range retreated sharply and the red panda is now confined to Sichuan, Yunnan, and Tibet (Fig. 1).

Sichuan is the primary homeland of the red panda in China. In this province its range extends from the Daxueshan Mountains eastwards to Qionglai and the Greater Xingling Mountains, southwards across Lesser Xiangling into Greater Liangshan Mountains, westwards into the Shalulishan Mountains and northwards into the Minshan Mountains (Wei & Hu, 1993). This distribution encompasses six mountain ranges: Liangshan, Xianglin, Qionglai, Minshan, Daxueshan, and Shalulishan Mountains, and more than fifty counties (Table 1). However, the Liangshan and Xiangling Mountains contain the main red panda habitats.

In Yunnan red pandas are mainly distributed in the following mountains: Gaoligong, Meli Snow, Jiawu Snow, Biluo Snow, Yunlin, Haba Snow, Yulong Snow, and Dalou. Both subspecies occur in this province. *A. f. fulgens* is found to the south of Nujiang River, in the Dulong River Basin and in the Himalayan hills of the Gaoligong Mountains. This area is connected with Chayu, Tibet in the northwest and with Myanmar (Burma) in the southwest. *A. f. styani* is distributed east of Nujiang River. Its range includes eleven counties: Deqing, Baoshan, Tengchong, Lushui, Yunlong, Zhondian, Lijiang, Fugong, Bijiang, Yiliang, and Weixing (Table 1). In the past red pandas were reported in Xishuangbanna (Mongla county) (Gao *et al.*, 1987). This was not confirmed by our investigations.

Only *A. f. fulgens* is found in Tibet, where its range covers the counties of Mangkang, Changdu, Chuola, Nielamu, Linzhi, Milin, Bomi, Chayu, and Motuo (Table 1)(Feng *et al.*, 1986; Wei & Hu, 1993; Yin & Liu, 1993). Our researches indicate that there are no red pandas in Jilong, Dingri, or Yadong counties where they were reported in the past (Feng *et al.*, 1986). Furthermore, there were no signs of red pandas in Cibagou (Chayu county) and Mangdu county which were formerly areas where red pandas could be seen easily (Yin & Liu, 1993).

Current habitat status

According to our survey there are 76,245.5 km^2 of forest within the current distribution of the red panda. Sichuan has a total of 35,088.3 km^2 (including 7,596.8 km^2 in the Minshan Mountains, 7,681.3 km^2 in the Qionglai Mountains, 8,191.3 km^2 in the Lianghan Mountains, 4,280.4 km^2 in the Xiangling Mountains, 2,845.8 km^2 in Daxueshan , and 4,492.6 km^2 in the Shalulishan Mountains), while Yunnan and Tibet have 21,658.1 km^2 and 19,499.1 km^2, respectively (Table 1).

Our recent research on red panda ecology shows that this species exhibits a clear preference for particular habitats (Wei *et al.*, 1995; Wei, 1997). This means that not all forest areas are suitable for red pandas. In Sichuan Province, red and giant pandas (*Ailuropoda melanoleuca*) are sympatric and their habitat requirements are similar (Wei, 1997). In the period 1984-87, a study was made of the habitat requirements of the giant panda by the Ministry of Forestry of China cooperating with the WWF. This study demonstrates that, although the total forest available to the giant panda was 28,331.8 km^2, it used an area of only 13,921.52 km^2, i.e. 49.1% of the total forest cover (Wang, 1989). If we use this figure to estimate the area of red panda habitat in China, we find a probable area of 37,436.9 km^2 (17,228.4 km^2 in Sichuan Province, 10,634.2 km^2 in Yunnan Province, and 9,574.2 km^2 in Tibet)(Table 1).

Current population status

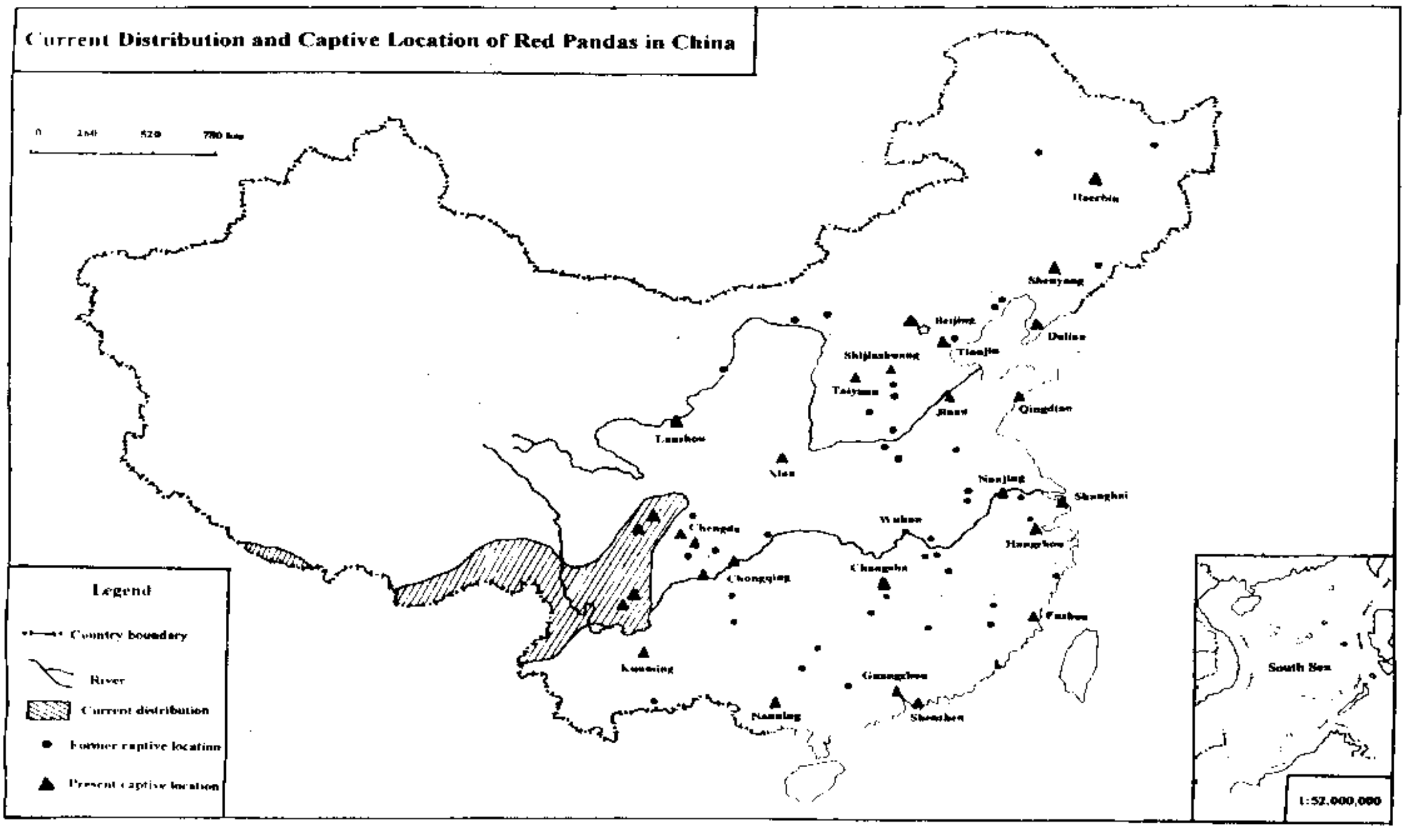
Relative density of red pandas was surveyed by investigation through feeding signs and droppings left by the animals in different counties of Sichuan, Yunnan, and Tibet. We classified the density in different counties in four categories: high, medium, low, and very low (Table 1).

During the past few decades, the number of red pandas has declined rapidly due to increasing human activity and massive habitat loss. It is estimated that their numbers may have decreased by as much as 40% over the last 50 years. Total population numbers estimated are about 6,000-7,000 red pandas in China (3,000-3,400 in Sichuan, 1,600-2,000 in Yunnan, and 1,400-1,600 in Tibet).

Fossil evidence indicates that red pandas formerly occurred in the Wufeng area of Hubei Province, the Xichou area of Yunnan Province, and the Fuminhe River and Zijin areas of Guizhou Province (Xu *et al.*, 1957). No red pandas are found in these areas today. To date, pandas have become extinct in Shanxi, Gansu, Qinghai, and Guizhou, and have disappeared from parts of the Qingchuan and Jiangyou counties of Sichuan Province. Only a few red pandas can be found in Yangliuba of Pinwu county, the region which was the type locality of Styan's panda (Wei & Hu, 1993). In the 1960s, red pandas were found in the Lushan area of Xichang in Liangshan Mountains, but they are now extinct.

Deforestation is the fundamental threat to red panda habitat. For a long period, annual forest consumption was much higher than annual forest growth. This led to a sharp decline in forest resources. According to the literature, there were 121 forestry enterprises with over 70,000 staff active in Sichuan province at the end of 1985 (Li & Yang, 1990). In the years between 1958-1960, the cut lumber stock of the Chuanxi Forestry Bureau was 929,000 m^3, 910,000 m^3, and 822,000 m^3 respectively, and timber production reached 359,800 m^3, 362,400 m^3, and 549,000 m^3 (Liang, 1990). From these data the scale of tree felling over the whole province can be imagined. According to some statistics, 200 million m^3 of forest resources were consumed during a 25 year period in Aba Autonomous Area of Sichuan Province. This constitutes 58.8% of the total forest growth and gives an annual forest consumption four times as high as the annual forest yield. It is predicted that, if tree felling continues at the same rate, Aba will be totally clear-felled by the end of this century (Liang, 1990). In Ganzi Autonomous Area of the same province, 120 million m^3 of forest resources were consumed over 30 years, which is 28% of current forest growth (Li & Yang, 1990). In Liangshan, another prime area for the red panda, 23.8 million m^3 of forest resources were swallowed up over the last 35 years. This constitutes 10% of current present forest growth (227.07 million m^3). In the Sichuan part of the red panda's range, 22 big forestry enterprises consumed up 3,597.9 km^2 of red panda habitat in the last 25 years. This represents 20.9% of current red panda habitat in Sichuan. The rate of forest loss in the upper region of Min river, prime red panda habitat, declined from 30% in the 1950s to 18.8% in the 1980s (Li & Yang, 1990). Similarly, forest loss in the Ya'an region has declined by 25%, by 14.1% in Mianyang, by 12.4% in Leijiang, by 13.2% in Nanchong, and by 15% in Wanxian (Liang, 1990). However, the situation is improving gradually. Today the Chinese government is also paying more attention to afforestation. According to current data, the total area of reafforestation in western Sichuan is over 70,000 ha. Total reafforested areas now cover 200,000 ha in the same area (Liang, 1990). This represents a very positive step towards maintaining forest cover. However, it must be remembered that forest renewal is a long process and that man-made forests may not easily lend themselves to habitation by red pandas.

Poaching is another threat to red pandas, as their fur is used to make hats and clothing by local people. The fur-hat with its long, luxurious tail at the back looks beautiful and warm. In Zhongdian of Yunnan Province, this type of hat is still needed by newly married couples as it was regarded as a talisman for a happy marriage in the past. During our investigations in the field we still found some people wearing this type of hat in different areas. The exact number of people with such hats is difficult to estimate. The purchase of red panda skins was quite prevalent in the past. For example, 29 pelts were sold in the period 1979-1981 in the Mianning county of Sichuan Province where we conducted our ecological study recently (Yu *et al.*, 1983). In Tibet, some 200 skins were sold on an annual basis in the 1970s (Yin & Liu, 1993).



Current Distribution and Captive Location of Red Pandas in China

Table 1 Distribution, relative density and habitat of red pandas in different mountains of Sichuan, Yunnan and Tibet

Province	Mountains	Density Category	Distribution Counties	Forest (Km²)	Habitat (Km²)
Sichuan	Minshan	Very low	Pingwu, Beichuan, Anxian, Mianzhu, Shifang, Nanping, Pengxian, Songpan, Rouergai	7596.81	3730.0
	Qionglai	High	Wenchuan, Baoxing, Tianquan	2401.46	1179.1
		Low	Dayi, Lushan, Lixian, Xiaojing, Danba, Kangding, Luding, Chongqing, Qionglai	5279.87	2592.4
	Xiangling	Medium	Hongya, Mianning, Shimian, Hanyuan	3200.21	1571.3
		Low	Emei, Rongjing	1536.68	754.5
	Liangshan	High	Yuexi, Mabian, Meigu, Ebian, Lebo	3454.45	1696.1
		Medium	Zhaojue, Dechang, Puge, Xide, Ganluo	2835.31	1392.1
		Low	Jingyang, Butuo, Miyi, Huidong, Ningnan, Huili, Yanyuan	1445.12	709.6
	Daxueshan	Low	Yajiang, Jiulong	2845.81	1397.4
	Shalulishan	Low	Xiangcheng, Daocheng, Muli, Yanbian, Litang	4492.62	2205.9
Yunnan		Medium	Gongshan,, Lushui, Fugong	3066.70	1505.8
		Low	Deqing, Zhongdian, Weixi, Lijiang, Lanping, Yunlong, Baoshan, Tengchong	18287.40	8979.1
		Very low	Weixin, Yiliang	304.00	149.3
Tibet		Low	Linzhi, Milin, Motuo, Bomi, Chayu, Cuona, Mangkang, Changdu, Nielamu	19499.10	9574.3
Total		4	73	76245.54	37436.9

In Changdu, Tibet, alone 148 skins were sold in the period 1968-1971. In the 1970s more than 400 red pandas were caught in the eastern forests of Tibet (Feng *et al.*, 1986). The data above are remarkable, as they indicate that hunting and poaching pressure were severe especially for a declining population. This not only leads to an even greater decline of red panda numbers, but also to extinction in some areas. For example, today it is difficult to discover any trace of the red panda in the Chibagou of Chayu county or the Xiaochangdu of Mangkang county, Tibet (Yin & Liu, 1993). Red pandas in Qingchuan county and the Wanglang Natural Reserve of Pingwu county also disappeared at the end of the 1950s (Wei & Hu, 1993). Our present investigation shows there are probably only 10-20 individuals in Yangliuba of Pinwu county (the type locality of *A. f. styani*).

Red pandas are exquisite and beautiful with high exhibition value. Trapping for exhibition at different zoos had a great negative impact on the wild population in the past. Before 1974 they could be purchased freely because Wildlife Protection Laws had not been drawn up. Zoos have purchased large numbers of red pandas at their native lands since 1950. According to incomplete statistics, zoos in Sichuan have purchased over 1,000 red pandas since the 1950s. Zoos in Yunnan Province purchased more than 500 wild-caught specimens.

Captive status

Between 1936 and 1938, a Mr. Smith, an English banker called the 'Panda king' in the west, took a great interest in wildlife collecting while living in Shanghai. He often travelled to the giant panda's range and caught and shipped 12 live giant pandas to the west. He also trapped two live red pandas and after exhibiting in Shanghai Zhaofeng Park for a year shipped them to the USA. Thus Zhaofeng Park was the first place to exhibit red pandas in China and the USA became the western country that exhibited red pandas. After the Chinese liberation in 1949, Chengdu Zoo exhibited red pandas in February 1953. Two months later, Beijing Zoo exhibited red pandas in May 1953. According to our investigation, a total of 74 institutions have held pandas since the 1950s. Only 30 institutions (with ca. 250 red pandas) are left in China (map).

The breeding program of red pandas in China has made great progress since 1954. Beijing Zoo first successfully bred one litter with two babies in June 1954. Though this litter did not survive this was the first hand-raising breeding record in China. Shanghai Zoo successfully bred and raised a red panda in 1961. Chongqing Zoo successfully bred and raised red pandas: From 1972 to 1994, 173 young of 87 litters were born, 74 cubs survived (survival rate 42.8%). Since the middle of the 1970s and particularly from the 1980s over 20 zoos or reserves in China succeeded in breeding red pandas. These include following 18 zoos and reserves: Beijing Zoo, Shanghai Zoo, Chongqing Zoo, Chengdu Zoo, Kunming Zoo, Nanjin Zoo, Hangzhuo Zoo, Shijiazhuang Zoo, Zhongshan Park, Lanzhou Wuquanshan Zoo, Wuhan Zoo, Taiyuan Zoo, Wuxi Zoo, Hubei Huangshi Park, Nanchang Zoo, Lushan Huajin Park, Xi'an Zoo, and Wolong Natural Reserve.

Conservation status

Today the Chinese government pays much more attention to wildlife protection, and it has launched a series of laws and regulations to preserve rare animals and plants. These include the National Constitution, the Criminal Laws, the Wild Animal Protection Law, the Forestry Law, and the Environmental Protection Law. The red panda is listed in Category II of the Wild Animal Protection Law. This means that red pandas cannot be caught or hunted without a permit from the Ministry of Forestry or its duly delegated authorities. If red pandas are needed for scientific research or for exhibition in zoos, a lot of procedures must be completed to get permission. Anyone who hunts, catches, sells, or trades red pandas without a permit from the provincial wildlife authorities is severely punished.

In addition, the Chinese government has established many national reserves as refuges for wildlife. To date 31 reserves have been established within the red panda's range: 18 in Sichuan, 7 in Yunnan, and 6 in Tibet. These reserves together protect 15,864.94 km^2 of red panda habitat, 6,561.1 km^2 in Sichuan, 6,946.3 km^2 in Yunnan, and 2,357.54 km^2 in Tibet (Table 2). This represents about 42.4% of the red panda's habitat in China. From our survey it can be seen that the densities of red pandas in these reserves are much higher than in areas outside of them. This indicates that these nature reserves have played an important role in the conservation of the red panda.

Table 2 Protected areas of natural reserves within red panda's ranges in China

Province	Reserve Name	Location(county)	Date	Area(Km^2)	Total
	Jiuzhaigou	Nanping	1978	600.00	
	Baihe	Nanping	1963	200.00	
	Huanglongsi	Songpan	1983	400.00	
	Xiaozhaizi	Beichuan	1979	67.00	
	Wolong	Wenchuan	1985	2000.00	
	Fengtongzhai	Baoxing	1975	400.00	
	Labahe	Tianquan	1963	125.00	
	Mabian Dafengding	Mabian	1978	300.00	
Sichuan	Meigu Dafengding	Meigu	1978	130.00	6561.1
	Baiyang	Songpan	1994	582.90	
	Sier	Pingwu	1994	189.70	
	Piankou	Beichuan	1994	197.30	
	Wujiao	Nanping	1994	371.00	
	Qianfushan	Anxian	1994	172.30	
	Moshui	Lushan	1994	317.90	
	Anzihe	Chongqing	1994	101.00	
	Yele	Mianning	1994	247.00	
	Washan	Hongya	1994	160.00	
	Gaoligongshan	Baoshan, Tengchong, Lushui	1986	1239.00	
	Tianchi	Yunlong	1983	66.30	
	Baimaxueshan	Deqin	1988	1879.77	
Yunnan	Nujiang	Gongshan, Fugong	1986	3254.33	6946.3
	Habaxueshan	Zhongdian	1984	219.08	
	Yulongxueshan	Lijiang	1984	260.00	
	Haizhiping	Yiliang, Weixin	1984	27.82	
	Gangxiang	Bomi	1985	46.00	
	Motuo	Motuo	1986	62.62	
Tibet	Chayu	Chayu	1985	101.40	2357.5
	Zhangmukouan	Nielamu	1985	68.52	
	Mangkang Golden Monkey	Mangkang	1990	1853.00	
	Linzhidongjiou	Linzhi	1990	226.00	
Total	31				15864.9

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Literature

Expedition Rare Animals in Sichuan. 1977. Report on the rare animal species in Sichuan. Sichuan Forestry Bureau. Chengdu. (In Chinese)

Feng. Z., Cai, G. & Zheng. C. 1986.*Mammals in Tibet*. Science Press. Beijing. (In Chinese)

Gao. Y. *et al.* 1987 *Fauna Sinica. Mammalia. Vol. 8. (Carnivora)*. Science Press. Beijing. (In Chinese)

Glatston. A. R. 1989. *Red panda biology*. SPB Academic *Publishing*, The Hague.

Glatston. A. R. 1994. *Status survey and conservation action plan for procyonids and ailurids. The red panda, olingos, coatis, raccoons, and their relatives*. IUCN, Gland.

Hu J. & Wang. Y. 1984. *Fauna of resource animals in Sichuan. Vol. 2. Mammals*. Sichuan Science & Technology Publishing House. Chengdu. (In Chinese)

Kunming Institute of Zoology. 1989. *Animal Fauna*. Annals of Yunnan Province. Vol. 6. Yunnan People's Publishing House, Kunming. (In Chinese)

Li C. & Yang. Y. 1990. Status and assessments of forests in southern Sichuan Province. Pp. 573-586 *in* Li. C., ed. *Forest ecology in Sichuan*. Sichuan Science & Technology Publishing House, Chengdu. (In Chinese)

Liang. H. 1990. Overview of deforestation and afforestation in southern Sichuan Province. Pp. 513-536 *in* Li. C., ed. *Forest ecology in Sichuan*. Sichuan Science & Technology Publishing House, Chengdu. (In Chinese)

Northwest Plateau Institute of Biology. 1989. *Qinghai fauna*. Qinghai People's Publishing House, Xiling. (In Chinese)

Roberts. M. S. & Gittleman. J. L. 1984. *Ailurus fulgens. Mamm. Species* 222:1-8.

Wang. M. 1989. Survey reports on habitat of giant pandas in China. Sichuan Forestry Bureau. (In Chinese)

Wei. F. 1997. Habitat selection, foraging and energetic strategies of giant and red pandas in Xiangling Mountains. Ph.D. dissertation. Institute of Zoology, Chinese Academy of Sciences. (In Chinese)

Wei. F. & Hu. J. 1993. Status and conservation of red pandas in Sichuan. Pp. 56-60 *in* Xia. W. *et al.* eds. *Changes of mammal resources under human activities*. China Science & Technology Publishing House, Beijing. (In Chinese)

Wei. F., Wang. W., Zhou. A., Hu. J. & Wei. Y. 1995. Preliminary study on food selection and foraging strategies of red pandas. *Acta Theriol. Sin.*, 15(4): 259-266. (In Chinese)

Xu. Y., Li. Y., Xue. X. 1957. Mammal fossils in the Pleistocene at Zijin of Guizhou Province. *Acta Palaeontol. Sin.*, 5:342-350. (In Chinese)

Yin. B. & Liu. W. 1993.*Rare wild animals and the conservation in Tibet*. Chinese Forestry Publishing House. Beijing. (In Chinese)

Yonzon. P. B., 1989. Ecology and conservation of red panda in Nepal Himalyas. Ph. D. thesis. Univ. Maine. Orono. USA.

Yu. Z., Yu. Z., Sha. S., Deng. Q. & Cui. Y. 1983. Natural reserves in Sichuan. Pp. 573-586 *in* Gan *et. al.*. eds. *Sichuan agriculture division*. Sichuan Social Science publishing House. Chengdu. (In Chinese).

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Long-term latrine use by Rusty-spotted genet *Genetta rubiginosa* in Kenya

Thomas R. ENGEL

Introduction

The Rusty-spotted genet *Genetta rubiginosa* (sensu Crawford-Cabral & Pacheco, 1989 (1992); also Crawford-Cabral, 1981 [Van Rompaey, pers. comm.]; probably syn. *G. tigrina rubiginosa* Pucheran, 1855 syn. Large-spotted genet *G. tigrina* sensu lato, compare also e.g. Wemmer, 1977; Crawford-Cabral, 1980-81; Skinner & Smithers, 1990) is one of the viverrids (and herpestids) using latrine sites. So far, latrine use by "Large-spotted" genets was mentioned, e.g. by Haltenorth & Diller (1988), Stuart & Stuart (1988,1994), and near nest holes by Apps (1992). Use of dung middens is also known for the Common genet *G. genetta* (e.g. Roeder, 1980a,b; Stuart & Stuart, 1988,1994; Apps, 1992; Jordano, 1992; Palomares, 1993). Nevertheless, field data and detailed descriptions on latrine use seem rare for the rusty-spotted genet.

During a study on natural forest regeneration and comparative seed dispersal more than 50 basically viverrid/African civet (*Civettictis civetta*) latrine sites were discovered (pers. unpubl. data). However, at two exposed latrine sites, defecations were never caused by African civet, but by smaller viverrids or herpestids. At this two latrines huge accumulations of seeds and other food remains were recorded for more than two and half years until the frugivore species causing these particular seed depositions became finally known.

This paper examines the visitation and use of these two exposed latrine sites by genets, and part of their ecology will be discussed. Attempts and methods to prove genet presence are mentioned.

Material and methods

Investigations were carried out in the Shimba Hills National Reserve (near Mombasa, coastal Kenya, approx. 04°14,5'S, 39°22,5'E). Two latrine sites, a concrete roundabout (approx. 1 m high in centre) south of Makadara Forest at the crossing to Pengo Hill and the concrete floor inside Pengo Hill Lookout building were examined and regularly controlled from June 1993 up to 1996. At these two latrine sites, situated approx. 250 m away from each other, available defecations were either recorded at the site or collected each month. Occasionally, the sites were checked even twice during day and night. If highly frequented, defecation units were marked with a permanent pen on the floor to avoid double-counting. All accumulated faeces were removed irregularly in 1993, but basically every month in 1994 and 1995. In case of few weeks absence, material was kindly collected by S. Thießen and J. Kamaleh, or older defecations were backdated as far as possible. For September 1994, last records were taken mid-month; the next recording took place on 1/11/94.

Identification of the latrine visitors was attempted by exposing smoothed sand and loamy soil around the latrine sites to obtain foot prints, by direct observation (which included use of night vision), by setting electric camera traps (i.e. infrared movement sensors, switchboards, trembling sensors combined with fishing rope as trip wires) for several hundred nights, and by setting traps (for several weeks in total) nearby the latrines. Traps were approx. 1 m long tunnels of wood (close type) or wire netting (open type). Bait in the traps was renewed daily and usually consisted of banana or mango, papaya, meat and egg. Further, a total of up to seven traps were set on the ground at other areas of various habitat types for several hundred nights and days.

Results

Evidence of genet. Footprints, some probably belonging to genet were observed on many nights on the sandy road nearby and on few occasions on soil exposed at the two latrine sites. One automatically-taken picture showed a Rusty-spotted genet actually visiting the latrine site on the roundabout (Fig. 1), another showed a genet visiting the latrine in the Pengo Hill building (Fig. 2). Only seven times were genets caught at night in traps in the Makadara forest (three individuals, one twice) and in Marere bushland (three individuals), but never close to a latrine site or in the grassland (where they were seen on roads as well). All recorded genets had comparatively large and rusty (but black surrounded) spots and a black tipped tail (resembling the whole type from drawing no. 268 in Skinner & Smithers, 1990).

Regularity of defecation. In total, 514 defecations were collected within a period of 31 months from the two sites (compare Fig. 3). Faeces deposition followed no regular daily scheme and was irregular over months and years. The number of defecations ranged from zero to 29 per site/month and varied between the sites. Apart from June 1994 (finding uncertain), during one month at least one of the latrines always carried defecations, but for a few months no new droppings were found at one of the two sites (compare Fig. 3). Occasionally, more than one fresh dropping was deposited at one site during one night and the contents differed - though not always. Sometimes both sites had fresh defecations with either similar or different composition/content.

Fecal contents. 74 % of 519 defecations (incl. one of four from trapped animals, and one from a further roundabout from June 1994) from the field carried diaspores which usually made up the bulk of the content, when present. 82 % of 519 defecations (including such with diaspores) had remains of arthropods (basically insects), small mammals and green grass leaves, among a few other food items (details see Engel, 1998). In total, diaspores of 35 plant taxa were found in 519 field defecations from the latrines including one taxon from one of four defecations of trapped genets.

Discussion

Was it always genet? At the two sites, the occasionally observed weak foot prints did not allow unambiguous specific identification (compare also Stuart & Stuart, 1988,1994; Skinner & Smithers, 1990; Walker, 1992), other small and similar viverrids and herpestids being present (Glover, 1968; Engel, 1996), and direct observation of the visitors having failed. During more than 1000 days and nights of presence in the field, genets and African civets were each sighted only approximately 10 times in the park; whereby White-tailed mongooses were seen slightly more often at night, but all other species were encountered less often (all

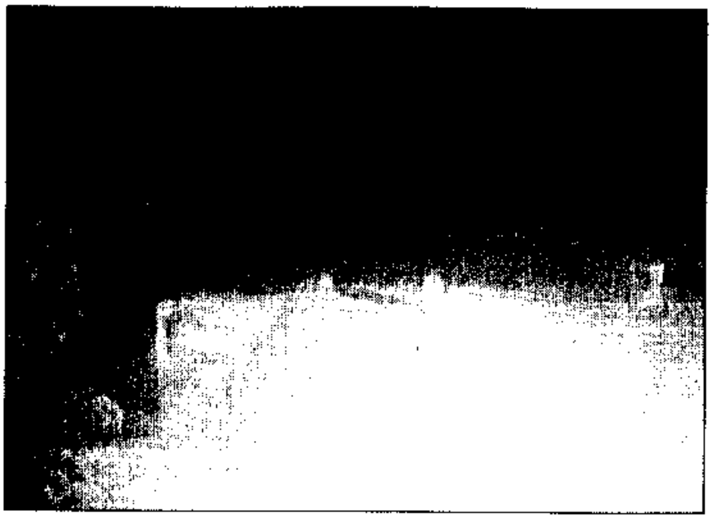

Fig. 1. Rusty-spotted genet visiting the latrine on the roundabout. The condensed water on the lens of an automatic camera trap indicates activity between late after midnight and before dawn in the clear, dry night at an exposed site.

Fig. 2. Rusty-spotted genet leaving the latrine at the Pengo Hill Lookout building (enlargement from wide-angle picture taken by movement sensor trap).

viverrids and herpestids mentioned in this paper were never seen in the field during the daytime). The two pictures of genets visiting the latrines per se, finally obtained by a trip wire and an infrared movement sensor photo-trap, cannot exclude other species causing the droppings as well. Unfortunately, the photographed genets did not defecate these nights probably due to disturbance by the flash light. Nevertheless, the defecations of interest always happened at night and were undoubtedly caused by nocturnal viverrids or herpestids. The more arboreal Two-spotted* palm civets (*Nandinia binotata;* *the two trapped animals had no white spots), which were also trapped and kept, probably stay in forests, were never observed on roads outside the forests and seem more frugivorous (e.g. Charles-Dominique, 1978; also Estes,1991). Apart from the two-spotted palm civet, the co-occurring small herpestids like the white-tailed mongoose (few unpubl. data of fecal analysis and feeding experiments), the rare Sokoke bushy-tailed mongoose (*Bdeogale crassicauda omnivora;* Engel & Van Rompaey, 1995; Engel 1996), the diurnal Slender mongoose (*Galerella sanguinea;* Estes, 1991) and the Marsh mongoose are – as far as is known – less frugivorous (compare e.g. Estes, 1991; Skinner & Smithers, 1990 – though, Haltenorth & Diller (1988) mentioned fruit as an (exceptional?) part of the diet also for these species [apart from *Bdeogale* spp.]).

Faeces found on the roundabouts and in the Pengo Hill building were too different in their general composition and contents spectra from those of well-known African civet, primate and most other droppings. Apart from the two-spotted palm civet (Skinner & Smithers, 1990), genets are most adapted to climbing and jumping on the roundabout, which might be more difficult for other co-occurring terrestrial species. Furthermore, all of over 50 investigated basically African civet latrines were always at ground level inclusive one close to the Pengo Hill roundabout. Whether another species "*Genetta genetta neumannii* Matschie" (probably syn. *G. genetta* sensu Crawford-Cabral, 1981) occurs as observed by Glover (1968) and his team is unknown; however, though they recorded other viverrids and herpestids as well, they did not record and prove *G. rubiginosa* (or syn. *G. tigrina,* etc. by that time). In conclusion, for the defecations at the two sites considered here as belonging to genets, the tracks and the size, smell, contents and constitution of the droppings resembled the ones obtained from trapped genets, and the defecations were all similar amongst each other, but different from faeces of most other frugivores. According to their known habits, other species can be excluded (almost certainly, see above) and evidence of latrine visitation was exclusively achieved twice for rusty-spotted genets only.

Latrine use. The extremely low number of only two successful pictures does not necessarily reflect the frequency of latrine visitation (even without defecation). On several occasions, there were fresh droppings, and although the camera systems were still active, they had either not released or produced plain pictures without any animal. For Common genets (*G. genetta*), more than one individual is known to contribute to latrine formation (Roeder, 1980a,b; Palomares, 1993). Here, lacking proof of more than one individual at one site, the irregular scheme of utilization and even the variable fecal contents can not explain how many individuals visited the sites. At Marere bushland, a pregnant female and an almost mature individual were trapped at 100 m distance during one night and two weeks before one more individual was caught in the same area; thus more than one individual occurred at one area. Nevertheless, due to a change in diet or variation in gut passage times, even one individual can defecate different contents during one night. Irregularities between nights and months might have been caused - on one hand – by cleaning and controlling the sites, what probably caused disturbance and reduced visitation and defecation rates. On the other hand, after cleaning or even after covering the roundabout with a new concrete sealing by the park authorities, defecations occasionally continued or even increased, and more visits also might have happened without defecation occurring. Supposedly, genets defecate exclusively at latrines, latrine switching between several latrines within the same area must have occurred (compare e.g. for Egyptian mongoose [*Herpestes ichneumon*]; Palomares, 1993), as although genets certainly defecate daily the sites did not carry fresh defecations every day. Genets probably defecate even twice (or more often) per 24 hours as was occasionally observed during feeding experiments - even though this seems still a very low rate compared with bushbabys or two-spotted palm civets of similar body size (unpubl. data).

Reliability of results. For June 1994, there might have been few defecations as well (non-visitation was not mentioned *expressis verbis* in record). In addition, less than approximately 10 % of the defecations were found already mixed to some extent or part of it had been removed (mainly by ants, dung beetles and rain), so that they had to be either subjectively separated again (following the intact units), or were treated as one defecation unit (a few times only). Thus, on one hand the total number of defecations and frequency of latrine use, respectively, might be very slightly higher for a few months. On the other hand, the real number of defecations might have been lower, because sometimes the separately defecated parts of a single defecation might have been counted as being more than one defecation. One defecation unit was preferably any faeces of same age (condition), micro location and composition; however, subjective decisions based on experience from similar but fresh defecations were occasionally necessary. Furthermore, after absence during the end and beginning of a month (particularly in September/October 1994), ageing the defecations was a subjective matter of experience. Thus, the number, relative content and phenology of defecations might have been slightly different in reality. However, these effects must be considered very minor, because on the concrete decomposition or diaspore export was, apart from a few exceptions, comparatively low. Most defecations were rather easily to distinguish from each other, providing comparatively reliable field data.

Activity pattern. One visitation probably took place before dawn, but certainly late after midnight, because one of the pictures shows the camera lens covered by condensed water (Fig. 1), as was occasionally observed on clear nights on the wind-exposed roundabout in the very early morning hours. Some defecations happened after 11.00 p.m., and some looked very fresh when checked in the morning. Otherwise, genets seem to be more active in the first part of the night (see Ikeda et. al., 1982; Estes, 1991) when they were also observed on roads at Shimba Hills by the author (early at night). Fresh defecations were also found even soon after sunset (7.00 p.m., 28/6/95). A road-killed animal was found at 1.45 am, but was already cold. In 1968, Glover and his team saw 'genets' (see above) "occasionally in the daytime but they are nocturnal and tracks were observed quite frequently on the roads in the mornings".

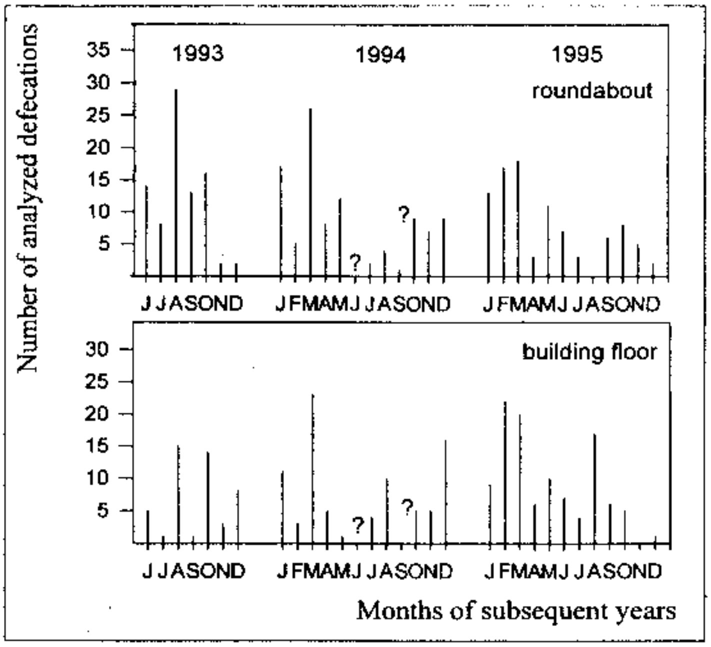

Fig. 3. Utilization of two genet latrines and frequency and phenology of dat collection (? = lacking proper data; see also text).

Conclusions

Direct proof of the identity of the investigated species, preferably by camera traps, seems necessary particularly in species-rich biocoenoses, and in areas where species with similar habits cannot be excluded or are simply not known (compare Engel, 1996). The roundabout is known to the author as having been in use as a latrine for more than five years. Thus, the sites seem to be permanently established and might be even continued by subsequent generations. Provided that all faeces from the roundabout and the Pengo Hill building floor belonged to rusty-spotted genets as assumed and shown here, *G. rubiginosa* seems to use the same latrines continuously over long periods, though on an irregular basis. Common genets (*G. genetta*) are (also) known to place their latrines in trees situated on the edges of the more frequently used habitat types (Palomares, 1993). In the Shimba Hills, the rusty-spotted genet (also) maintained latrines on the ground, as known for other viverrids and herpestids (unpubl. data). Nevertheless, compared to other viverrid or herpestid sites along roads or on the forest floor, these two genet latrines were still comparatively exposed. For a genet, a roundabout or concrete floor probably resembles solitary or topmost exposed rocks. Still, why genets use latrines is not known, and whether genets are territorial is not understood either (Estes, 1991). There are considerations that viverrids and genets (e.g. *C. civetta*: Estes, 1991; *G. genetta*: Palomares & Delibes, 1994) are territorial, which could explain the use of latrines to mark their territories. Due to competition, sexual activity, etc., the rate of defecation at latrines might also correlate with changes in marking behaviour (for latter compare for *G. genetta*; Palomares, 1993). In addition, marking (e.g. by urine and gland secretions) is described for the large-spotted genet '*G. tigrina*' (Wemmer, 1977) and *G. genetta* (Estes, 1991; see also Roeder, 1980a,b; Roeder, 1984), and scent-marking could happen at *G. rubiginosa* latrines even without defecation. Scent-marking occurs for *G. genetta* in short intervals (Roeder, 1980b), and individual recognition was reported even after nine weeks in captivity (Roeder, 1983). Thus, for permanent marking daily defecations or other daily marking visits are probably not necessary. As considered for other species (compare e.g. Palomares, 1993; also Wemmer, 1977; Roeder, 1980a), the latrines of Rusty-spotted genets might as well function as 'odorous centres of communication'.

Acknowledgements

I wish to acknowledge the kind support of the Office of the President and the National Research Council of Kenya, the Botany Department of the University of Nairobi, the Kenya Wildlife Service (particularly at Kwale) and the National Museums of Kenya. This research was part of a project on natural forest rejuvenation, kindly funded by the 'Deutsche Forschungsgemeinschaft' (DFG). Many persons helped in different ways, to all my sincere thanks.

References

Apps, P. 1992. *Field guide to the behaviour of Southern African mammals: Wild ways.* Southern Book Publishers.

Charles-Dominique, P. 1978. Ecologie et vie sociale de *Nandinia binotata* (Carnivores, Viverrides) : Comparision avec les prosimiens sympatriques du Gabon. *Terre Vie* 32:477-528.

Crawford-Cabral, J. 1980-81. The classification of the genets (*Carnivora, Viverridae*, genus *Genetta*). *Bolm Soc. Port. Ciênc. Nat.*, 20 (2):97-114.

Crawford-Cabral, J. 1981. A new classification of genets. *Afr. Small Mamm. Newsl.*, 6:8-10.

Crawford-Cabral, J. & Pacheco, A. P. 1989 (1992). Are the Large-spotted and the Rusty-spotted genets separate species? (Carnivora, Viverridae, genus *Genetta*). *Garcia de Orta, Sér. Zool.*, 16 (1-2):7-17.

Engel, T. R. 1996. Update of new records of the rare Sokoke bushy-tailed mongoose, *Bdeogale crassicauda* c.f. *omnivora* at the Shimba Hills, Diani Beach and Tiwi. *EANHS Bull.*, 26 (2):24-29.

Engel, T. R. 1998 (accepted). Seeds on the roundabout – tropical forest regeneration by *Genetta rubiginosa*. *Small Carnivore Conserv.*, 19

Engel, T. & Van Rompaey, H. 1995. New records of the rare Sokoke bushy-tailed mongoose, *Bdeogale crassicauda omnivora* in the coastal Shimba Hills National Reserve and at Diani Beach, Kenya. *Small Carnivore Conserv.*, 12:12-13.

Estes, R. D. 1991. *The behavior guide to African mammals*. University of California Press, Berkeley, CA.

Glover, P. E. 1968. *Report on an ecological survey of the proposed Shimba Hills National Reserve*. Kenya National Parks, Nairobi.

Haltenorth, T. & Diller, H. 1988. *A field guide to the mammals of Africa including Madagascar*. Collins, London.

Ikeda, H., Ono, Y., Baba, M., Doi, T. & Iwamoto, T. 1982. Ranging and activity patterns of three nocturnal viverrids in Omo National Park, Ethiopia. *Afr. J. Ecol.*, 20:179-186.

Jordano, P. 1992. Fruits and frugivory. Pp. 105-156 *in* M. Fenner, ed. *Seeds. The ecology of regeneration in plant communities*. CAB International, London.

Palomares, F. 1993. Faecal marking behaviour by free-ranging Common genets *Genetta genetta* and Egyptian mongoose *Herpestes ichneumon* in southern Spain. *Z. Säugetierkunde* 58:225-231.

Palomares, F. & Delibes, M. 1994. Spatio-temporal ecology and behavior of European genets in southwestern Spain. *J. Mammalogy* 75 (3):714-724.

Roeder, J. J. 1980a. Les emplacements de defecation chez la genette *Genetta genetta* L.. *Rev. Ecol. (Terre Vie)* 34 (4):485-494.

Roeder, J. J. 1980b. Marking behaviour and olfactory recognition in genets (*Genetta genetta* L., Carnivora - Viverridae). *Behaviour* 72:200-210.

Roeder, J. J. 1983. Mémorisation des marques olfactives chez la genette (*Genetta genetta* L.): durée de reconnaissance par les femelles de marques olfactives des males. *Z. Tierpsychol.*, 61:311-314.

Roeder, J. J. 1984. Ontogenèse des systèmes de communication chez la genette (*Genetta genetta* L.). *Behaviour* 90:259-301.

Skinner, J. D. & Smithers, R. H. 1990. *The mammals of the Southern African subregion*. University of Pretoria, Pretoria.

Stuart, C. & Stuart, T. 1988. *Field guide to the mammals of Southern Africa*. New Holland, London.

Stuart, C. & Stuart, T. 1994. *A Field guide to the tracks and signs of Southern and East African Wildlife*. Southern Book Publishers, Halfway House.

Walker, C. 1992. *Signs of the wild. Field guide to the spoor and signs of the mammals of southern Africa*. Struik, Cape Town.

Wemmer, C. M. 1977. Comparative ethology of the Large-spotted genet *Genetta tigrina* and some related viverrids. *Smithson. Contrib. Zool.*, 239:1-93.

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REQUESTS

Request for veterinary information

I write to you as chairman of the Veterinary Group to ask for your assistance in supplying us with a list of any diseases which are perceived by any of your members to be a threat to the wild populations of the taxa in which your group has a special interest.

We are also anxious to receive details of the causes of any morbidity or mortality of which your members may be aware. Reference to reports, scientific papers, newspaper articles, etc. relating to disease in all its aspects as it may affect your Group's interests are also of concern to us and we would be grateful if you would be kind enough to draw our attention to any such publications or send us photocopies for our database, if you have them. Please also inform us of any specialist wildlife disease diagnostic laboratories of which you are aware.

In return, we hope to be able to offer you the service for which our Group was formed. We would particularly like to draw your attention to the extreme importance of obtaining veterinary advice whenever wild animal capture, translocation, reintroduction or restoration projects are components of your Action Plans. The risk of the transmission of important diseases of humans, domestic livestock, and other wild animals when wild or captive-bred animals are translocated, even over short distances from one ecozone or biotope to another, can be considerable and must be minimized by appropriate screening, quarantine, and where necessary, vaccination.

- **Michael H. Woodford,**
  Chairman Veterinary Group IUCN/SSC, 500 23rd Street, N.W., Apt. B-709, Washington D.C. 20037 USA

Request for small carnivore records for Ecuador

With Luis Albuja, Escuela Polytechnica Nacional, Quito, I am writing a field guide to the mammals of Ecuador. It will be published by Conservation International, in the same series as their recent *Lemurs of Madagascar* guide, the format of which it will broadly follow.

The literature on small carnivores in Ecuador is sparse and museum specimens infrequent for many species. So, for both biogeographical and ecological reasons we want your field observations! Even fragmentary data and rumours may be of use, so don't hesitate to send snippits. All such contributions will be acknowledged in the book.

- **Adrian Barnett**
  Akodon Ecological Consulting, 114 Petrie Av.
  Bryn Mawr, PA19010 USA
  Fax: 610-525-2539, e-mail: infovore@mail.op.net

Use of camera-traps to survey small carnivores in the tropical rain forest of Kalakad-Mundanthurai Tiger Reserve, India

Divya MUDAPPA

INTRODUCTION

Tropical rain forests often have a diverse community of mammalian carnivores, both large and small. Since most of these carnivores are nocturnal, rare, and elusive, very little is known of their ecology. The large carnivores have been studied in South Asia (Schaller, 1967; Sunquist, 1981; Johnsingh, 1983; Chellam, 1993; Karanth, 1993), whereas there have been but few studies of small carnivores in either south or south-east Asia (Rabinowitz, 1990, 1991; Yoganand & Kumar, 1995). In India, even the distribution and conservation status of small carnivores is inadequately known.

Most small carnivores, besides being small, are also rare, nocturnal, solitary, and often inhabit areas with poor visibility due to thick vegetation. This makes even assessments of their occurrence and abundance, based on direct sightings, almost impossible. Since many of the small carnivores are not sighted even by local people, knowledge of the natural history of these taxa is scanty. The distribution and relative abundance of small carnivores have been recently assessed using scat abundance as an indicator, with workers identifying scats to the family level in the Nilgiri Biosphere Reserve, Western Ghats (Yoganand & Kumar, 1995). Attempts at identifying small carnivore (particularly viverrid) scats to species level, using thin layer chromatography on extracts of bile acids from the scats, have not been successful (Kumar, *pers. comm.*). An assessment of the occurrence and abundance of small carnivores still remains a daunting task, especially when the community is species rich.

In this paper I discuss the use of camera-traps in surveying small carnivores in the tropical rain forest of the southern Western Ghats.

Study area and study species

A survey was conducted using many direct and indirect methods to confirm the occurrence of the different species of small carnivores in the tropical rain forest of the Kalakad-Mundanthurai Tiger Reserve (KMTR; 08°25'-08°35'N and 77°25'-77°35'E; Fig. 1), the southernmost protected area in the Western Ghats, in Tamil Nadu State, India.

Camera trapping was carried out during a period of five months from November 1996 to March 1997, in order to make a preliminary assessment of the occurrence and distribution of small carnivores in the area, and prior to a radio-telemetric study. In an area of about 250 km², three sites were selected, ranging in altitude from 750 m to 1,300 m ASL. The sites were Kannikatti, Sengaltheri, and Kakachi.

The small carnivore community in the Western Ghats consists of four species, mongooses, and small cats. They are the Small Indian (*Viverricula indica*), Common palm (*Paradoxurus hermaphroditus*), Brown palm (*P. jerdoni*), and Malabar (*Viverra civettina*) civets, the Indian grey (*Herpestes edwardsii*), Ruddy (*H. smithii*), Stripe-necked (*H. vitticollis*), and Brown (*H. fuscus*) mongooses, and the Leopard cat (*Prionailurus bengalensis*),

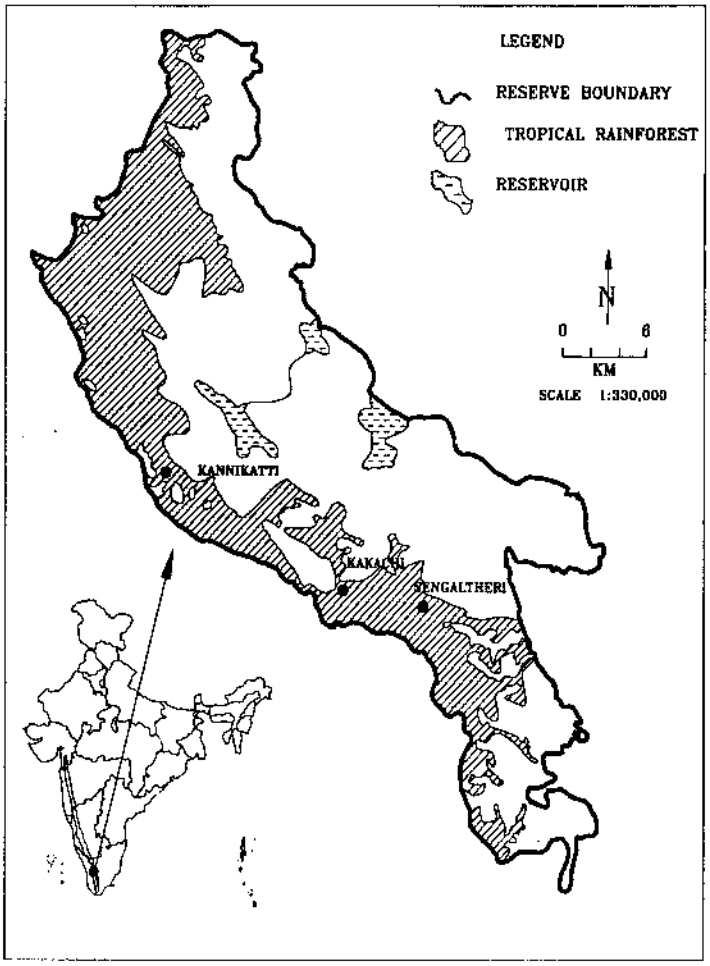

Fig. 1. Kalakad-Mundanthurai Tiger Reserve showing the location of the three sites and the extent of tropical rainforest.

Jungle cat (*Felis chaus*), Fishing cat (*Prionailurus viverrinus*), and the Rusty-spotted cat (*P. rubiginosus*). The family Mustelidae is represented by the endemic Nilgiri marten (*Martes gwatkinsi*), and the Ratel (*Mellivora capensis*). The Small-clawed (*Amblonyx cinereus*), Common (*Lutra lutra*), and Smooth-coated (*Lutrogale perspicillata*) otters form the aquatic small carnivore community.

The brown palm civet, the Malabar civet, and the Nilgiri marten are endemic to the Western Ghats at the specific level, whilst the stripe-necked mongoose and brown mongoose are endemic at the sub-species level (the species being also found in Sri Lanka.

Methods

Each camera-trap consisted of a fixed-focus Yashica camera (with electronic shutter release, flash, and auto-winder) and a pressure pad. The pressure pad consisted of two sheets of aluminium foil (30 x 45 cm) separated by a 0.5 cm thick sponge with several perforations, and enclosed in a water-proof air pillow. The aluminium foil was connected by a thin cable of about 2 m in length to the electronic shutter release. The circuit is completed and the shutter released when contact is established between aluminium foil layers by an animal that steps on the pad. Two such camera-traps were used in the survey.

Fig. 2. Paradoxurus jerdoni *in KMTR. Photo: Ravi Chellam*

Fig. 3. Viverricula indica *in KMTR. Photo: Ravi Chellam*

Fig. 4. Herpestes fuscus *in KMTR. Photo: Ravi Chellam*

The cameras were placed near existing forest trails, streams, or fruiting trees. The pressure pad was placed on the ground and covered with a thin layer of sand and baited with banana (89.4%, n=66), dates, and chicken scraps, and occasionally dry fish and wild fruits. Commercial lures for carnivores (Cat Passion, Weasel Lure, Feline Essence, and Skunk and Opossum Lure) were used on many occasions. A camera-trap was run for a period of 2 to 9 days at one station. Traps were checked every morning, when the frame number, presence of tracks, use of bait, and any other indication of a small carnivore or another animal's visit was recorded. The traps were kept functional through the day and night.

The results are presented as percent success, out of a total number of photo-trap days. A trapping day was considered successful only if at least one picture of a small carnivore was obtained. Multiple pictures of the same species on the same night at a trap are taken as a single incidence. The effect of lure is analyzed using the chi-square test (Siegel & Castellan, 1988).

Results

The two camera traps were set at 17 different stations for a total of 66 trap-days, with each session lasting for a period of 2-9 days (Table 1). Three stations were by streams, and the rest were along existing forest trails. Lure was used on 39 days. Only four stations (two each in Sengaltheri and Kannikatti) failed to attract any small carnivores. At least one small carnivore was photo-trapped on 41% of the trap-days. Three species were photo-trapped: the brown palm civet (Fig. 2), the small Indian civet (Fig. 3), and the brown mongoose (Fig. 4). One station in Kakachi had all the three species, and four stations (in Sengaltheri and Kakachi) had two species, either over the same night (n=4) or session (n=4). In Sengaltheri only two small carnivores were photo-trapped (brown palm civet and brown mongoose) and in Kannikatti only one (brown palm civet). Kakachi also had the highest trapping success of 68.4% (n=19 trap days), followed by Sengaltheri with 37.5% (n=24), and Kannikatti with 21.7% (n=23). The brown palm civet was photo-trapped on 25 days, accounting for 92.6% of the success, the small Indian civet on four days (14.8%), and the brown mongoose on two days (7.4%). Traps with lure (n=39 days) had a significantly greater success rate (56%) than traps without lure (12.8%, n=27, chi-square = 4.28, $p<0.05$). (Table 1).

Discussion

Camera trapping was found to be an effective method, with a high success rate in surveying terrestrial small carnivores in rain forest habitats in the Western Ghats, when compared to those reported from similar habitats in north-eastern India (Rai & Johnsingh, 1993; Athreya & Johnsingh, 1995). The Brown palm civet, which has been considered to be very rare (Ashraf *et al.*, 1993) was found to be the most common civet in these forests. They were photo-trapped more frequently than either the small Indian civet or the brown mongoose. They also have been sighted regularly in the study area, sometimes on trees.

Observations recorded at the stations indicate brown palm civet to be more frugivorous than either the small Indian civet or the brown mogoose. On all the incidences when a brown palm civet had been photo-trapped, the bait (fruit) had been consumed. The small Indian civet consumed the fruit bait only once, and the brown mongoose never did. All three species were nocturnal, being photographed only at night. The brown mongoose has, however, been sighted during the day in the study area. The wild fruits laid along with the main bait, though commonly found in the scats, were not consumed at the baited camera stations. The baits also attracted non-focal animals such as the Sloth bear (*Melursus ursinus*) and White-bellied wood rat (*Rattus rattus wroughtoni*) to the stations. In addition to the effect of lure, the greater densities of small carnivores (D. Mudappa, *unpubl. data*) could be responsible for the higher camera-trapping success in Katachi as compared to Sengaltheri and Kannikatti.

Sites	# Stations (# of trap-days)	# of trap-days with lure	Trapping success (%)
Kakachi	5 (19)	19	68.4
Sengaltheri	8 (24)	18	37.5
Kannikatti	4 (23)	2	21.7

Table 1. Details of camera-trapping efforts between October 1996 and March 1997 in three sites in KMTR, Western Ghats.

Even though I used only two camera traps, the results have been promising enough to consider the adoption of this method on a larger scale. Camera traps can also be used to study the habitat use and activity patterns of small carnivores. By using a variety of baits and lures, more species can be photo-trapped than was possible during the present study.

The other small carnivores sighted in the area are the Nilgiri marten, seen at all the three sites in KMTR, and the leopard cat (seen in Kakachi and Sengaltheri). The stripe-necked mongoose has been sighted once in Kakachi. The ruddy mongoose is common in the drier parts of the Tiger Reserve.

This survey was carried out as part of the on-going project "Impact of rain forest fragmentation on the biological diversity of small mammals and herpetofauna in Western Ghats mountains, India". Studies of feeding habits of small carnivores in relation to fruit and prey availability have been initiated. Other aspects such as habitat use, activity, and range use of endemic small carnivores by the use of radio-telemetry have been proposed.

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References

Ashraf, N. V. K., Kumar, A. & Johnsingh, A. J. T. 1993. Two endemic viverrids of the Western Ghats, India. *Oryx* 27(2):109-114.

Athreya, V. R. & Johnsingh, A. J. T. 1995. Survey of the clouded leopard (*Neofelis nebulosa*) in north-east India. Wildlife Institute of India, Dehradun.

Chellam, R. 1993. *Ecology of the Asiatic lion* (Panthera leo persica). Ph.D. thesis, Saurasthra University.

Johnsingh, A. J. T. 1983. Large mammalian prey-predators in Bandipur. *J. Bombay Nat. Hist. Soc.*, 80:1-57.

Karanth, K. U. 1993. *Predator-prey relationships among the large mammals of Nagarahole National park (India).* Ph. D. thesis, Mangalore University.

Rabinowitz, A. 1990. Notes on the behaviour and movements of Leopard cats, *Felis bengalensis*, in a dry tropical mosaic in Thailand. *Biotropica* 22(4):397-403.

Rabinowitz, A. 1991. Behaviour and movements of sympatric civet species in Huai Kha Khaeng Wildlife Sanctuary, Thailand. *J. Zool.*, 223:281-298.

Rai, N. & Johnsingh, A. J. T. 1993. A preliminary survey of the Clouded leopard (*Neofelis nebulosa*) in Mizoram and Sikkim, India. Wildlife Institute of India, Dehradun.

Schaller, G. B. 1967. *The deer and the tiger.* University of Chicago Press, Chicago.

Siegel, S. & Castellan, N. J. Jr. 1988. *Non-parametric statistics for the behavioral sciences.* 2nd ed. McGraw-Hill Inc.

Sunquist, M. E. 1981. The social organisation of tigers (*Panthera tigris*) in Royal Chitwan National Park, Nepal. *Smithson. Contrib. Zool.*, 336:1-98.

Yoganand, T. R. K. & Kumar, A. 1995. The distribution of small carnivores in the Nilgiri Biosphere Reserve, southern India. A preliminary report. *Small Carnivore Conserv.*, 13:1-2.

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Reproductive biology of captive Tayra (*Eira barbara*)

I have been studying the reproductive biology of captive *Eira barbara* at the Philadelphia Zoo since 1995. We currently house 1.2 tayra and have completed preliminary fecal E2/P4 testing on one female. As the results are inconclusive, I would like to expand the study.

I have been collecting the faeces and sending the frozen samples to an endocrine laboratory for analysis. However, the turn around time between sample collection and the receipt of results has become impractical for assisting in day to day decisions regarding reproductive management. I am looking for a 'table-top' or 'cage-side' testing method. Does such a test exist ? Is anyone working on developing this type of test who might be interested in testing their assay here at Philadelphia Zoo ?

Any additional information on individuals who are currently studying mustelid ovarian function or laboratories that are performing faecal steroid assays would be greatly appreciated.

Susan A. Gurley, Mammal Keeper, Philadelphia Zoo, 3400 W. Girard Ave. Philadelphia, PA 19104-1196, USA

First confirmation of the presence of the Liberian mongoose, *Liberiictis kuhni*, in Côte d'Ivoire

Marc COLYN[1], Patrick BARRIERE[1], Pierre FORMENTY[2], Olivier PERPETE[1], and Harry VAN ROMPAEY[3]

Introduction

The rare Liberian mongoose, *Liberiictis kuhni*, originally described by Hayman in 1958 on the basis of eight skulls collected by ethnologist Hans Himmelheber from two villages (Kpeaple and Gaple) in north-eastern Liberia, has up till now been scarcely studied (Kuhn, 1965). Its external morphological characters were only described in 1974 on the basis of two specimens collected near Tar, Liberia (Schlitter, 1974; Rosevear, 1974). Subsequently, another specimen was collected from the Gbi National Forest (Taylor, 1988, 1989). In 1989 a live specimen was captured by an expedition organised by the Royal Ontario Museum and Metro Toronto Zoo (Taylor, 1992). However, up till now only 27 specimens are known to be held in personal and museum collections (Goldman & Taylor, 1990), all originating from seven localities in Liberia (Fig. 1): Gaple; Kpeaple; Tapeta; 32 km south-east of Tapeta, and near Nimbowehn (both in the Gbi National Forest); Frog City and Tar (both about 25 km north of Zwedru) (Schreiber *et al.*, 1989: Goldman & Taylor, 1990).

On the other hand its presence is also suspected at other localities in north-east Liberia: on the Nimba ridge (Coe, 1975) and in two localities in southern Nimba (Taylor, 1988), in the Sapo National Park, as well as in Sierra Leone, southern Guinea and in western Côte d'Ivoire (Ivory Coast) (Schreiber *et al.*, 1989; Goldman & Taylor, 1990).

Since 1990 several authors reported sightings or collected evidence of the Liberian mongoose from Côte d'Ivoire. Roth & Merz (1986) thought the presence of *Liberiictis kuhni* in the Taï National Park (Taï NP) very likely. Hoppe-Dominik (1990), following interviews held in several villages, indicates five localities: south-east of Péko National Park, northern Taï NP, and three localities in the extreme south-west of the country. In 1990, Mary Gartshore, a biologist, having seen the captive specimen in Metro Toronto Zoo, confirmed her sighting of the species whilst studying birds in the Taï National Forest (Taylor, 1992; Gartshore *et al.*, 1995).

Thus far these suppositions, field information, and sightings have brought no actual proof of the presence of *Liberiictis kuhni* in Côte d'Ivoire. This note aims to do so, following the discovery of a dead adult Liberian mongoose in the Taï NP.

First record from Côte d'Ivoire

After the isolation of a new strain of Ebola virus in western Africa in November 1994 (Le Guenno *et al.*, 1995), in April 1996 the World Health Organisation (WHO) established a research project in the Taï NP under the direction of one of the authors (PF). One of the principal aims of this programme consists of identifying the natural reservoir of the Ebola virus in Côte d'Ivoire. In order to carry out serological and/or virological analyses, different methods of trapping and sampling were used; birds and small mammals (rodents, insectivores, bats, and carnivores) were trapped, and dead animals found in the forest were collected.

During a sanitary surveillance patrol on 19 March 1997, Lucien Tiede Gnepa (research assistant of the WHO-Taï Forest Project) came upon the dead body of a herpestid which was in an advanced state of decomposition. The body, which was missing the extremities of the limbs and the tail, was found on the ground near a small brook, a tributary of the Audrenisrou River, which borders the park near the Taï village. The bones were brought to the Station de l'Institut d'Ecologie Tropicale (IET), cleaned and registered under the number T19. Six months later, one of the authors (MC), whilst identifying the specimens found in the forest, found to his surprise that the only herpestid carcass collected was none other than the very rare Liberian mongoose, never before collected in Côte d'Ivoire (Fig. 2).

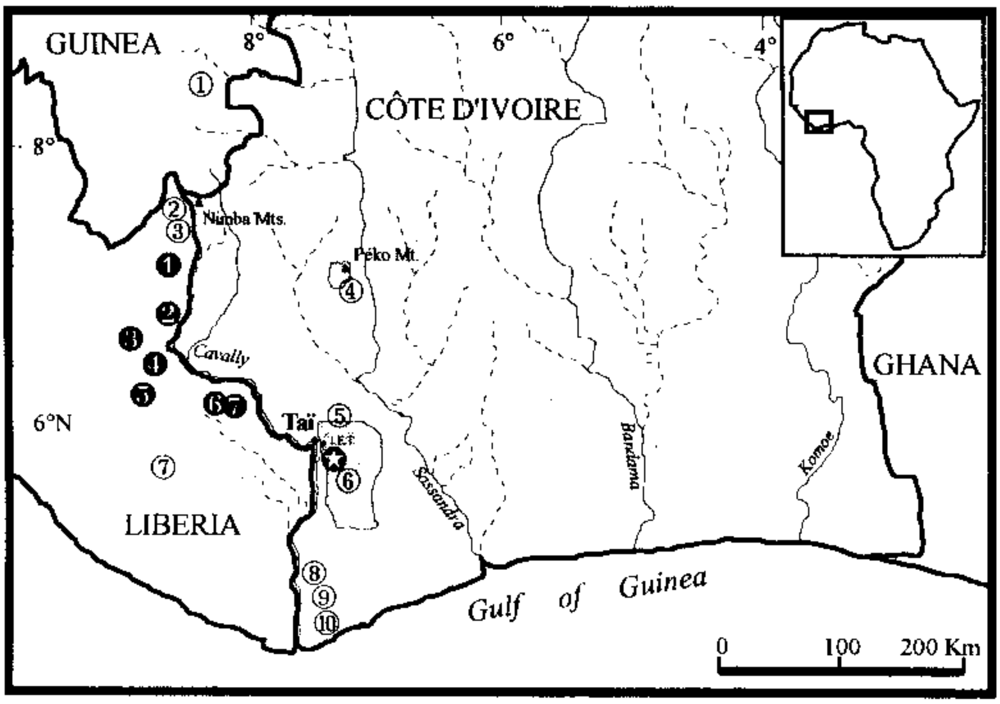

Fig. 1. Localities where *Liberiictis kuhni* has been collected (black circles) and/or assumed (open circles).

❶ Gaple
❷ Kpeaple
❸ Tapeta
❹ 32 km SE of Tapeta, Gbi NF
❺ Nimbowehn, Gbi NF
❻ Frog City
❼ Tar
✪ Institut d'Ecologie Tropical, Taï NP (new record)
① southern Guinea
②③ Mano region
④ SE of Peko NP
⑤ N of Taï NP
⑥ Taï NP
⑦ Sapo NP
⑧⑨⑩ SW Côte d'Ivoire

Later on, T19 was studied at the Station Biologique de Paimpont (ref.: MC/SBP 888/T19) and compared with the skulls of the holotype and several other specimens (including two paratypes) (Table 1). This confirmed that the specimen collected near the IET in the Taï NP does belong to *Liberiictis kuhni*, the sole representative of its genus. The research done within the scheme of the WHO-Taï Forest Project has thus made an important contribution to the knowledge of the mammal fauna of Côte d'Ivoire, and has finally confirmed the presence of *Liberiictis kuhni* in Côte d'Ivoire.

Biogeography

Several authors (Aubréville, 1949; Booth, 1958; Kingdon, 1971; Grubb, 1978, 1982; Delany & Happold, 1979) have recognised that the Côte d'Ivoire forests are situated astride to the two principal faunal regions, usually called 'Liberia' and 'Ghana'. This exceptional biogeographical situation means that Côte d'Ivoire can boast, on the one hand, of harbouring different endemic forest species on a continental scale (Upper Guinea) such as *Procolobus verus, Cercopithecus diana* and *Choeropsis liberiansis*. On the other hand (on a regional scale) Côte d'Ivoire harbours species typical of the «Liberia» centre of endemism (*Cephalophus zebra, C. jentinki, Liberiictis kuhni*), plus subspecies from both the 'Liberia' and 'Ghana' faunal regions such as *Cercopithecus p. petaurista, C. p. büttikoferi, C. d. diana, C. d. roloway, C. c. campbelli*,and *C. c. lowei*. The primate studies of Booth (1955, 1956, 1958) have the merit of having clearly differentiated the principal biogeographical units of the 'Upper Guinea' region.

The discovery of *Liberiictis kuhni* in the Taï NP strengthens the hypothesis that the «Liberia» Faunal Region extends into the forests irrigated by the left bank tributaries of the Cavally River which does not constitute a real barrier to faunal dispersion. Consequently, it is not very likely that the distribution of the Liberian mongoose in Côte d'Ivoire would be limited to the Taï NP. Actually, this park is included within a continuous block of forest which extends to the south into the eastern Cavally Basin and, more to the east, joins up with the Sassandra Basin. The results of the field interviews by Hoppe-Dominik (1990) from north and south-west of the Taï NP seem to confirm the extension of the distribution of *Liberiictis kuhni* in the whole of the forest block. Also, as the upper course of the Cavally river is situated in the forest, there is no barrier preventing the dispersion of the northern Liberian forest fauna. It is also probable that endemic species such as *Cephalophus zebra, C. jentinki*, and *Liberiictis kuhni* are also present in the Liberia-Côte d'Ivoire-Guinea border region.

Conservation

As a result of his field work in the villages of north-east Liberia Taylor (1989) concludes that the Liberian mongoose has disappeared from several of its former distributional areas, mostly because of mining, agriculture, logging, and hunting. The confirmed presence of *Liberiictis kuhni* in Taï NP, the largest section of the West African forest that is still intact, stresses the importance of the south-western region of Côte d'Ivoire as a faunal reserve area (Schreiber *et al.*, 1989; Taylor, 1992; Gartshore *et al.*, 1995). The study and conservation of *Liberiictis kuhni* seem more necessary today than ever before in order to discover the ecological role in the West African forest ecosystem played by this discrete species.

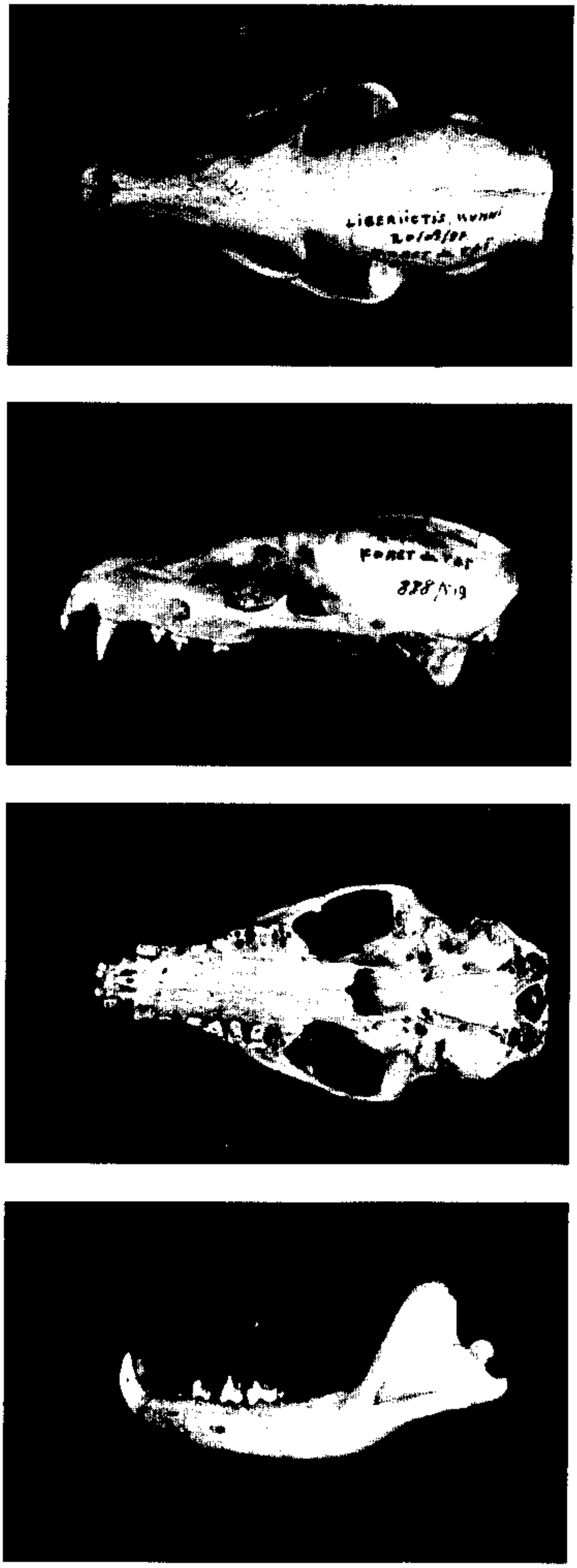

Fig. 2. Dorsal, lateral, and ventral view of the skull; lateral view of the mandible of Liberiictis kuhni *N° 888/T19 (Paimpont, France).*

Character	Present paper	Present paper	Present paper	Present paper	D.A. Schlitter 1974	D.A. Schlitter 1974	D.A. Schlitter 1974	M.E. Taylor 1989	Present paper
	Liberia Kpeaple	Gaple	Gaple	Gaple	Tar	Kpeaple	Tapeta	Gbi	Côte d'Ivoire Taï I.E.T.
	Holotype 58507	Paratype 5823	Paratype 5825	- 5824	- 481997	- 2004	- 2256	- 94596	- MCSBP 888/T19
	male	-	-	-	Male	-	-	Female	-
GRLG	97,4	95,4	94,8	96,4	96,7	98,7	100,4	96,5	99,8
CBLG	94,2	93,4	91,7	93,1	91,1	92,5	94,0	92,3	95,9
ROSP	37,6	35,7	36,0	36,8	35,7	-	-	36,9	38,0
PALL	53,4	49,9	49,0	50,6	50,5	50,8	50,3	50,9	50,9
MAXT	32,5	31,7	32,6	31,7	31,6	-	-	31,6	32,7
TYMP	16,7	16,0	16,5	16,8	-	-	-	-	17,3
CUCU	15,7	15,6	14,7	15,9	15,8	-	-	15,5	15,9
ROSB	22,4	21,6	20,7	22,1	-	-	-	-	23,5
IORB	17,0	16,7	16,1	17,4	18,5	17,9	17.2	17,9	18,4
MUMU	-	21,4	24,5	24,8	26,0	25,8	26,2	25,7	25,1
ZYGO	45,7	45,0	42,2	44,2	44,1	44,9	45,7	44,7	47,2
BRBC	31,5	31,3	29,7	31,0	-	-	-	-	32,5
MAST	35,2	35,1	34,5	33,9	34,8	34,8	34,5	33,5	35,3
HBCA	26,7	26,7	26,1	27,1	-	-	-	-	25,6
GMAN	65,1	63,7	61,7	65,0	-	-	-	-	64,8
MANT	35,8	35,5	35,2	34,7	-	-	-	-	35,8
MCAH	22,4	21,1	19,6	21,3	-	-	-	-	21,3

Table 1. Comparison of craniometric data (measured by different authors) of known *Liberiictis kuhni* specimens with the new specimen from Taï NP. The holotype (58507) is in The Natural History Museum, London, UK (BMNH); 5823, 5824, and 5825 in the Zoologisches Forschungsinstitut & Museum A. Koenig, Bonn, Germany (ZFMK); 481997 in the National Museum of Natural History, Washington DC, USA (NMNH); 2004 and 2256 in the Anatomisches Institut der Universität Frankfurt am Main, Frankfurt, Germany (AIF); and MCSBP 888/T19 in the Station Biologique de Paimpont, Paimpont, France. (Abbreviations: see Goldman, 1984).

Acknowledgements

We would like to express our gratitude to Cdt N'Dri Koffi, Director of the «Projet Autonome pour la Conservation du Parc National de Taï» (PACPNT), M. Yaya Sangare, President of the «Conseil Scientifique du Parc National de Taï» (Ministère de l'Enseignement Supérieur de la Recherche et de l'Innovation Technique), and Cdt Kouame Amani Denis, Director of the «Protection de la Nature» (Ministère de l'Agriculture et des Ressources Animales), as well as to the European Community Commission (Biofac DG VIII - contract B7 5041 93/26) for their continuing support for our field work. We are also grateful to D. Hills (BMNH, London) and G. Peters (ZFMK, Bonn) for graciously allowing us to examine the material in their museums.

References

Aubréville, G.M. 1949. Contribution à la palaeohistoire des forêts de l'Afrique tropicale. Société d'Editions Géographiques, Maritimes et Coloniales, Paris.

Booth, A.H. 1955. Speciation in the Mona Monkeys. *J. Mamm.*, 36:434-449.

Booth, A.H. 1956. The distribution of Primates in the Gold Coast. *J. W. Afr. Sci. Ass.*, 2:122-133.

Booth, A.H. 1958. The zoogeography of West African primates: A review. *Bull. I.F.A.N.* 2(20A):587-622.

Coe, M. 1975. Mammalian ecological studies on Mount Nimba, Liberia. *Mammalia* 39:523-581.

Delany, M.J. & Happold, D.C.D. 1979. *Ecology of African mammals.* Tropical Ecology Series, 434 pp.

Gartshore, M.E., Taylor, P.D. & Francis, I.S. 1995. Forest Birds in Côte d'Ivoire, a survey of Taï National Park and other forests and forestry plantations. *BirdLife International Study Report* No. 58. 81 pp.

Goldman, C.A. 1984. Systematic revision of the African mongoose genus *Crossarchus* (Mammalia: Viverridae). *Can. J. Zool.*, 62:1618-1630.

Goldman, C.A. & Taylor, M.E. 1990. *Liberiictis kuhni. Mamm. Species* 348:1-3.

Grubb, P. 1978. Patterns of speciation in African mammals. *Bull. Carnegie Mus. Nat. Hist.*, 6:152-167.

Grubb, P. 1982. Refuges and dispersal in the speciation of African forest mammals. Pp. 537-553 *in* G. T. Prance, ed. *Biological diversification in the tropics.* Columbia University Press, New York.

Hayman, R.W. 1958. A new genus and species of West African mongoose. *Ann. Mag. Nat. Hist.*, 13(1):448-452.

Hoppe-Dominik, B. 1990. On the occurrence of the Honey-badger (*Mellivora capensis*) and the viverrids in the Ivory Coast. *Mustelid & Viverrid Conserv.*, 3:9-13.

Kingdon, J. 1971. *East African mammals: An atlas of evolution in Africa.* Vol. 1. Academic Press, London-New York.

Kuhn, H.-J. 1965. A provisional check-list of the mammals of Liberia. *Senckenbergiana Biol.*, 46:321-340.

Le Guenno, B., Formenty, P., Wyers, M., Gounon, P., Walker, F. & Boesch, C. 1995. Isolation and partial characterization of a new strain of Ebola virus. *Lancet* 345:1271-1274.

Rosevear, D.R. 1974. *The Carnivores of West Africa.* British Museum (Natural History), London.

Roth, H.H. & Merz, G. 1986. Vorkommen und relative Häufigkeit von Säugetieren im Tai-Regenwald der Elfenbeinküste. *Säugetierk. Mitt.*, 33:171-193.

Schlitter, D.A. 1974. Notes on the Liberian mongoose, *Liberiictis kuhni* Hayman 1958. *J. Mamm.*, 55:438-442.

Schreiber, A., Wirth, R., Riffel, M. & Van Rompaey, H. 1989. *Weasels, civets, mongooses and their relatives. An action plan for the conservation of mustelids and viverrids.* IUCN, Gland.

Taylor, M. E. 1988. Search for a mongoose. *Species* 11:17.

Taylor, M.E. 1989. New records of two species of rare viverrids from Liberia. *Mammalia*, 53:122-125.

Taylor, M.E. 1992. The Liberian mongoose. *Oryx*, 26: 103-106.

Appendix:

Recorded localities of *Liberiictis kuhni* in Liberia and Côte d'Ivoire

Frog City and Tar (both about 25 km north of Zwedru): 6°13'N, 8°08'W; Gaple: 7°08'N, 8°28'W; Institut d'Ecologie Tropicale of Taï: 5°51'N, 7°23'W; Kpeaple: 6°36'N, 8°30'W; Nimbowehn, Gbi National Forest: 6°12'N, 8°47'W; Tapeta: 6°30'N, 8°52'W; 32 km southeast of Tapeta, Gbi National Forest: 6°25'N, 8°45'W.

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A note on the White-tailed mongoose (*Ichneumia albicauda*) in southern Arabia

Chris and Tilde STUART

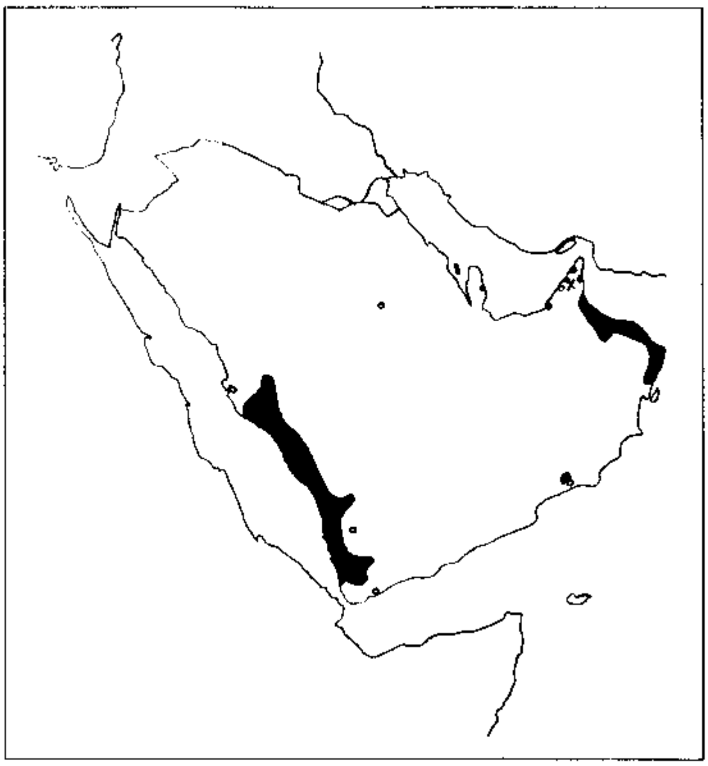
The white-tailed mongoose (*Ichneumia albicauda*) is a large herpestid (3.5 to 5.2 kg), with long, coarse and shaggy brown-grey coloured pelage, and the bushy tail being predominantly white. Despite its large size there seem to only 27 confirmed records of this mongoose through its southern Arabian range (Gasperetti *et al.*, 1985 ; Harrison *et al.*, 1991), 12 from south-western Saudi Arabia, nine from Oman, four from Yemen, and two from the north of the United Arab Emirates.

When these localities are plotted on a map they show a concentration on the coastal plain and adjacent mountains of south-western Saudi Arabia and Yemen, an apparently isolated location in the Dhofar of Oman and a second concentration along the Batinah coastal plain and adjacent interior of northern Oman. Within the northern United Arab Emirates the two records noted by Gasperetti *et al.* (1985) were apparently of live animals collected close to the towns of Ras al Khaymah and Fujayrah. Over the past three years the authors have undertaken extensive wildlife surveys throughout the northern Emirates but it was only in November of 1997 that we were able to confirm the continued presence of this mongoose in the region.

Tracks of the white-tailed mongoose were located at several points along a twent- kilometre stretch of the well-watered and –vegetated Wadi Shawka (Sharjah Emirate), that runs through the southernmost extension of the Shimayliyah Mountains. The locality centres on 40 4 05.6 E ; 27 76.1 N (UTM Map Datum Nahrwan) at an altitude of some 300 metres ASL. Cage traps, baited with dead quail and Schneekluth Canine Call scent lure, were set at several places where fresh tracks were found and on 20 November an adult mongoose was caught. In external appearance it was identical to animals we have observed in southern and eastern Africa. This animal was transferred to the Desert Park Endangered Species Breeding Centre, Sharjah. Although difficult to assess with accuracy we feel that between three and six animals are present in the section of wadi we surveyed. It has been brought to our attention that two apparent white-tailed mongooses were killed in a plantation in the settlement of Siji early in 1997, lying approximately six kilometres from the survey site, by Asian labourers who ate them. We have been told that the skin of one animal has been seen by a reliable observer (C. Gross, pers. comm.) and confirmed as being of this species.

Although the white-tailed mongoose would appear to have a broken distribution in southern Arabia we feel that as suitable habitat occurs in the area between the Batinah and Dhofar of Oman, and south-westwards to Yemen through the Hadramawt, it is considered highly likely that its range will be found to be more or less continuous. The lack of records from the intervening areas can be largely explained, we feel, by the fact that both the Dhofar and Hadramawt are zoologically under-explored.

An additional white-tailed mongoose locality (dead on road) from within its known Yemeni range was recorded by the authors on 18 April 1996 : 16°02.25'N, 43°10.90'E, at an altitude of 170 metres. The area was dominated by dry mixed thorn scrub, cultivated lands and wide sand-bottomed wadis. A specimen of this mongoose collected as a road casualty by J. E. Gibbs (April 1993), and assigned Oman Natural History Museum No. 2175, came from between Qalhat and Tiwi on the Batinah coastal road (22°43'N, 59°21'E) of northern Oman, within its currently known range.



Ichneumia albicauda *in the Arabian peninsula. Shaded areas: existing records; X: new record.*

Measurements (in mm) of three live-trapped Ichneumia albicauda *from Wadi Shawka, U.A.E.*

Sex	**Total length**	**Tail length**	**Hind foot(su)**	**Ear**
Male	902	362	110	22
Female	834	334	98	25.4
Female	880	370	104	25

All were adult animals and as far as we are aware the only representatives of this species to have been measured from the United Arab Emirates, the most easterly limit of their distribution. All average slightly smaller than the very limited sample detailed by Harrison & Bates (1991) from individuals measured from Yemen, Saudi Arabia and Oman. All three specimens had the typical colouration of this large mongoose.

References

Gasperetti, J., Harrison, D. L. & Buttiker, W. 1985. The carnivora of Arabia. *Fauna of Saudi Arabia* 7 :397-461.

Harrison, D. L. & Bates, P. J. 1991. *The mammals of Arabia.* Harrison Zoological Museum, Sevenoaks, Kent, UK.

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A note on the herpestids and viverrids of south-eastern Unguja (Zanzibar) Island

Chris and Tilde STUART

During April of 1997 the authors undertook a preliminary survey of the fauna of the south-east of Unguja Island, with special emphasis on the leopard. Zanzibar, part of a federation with mainland Tanzania, consists of several islands, the principal of which are Unguja and Pemba. Unguja lies some 40 kilometres from the African mainland and extends over an area of approximately 1650 km^2. It is a low-lying island with the highest point being at 110 m above-sea-level.

The principal topographical features are the north-south running parallel ridges of Machui and Masingini. The gently undulating coastal belt averages five to six kilometres in width and in the east it is dominated by what is known as *coral-rag thicket*. The central and western areas of the island are the most fertile and therefore have the highest human population densities, although major man-made impacts are obvious throughout the island.

Pakenham (1984) recorded five species of herpestids and viverrids on the island of Unguja, *Bdeogale crassicauda tenuis, Galerella sanguinea rufescens, Mungos mungo, Civettictis civetta schwarzi*, and *Viverricula indica rasse*. An additional species, *Atilax paludinosus rubescens*, has only been recorded on Pemba Island and not on Unguja.

Records seem to indicate that *Mungos mungo* was introduced to the island from the mainland but we found no evidence that this social mongoose occurs anywhere in the south-eastern sector of the island; whether it occurs elsewhere was not investigated. The presence of an additional species was confirmed during the course of the present survey, on the basis of clear tracks, a genet, *Genetta* sp.

Zanzibar slender mongoose
Galerella sanguinea rufescens

We made 25 sightings of this small mongoose during the course of the survey, in a wide variety of habitats, that included scrub thicket on coral rag, fringes of the Jozani Forest but never in its core, in cultivated fields of cassava, bananas, and on the edges of rice paddies. Only solitary animals were sighted and all had a dark to light reddish-brown coloured pelage.

Zanzibar bushy-tailed mongoose
Bdeogale crassicauda tenuis

The nine records of this mongoose were based on examination of their distinctive tracks, with which the authors are familiar from the mainland. Nearly all records were taken in and around the Jozani Forest. Despite several hours of night-driving on forest tracks no sightings were made. Local villagers questioned were familiar with this species.

Genet *Genetta* sp.

A skin and damaged skull of a servaline genet (*Genetta servalina* were collected in 1995 by Anthony L. Archer from ca. 4 km south of Jozani Forest (Van Rompaey & Colyn, 1998), the first indication that genets were in fact present on the island. During the course of the current survey we located and photographed clear genet tracks imprinted in the mud of a jeep trail in the Jozani Forest. Despite regular searches in the same general area over a period of several days no further tracks were found.

African civet
Civettictis civetta schwarzi

A total of 23 records of this species were noted, comprising mainly of fresh tracks but also one animal found dead on a forest trail (possibly shot) and one individual "caught" on film by an automatic camera. They occurred throughout the survey area, in coral rag thicket, stands of red mangrove, cultivated areas that included rice paddies, within the Jozani Forest and once on the beach above the high water mark. A common species that is on occasion shot by villagers.

Although no detailed examination of dung contents at midden sites was undertaken, the fruits of a number of tree and bush species obviously made up a considerable amount of their intake during April of 1997. Although it probably occurred naturally on the island, it is possible that animals were introduced by man centuries ago in order to extract the anal gland secretion! See the next species.

Javan civet
Viverricula indica rasse

Only four definite locations for this species were recorded, on the basis of clear tracks, once on the beach, twice in the north of the Jozani Forest, and once in the Kiwengwa Forest. This species was introduced to the island, possibly by Javanese traders as early as the 12th century, for extraction of the anal gland secretion that was used as a "perfume". The Zanzibari Arabs prized the secretion as a medicine.

References

Pakenham, R. H. 1984. *The mammals of Zanzibar and Pemba Islands*. Privately published. 81 pp.

Van Rompaey, H. & Colyn, M. 1998. A new servaline genet (Carnivora, Viverridae) from Zanzibar Island. *S. Afr. J. Zool.*, 33(1): in press.

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Species	Date	Location	GPS fix	Habitat	Remarks
Galerella sanguinea Slender mongoose	03.04.1997	South of Bungi	5 38.0 E / 93 07.3 N	Mango and coconutpalm plantation	Sighting
	07.04.1997	Jugakuu near Paje	5 55.1 E / 93 07.0 N	Coral rag thicket	Sighting
	09.04.1997	Jozani village	5 47.4 E / 93 06.8 N	Clearing in forest	Sighting
	11.04.1997	South of Paje along coast	5 59.2 E / 93 06.1 N	Coastal coral rag thicket	Sighting
	12.04.1997	Western edge of Jozani Forest	5 45.0 E / 93 06.3 N	Coral rag forest	Tracks
	12.04.1997	Western edge of Jozani Forest	5 44.6 E / 93 07.7 N	Coral rag forest	Tracks, very fresh
	12.04.1997	Paje	5 55.9 E / 93 07.1 N	Coral rag thicket	Sighting
	12.04.1997	Paje	5 56.3 E / 93 07.2 N	Coral rag thicket	Sighting (sick)
	14.04.1997	Uzingwi, nr. Jendele	5 41.0 E / 93 16.3 N	Rice fields , palm plantations	Sighting
	14.04.1997	Kwebona, Unguja Ukuu	5 40.6 E / 93 06.3 N	Fields nr. village, coral rag	Sighting
	15.04.1997	Jozani	5 47.2 E / 93 07.4 N	Coral rag forest	Sighting
	15.04.1997	Charawe	5 48.9 E / 93 16.6 N	Coastal coral rag thicket	Sighting
	18.04.1997	Paje police station	5 58.4 E / 93 07.6 N	Coastal coral rag thicket, edge of settlement	Sighting
	20.04.1997	Jozani Forest	5 47.3 E / 93 11.2 N	Coral rag forest	Tracks
	20.04.1997	Jozani Forest	5 46.6 E / 93 11.3 N	Coral rag forest	Tracks
	20.04.1997	Jozani Forest, Jimbini	5 46.2 E / 93 11.5 N	Bracken field	Tracks
	21.04.1997	Jozani Forest, northern section	5 47.0 E / 93 13.2 N	Coral rag forest	Tracks
	23.04.1997	South of Jozani	5 46.7 E / 93 06.4 N	Coral rag thicket near mangroves	Tracks
	24.04.1997	Jozani Forest, Totani	5 46.5 E / 93 11.4 N	Coral rag forest	Tracks
	24.04.1997	Jozani Forest, Jimbini	5 46.3 E / 93 11.5 N	Bracken field	Tracks
	24.04.1997	Magunibani	5 52.5 E / 93 03.4 N	Coral rag forest	Sighting
	25.04.1997	Mamli	5 55.4 E / 93 01.0 N	Coral rag forest	Tracks
	26.04.1997	Jozani Forest, road to Charawe	5 47.0 E / 93 08.8 N	Coral rag forest	Sighting
	27.04.1997	Kilombero	5 36.1 E / 93 34.0 N	Rice fields	Sighting
	29.04.1997	Between Bwejuu and Paje	5 58.8 E / 93 09.3 N	Coconut palms on coastal plain	Sighting
Bdeogale crassicauda Bushy-tailed mongoose	12.04.1997	Western edge of Jozani Forest	5 44.6 E / 93 08.0 N	Coral rag forest	Tracks
	12.04.1997	Western edge of Jozani Forest	5 44.5 E / 93 08.2 N	Bracken field in forest	Tracks
	12.04.1997	Jozani Forest	5 46.2 E / 93 11.5 N	Bracken field in forest	Tracks
	19.04.1997	Michamvi	5 56.1 E / 93 22.1 N	Coral rag thicket	Tracks
	20.04. 1997	Jozani Forest, Jimbini	5 46.2 E / 93 11.5 N	Brackenfield	Tracks
	21.04.1997	Jozani Forest, northern section	5 47.9 E / 93 11.8 N	Coral rag forest	Tracks
	21.04.1997	Jozani Forest, northern section	5 47.0 E / 93 13.2 N	Coral rag forest	Tracks
	24.04.1997	Magunibani	5 52.7 E / 93 00.7 N	Coral rag forest	Tracks
	25.04.1997	Mamli	5 54.6 E / 93 00.6 N	Coral rag forest	Tracks
Civettictis civetta African civet	05.04.1997	Kichanga	5 46.8 E / 93 05.2 N	Old bananafield near mangroves	3 middens
	06.04.1997	Northern section of Jozani Forest	5 45.8 E / 93 10.5 N	Open lower forest	Tracks
	09.04.1997	Between Paje and Bwejuu	5 58.8 E / 93 09.5 N	Transition between coral rag brush and coconut palm plantation on coastal sand	Tracks
	12.04.1997	Western edge of Jozani Forest	5 44.9 E / 93 07.1 N	Coral rag forest	Droppings
	12.04.1997	Western edge of Jozani Forest	5 44.5 E / 93 08.2 N	Bracken field in forest	Tracks
	12.04.1997	Western edge of Jozani Forest	5 44.5 E / 93 08.9 N	Coral rag forest	Tracks
	12.04.1997	Western edge of Jozani Forest	5 44.4 E / 93 09.2 N	Coral rag forest	Tracks
	15.04.1997	Jozani Forest, northern section	5 47.0 E / 93 12.9 N	Open coral rag forest	Droppings, marks
	17.04.1997	Jozani Forest, northern section	5 46.7 E / 93 12.6 N	Open coral rag forest	Mark on twig
	17.04.1997	Jozani Forest	5 47.6 E / 93 11.4 N	Coral rag forest	Calling
	18.04.1997	Jozani Forest, northern section	5 46.3 E / 93 12.7 N	Coral rag forest	Dead specimen
	19.04.1997	Mkokoni, north of Bwejuu	5 58.8 E / 93 14.4 N	Coral rag thicket	Tracks
	20.04.1997	Jozani Forest	5 46.5 E / 93 11.4 N	Coral rag forest	Tracks
	20.04.1997	Jozani Forest, Jimbini	5 46.2 E / 93 11.5 N	Bracken field	Tracks
	20.04.1997	Jozani Forest	5 46.3 E / 93 11.5 N	Coral rag forest	Tracks
	21.04.1997	Jozani Forest, northern section	5 47.0 E / 93 13.2 N	Coral rag forest	Tracks
	23.04.1997	South of Jozani	5 47.0 E / 93 06.3 N	Coral rag thicket near mangroves	Tracks
	24.04.1997	Jozani Forest, northern section	5 47.3 E / 93 13.0 N	Coral rag forest	Tracks
	25.04.1997	Jambiani to Mamli	5 57.4 E / 93 01.7 N	Coral rag thicket	Tracks, big
	26.04.1997	Jozani Forest, northern section	5 47.8 E / 93 12.3 N	Coral rag forest	Tracks
	26.04.1997	Jozani Forest	5 47.6 E / 93 11.0 N	Coral rag forest	Tracks
	26.04.1997	Jozani Forest	5 47.6 E / 93 11.1 N	Coral rag forest	Tracks
	27.04.1997	Kiwengwa	5 44.5 E / 93 33.8 N	Coral rag forest nr. coast	Tracks
Viverricula indica Indian civet	11.04.1997	Kijibwe Chui, south of Paje	5 59.8 E / 93 04.3 N	Sandy beach	Tracks
	21.04.1997	Jozani Forest, northern section	5 47.0 E / 93 13.2 N	Coral rag forest	Tracks
	24.04.1997	Jozani Forest, northern section	5 47.9 E / 93 12.1 N	Coral rag forest	Tracks
	27.04.1997	Kiwengwa Forest	5 42.6 E / 93 36.6 N	Coral rag forest near coast	Tracks
Genetta sp. Genet	20.04.1997	Jozani Forest, Jimbini	5 46.2 E / 93 11.5 N	Bracken field	Tracks

A spontaneous case of amyloidosis associated with hypergammagloninaemia in *Martes foina*

P. E. MARTINO and E. GIMENO

Abstract

The present paper is a contribution to our knowledge of the clinical manisfestation of amyloidosis in martens, with special reference to hematological, serological, and relevant biochemical examinations related to the pathological lesions accompanying this condition.

Blood collected at agony showed an outstanding level of hypergammaglobulinaemia (38%) and a total protein value of 133 g/l. These values differed greatly from the confidence limits of the standard values established for healthy beech martens, and indicate disturbed homeostasis. Histological findings are consistent with secondary (reactive) AA amyloidosis.

Introduction

Martens often live close to human habitations. Although they are not abundant, presumably they come to town only sporadically to exploit good food sources (especially fruits) and possibly also nesting sites. Persecution by man may be severe (Cavallini, 1992).

The purpose of this paper is to present the results of a detailed case report of spontaneous idiopathic amyloidosis in a marten (*Martes foina*, Erxleben, 1777), observed when the senior author was placed at the Veterinary College of Milan (Italy). The sick animal had been found by a farmer in a mixed forest/field near a village.

Materials and methods

Case report:

Based on its history and physical condition the animal in this study was clinically agonic at the time of blood collection, presenting clinical signs of a mucopurulent discharge, a rectal $T = 36.8°$ C, 123 pulses/min (auscultated), dyspnea and anorexia. The animal had good general body condition and its age (between 10 and 18 months) was determined primarily from body length, dentition and the appearance of organs.

Haematology:

A blood sample was collected after the animal was manually restrained whilst 2 ml of blood was collected by heart puncture through a 20-gauge needle into a 5 ml syringe – additional small blood samples were collected on heparinized capillaries following puncture of the tail according to Bleakley (1980). Blood was placed into vaccuum tubes containing 2.5% of an anticoagulant consisting of disodium ethylenediaminetetra acetate (EDTA) and formaldehyde at a final concentration of approximately 10% in sterile distilled water.

Serum and plasma were separated by double centrifugation. Cell counts and blood smears were made within 3 hours of sample collection. The blood samples were diluted 1/100 and mixed for one minute to ensure even cell distributions. A double haemocytometer (Improved Neubauer, 1/400 mm, Hawksley) was filled and erythrocytes were counted, the average of the two counts being taken. Determination of total white cell count was done by an electronic particle counting device. Haemoglobin was measured photometrically at 540 nm by the 'haemoglobin cyanide method'; packed cell volume (PCV) was determined in capillary tubes run for 6 min in a Cellokrit centrifuge.

Biochemistry:

Total protein was measured by the burette method (Weichselbaum, 1946). Albumin was determined by the Bromcresol green method of Doumas *et al.* (1971), and globulin was calculated by subtracting the albumin from the total protein values. For the estimation of gammaglobulin, serum proteins were separated by cellulose acetate electrophoresis, stained, and scanned with a recording computer densitometer. Samples were also examined using the Unitest 300 system (Boehringer) for blood urea and blood glucose. Aspartate amino transferase (ASAT) and alanine amino transferase (ALAT) were determined at 37° C as described by Keiding *et al.* (1974). These analyses were performed in a Gensaec fast analyzer. Creatinine was assayed photometrically at λ=490 nm. Calcium (Ca), magnesium (Mg), sodium (Na), and potassium (K) were detected by atomic absorption (Perkin-Elmer 303).

Serological tests:

Serum samples for serological Aleutian disease (AD), Leptospira and Toxoplasma sreening were obtained by cutting a claw short and collecting blood in a heparinized capillary tube for the counter immunoelectrophoresis test (Cho & Ingram, 1974) using live Aleutian disease virus antigen (United Vaccines, USA); and the microscopic agglutination test (Natl. Vet. Services Lab. 1987) for Leptospira and Toxoplasma antibodies. The antigens used were *Leptospira interrogans* (representative of the *icterohaemorrhagiae* group), *canicola, grippotyphosa, hardjo,* and *bratislava* at a 1:100 sreening dilution.

Necropsy and histological examination:

After autopsy, tissues were collected, fixed in buffered 10% formol saline and wax-embedded. Sections were cut and stained with hematoxylin and eosin, red Congo and silver methenamine.

The affinity of amyloid for Congo red after incubation with potassium permanganate as described by Wright *et al.* (1977) was studied. Sections were cut at 4 µ, incubated for 3 minutes with equal volumes of 5% potassium permanganate and 0.3% sulphuric acid, decolourised with 5% oxalic acid, washed twice in distilled water and stained with alkaline Congo red. The sections were studied under light microscope and polarising microscope.

Bacterial examination:

For routine isolation of bacteria, blood agar eosine methylene blue agar plates were inoculated with the main organ samples and incubated at 37° C for 18 to 24 hours in a 5 to 10% CO_2 atmosphere. Plates were examined for bacteria, incubated for an additional 24 hours at 37° C in an aerobic environment and reexamined. Bacteria were identified by means of standard procedures (Carter & Cole, 1990). In order to isolate fungi, Sabouraud dextrose agar and mycotic agar plates were inoculated and incubated at approximately 25° C in the dark for a minimum of 3 weeks, and examined weekly for evidence of fungal growth.

Virologic examination:

Samples of liver, spleen, kidney and mesenteric lymph node were examined by transmission electron microscopy. Tissue extracts were prepared for electron microscopy by grinding approximately 0.5 g tissue in phosphate buffer to give a 10% v/v final concentration (Welchman *et al.*, 1993). Electron microscope grids coated with formvar and stabilized with evaporated carbon were floated on drops of the extract. The grids were touch dried after one minute and then negatively stained (for one minute) in 2% phosphotungstic acid (pH 6.6). After touch drying the grid was observed in the EM-S-Seizs.

Results

Hematological and biochemistry:

The analyses of samples from the marten are shown in Table 1.

Necropsy and histology:

At necropsy there was a mucous exsudate in the nostrils and larynx. The trachea, bronchi and bronchioles contained a white, frothy fluid wich could not be expressed from the cut lung. The spleen had splenomegaly, was abnormally firm and elastic in consistency, and showing a characteristic translucency in section. Microscopically, the organ showed a diffuse amyloid degeneration (Red Congo: +): the malpighian bodies were indiscernable as a result of advanced atrophy, total amyloid replacement of the arterial components, the walls of the sinuses were abnormally thick and the reticulum of the pulp was coarser than normal.

The kidneys were moderately increased in size and weight, and were firm and elastic, with the cortex augmented in depth, translucent and grey-flecked. Histologically, glomeruli showed moderate mesangial-sclerosing glomerulonephritis. The afferent glomerular arterioles were affected in the stroma of the media (replaced by a thicker amyloid framework). Other glomeruli were more involved with amyloid material laid down on their reticulum supporting the glomerular capillaries. The glomerular tufts were usually swollen and showed an actual loss of cappilaries owing to obliteration of their lumina in the advanced cases.

The liver was enlarged, the borders rounded and the surface smooth.

Microscopically, amyloid deposits involved the hepatic arterioles and, in some capillaries of the intermediate zone of the lobules in association with the reticulum of hepatic sinusoids, periportal infiltration of lymphocytes and plasma cells in the liver. The adjacent cells have consequently undergone progressive atrophy and have been replaced by irregular masses of homogeneous amyloid.

The larynx exhibited a mild epithelial necrosis and fibrin thrombi in mutiple submucosal vessels.

Mesenteric lymph nodes were enlarged and showed lymphoid hyperplasia with prominent germinal center formation.

No pathological changes were evident on examination of samples from bone marrow.

The material within the Space of Disse stained with Congo red and had bright, apple green bi-refringence* when viewed with polarized light. Congo red staining was not retained in specimens treated with potassium permanganate and dilute sulphuric acid, and applegreen bi-refringence was absent under polarized light.

Bacteriology, virology and serology:

No relevant or transient bacteria were recovered from the liver (i.e. *Enterobacter cloacae* and *Bacillus* spp.) or from the kidney (coliforms), meanwhile no bacteria were recovered from the spleen, brain or lung.

Also the animal was serologically negative to the tests performed and virus-like particles were not found in the samples screened.

Discussion

Idiopathic amyloidosis has been well documented in wild stone martens, but its cause has not been defined clearly (Linke *et al.*, 1980).

Taking into account that almost all diseases are accompanied by homeostatic disorders, modern biochemical tests are employed to assess the state of health of fur-bearing animals. Details of the clinical biochemistry of sick martens with amyloidosis have been documented poorly (Geisel, 1982), and haematological details of live animals with amyloidosis are not published yet. The haematological variables obtained were within their normal ranges (Damgaard & Hansen, 1992), although the level of eosinophil leucocytes could be a reflection of the physiological stress situation over a prolonged period (Moller *et al.*, 1991).

Among the plasma chemical results from the laboratory tests (except for those for total protein and gamma globulin) the means of the rest of the parameters remained within normal ranges (Damgaard & Hansen, 1992). No data are available for the glucose parameter of martens in the literature. However, one would expect that, due to the marten's close relationship to the mink, both species would have values within the same order of magnitude.

Here, examination of serum proteins revealed marked hyperproteinemia due to enormous hypergammaglobinaemia: 38%, meanwhile the albuminaemia value remained below normal limits. Wandeler & Paoli (1969), by electrophoretic studies, found serum-albuminaemia values among dead and sick animals to be lower than those of normal martens, and also discovered an additional fraction between the alpha and beta globulins.

Excessive hypergammaglobulinaemia and some pathoanatomical and histological lesions (i.e. glomerulonephritis, periportal infiltration of lymphocytes and plasma cells in the liver, vasculitis indicative of immune complex deposition) led us to suspect the possibility of our facing a case of Aleutian disease (Porter *et al.*, 1980; Martino *et al.*, 1991) (also taking into account that the animal was found very close to a mink ranch which had a mild AD infection amongst the animals). In eastern England escaped ranched mink were the suspected source of infection to a wild otter (*Lutra lutra*) which had the pathological changes consistent with AD (Wells *et al.*, 1989). Progessive-AD is caused by a mink parvovirus and infected mink become hypergammaglobulinaemic: the plasma concentration of gamma-

* Bi-refringence: a double, optical/coloured (green apple) special effect seen in a Congo red stain of amyloid tissue under a polarized light microscope.

globulin is higher than 25% of the total plasma protein (Aasted, 1985). However, the CIEP test and virological attempts were later found to be negative. In addition, there is no indication of susceptibility to this parvovirus in martens (Geisel, pers. comm.).

The potassium permanganate method is important in dividing the major forms of generalized amyloidosis in humans into AA-amyloid and non-AA-amyloid. The affinity of amyloid for Congo red after incubation does not change in patients with myeloma-associated amyloidosis, familiar amyloidotic polineuropathy, medullary carcinoma of the thyroid, pancreatic island amyloid, and cerebral amyloidosis, all consisting of non-AA-amyloidosis (Van Rijswijk & Van Heusden, 1979). Our findings are consistent with secondary (reactive) AA-amyloidosis.

The most common cause of death in dogs with amyloidosis is nephrotic symptoms and renal failure (Thornburg & Moody, 1981). Secondary amyloidosis is often associated with chronic infection, inflamation, neoplasia, and immune diseases (Loeven, 1994).

Hypergammaglobinaemia and monoclonal gammopathy could be associated with an infectious peritonitis, a multiple myeloma or an extramedullary plasmacytoma, but all these possibilities were later discarded. So, when studying this phenomenon in detail, a spontaneous generalized amyloidosis was probably the primary cause of this marten's death.

Parameter	Value
Haemoglobin (nmol/l)	12.1
Haematocrit (%)	41
Mean corpuscular volume (MCV)(fl)	40
Mean corpuscular haemoglobin (MCH)(fmol)	0.9
Erythrocytes (x 10^{12}/L)	12.3
Total leucocyte count (1000/ul blood)	9.7
Neutrophils segmented (%)	46.4
Neutrophils band. (%)	5.1
Lymphocytes (%)	40.3
Monocytes (%)	5.1
Eosinophiles (%)	2.9
Basophiles (%)	0.2
Glucose (mmol/l)	30
Total protein (g/l)	133
Albumin (g/l)	43.6
Alpha 1-globulin (%)	3.1
Alpha 2-globulin (%)	2.3
Beta 1-globulin (%)	2.2
Beta 2-globulin (%)	7.1
Fibrinogen (%)	3.2
Gamma-globulin (%)	38.5
Urea (mmol/l)	16.7
Creatinine (µmol/l)	70
S-transaminases	
ASAT (U/l)	47
ALAT (U/l)	84

Table 1. Haematological and biochemical analyses of blood samples

References

Aasted, B. 1985. Aleutian disease of mink: Virology and immunology. *Acta Pathol. Microbiol. Immonolog. Scand.*, 93:1-43.

Bleakley, S. P. 1980. Simple technique for bleeding ferrets (*Mustela putorius furo*). *Lab. Anim.*, 14:59-60.

Carter, G. R. & Cole, J. R., eds. 1990. *Diagnostic procedures in veterinary bacteriology and mycology. 5th ed.* Academic Press, San Diego, CA.

Cavallini, P. 1992. Stone martens (*Martes foina*) in Siena, Italy. *Small Carnivore Conserv.*, 7:7.

Cho, H. J. & Ingram, D. G. 1972. Antigen and antibody in Aleutian disease in mink. I. Precipitation-reaction by agar-gel electrophoresis. *J. Immunol.*, 2:555-557.

Damgaard, B. M. & Hansen, S. W. 1992. Hematological and plasma chemical characteristics in Beech marten (*Martes foina*). *Comp. Biochem. Physiol. A.*, 4:721-725.

Doumas, B. T., Watson, W. A. & Briggs, H. 1971. Albumin standards and measurement of serum albumin with bromcresol green. *Clin. Chim. Acta* 31:87-96.

Geisel, O. 1982. Die idiopatisch generalisierte Amyloidose der Marder. *Tierärztl. Prax.*, 10:535-547.

Keiding, R. M. Horder, W. & Pitkanen, E. 1974. Recommended methods for the determination of four enzymes in blood. *Scand. J. Clin. Lab. Invest.*, 33:291-306.

Linke, R. P. *et al.* 1980. Idiopathic amyloidosis in the Stone marten: Identification of amyloid fibril proteins in tissue sections using the immunoperoxidase technique. *Blut* 41:465-468.

Loeven, K. 1994. Hepatic amyloidosis in two Chinese Shar Pei dogs. *J. Amer. Vet. Med. Ass.*, 1212-1216.

National Veterinary Services Laboratory. 1987. Microtiter technique for detection of Leptospira antibodies. *Proc. Annual Meet. US Anim. Hlth. Ass.*, 91:65-73.

Martino, P. E., Martino, J. J. & Villar, J. A. 1991. A note on diseases of mink. *J. Vet Med.*, 38:227-230.

Moller, S. H. *et al.* 1991. Production of mink. *In* Report from the Natl. Institute of Animal Science. 688 Beretning, Denmark.

Porter, D. D., Larse, A. E. & Porter, H. G. 1980. Aleutian disease of mink. *Adv. Immunol.*, 29:261-286.

Thornburg, L. P. & Moody, G. M. 1981. Hepatic amyloidosis in a dog. *J. Amer. Anim. Hosp. Ass.*, 17:721-723.

Van Rijswijk, M. H. & Van Heusden, C. W. 1979. The potassium permanganate method: A reliable method for differentiating amyloid AA from other forms of amyloid in routine laboratory practice. *Amer. J. Pathol.*, 97:43-45.

Wandeler, A. & Paoli, B. 1969. Amyloidose bei Steinmarder. *Schweiz. Arch. Tierheilk.*, 111:532-539.

Weichselbaum, T. E. 1946. An accurate and rapid method for the determination of proteins in small amounts of blood serum and plasma. *Amer. J. Clin. Pathol.*, 16:40-49.

Welchman, D. B., Oxenham, M. & Done, S. H. 1993. Aleutian disease in domestic ferrets: Diagnostic findings and survey results. *Vet. Rec.*, 8:479-484.

Wright, J. R., Humphrey, R. L. & Calkin, E. 1977. Potassium permanganate reaction in amyloidosis: A histological method to assist in differentiating forms of this disease. *Lab. Invest.*, 36:274-281.

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New distribution records for *Poecilogale albinucha* and *Rhynchogale melleri* in southern Africa

Chris and Tilde STUART

The Striped weasel (*Poecilogale albinucha*) has a fairly broad distribution to the south of the Equator. In southern Africa it is restricted to the east, except for a narrow belt across north of South Africa and extending marginally into Namibia. Although most records of occurrence are from various grassland associations, they do occur in lowland rainforest in the southern Congo River basin. On the 6th of January 1997 a car-killed *Poecilogale* was collected and photographed (Jaco van Deventer who supplied the details and voucher photographs) in the extreme south-west of Western Province, South Africa. Locality details: 3319AC (33°17'10"S, 19°10'E), close to Boontjie's River, between Watervalsberg in the west and the Witsenberg range in the east, on the farm 'Artoes'.

This constitutes a westerly range extension of more than 250 km and it is the first time that this tiny mustelid has been recorded in Cape Macchia (Fynbos) vegetation type. The road runs through a mix of arable fields and short grassland circled by fynbos covered hills.

In 1989 the authors discovered the presence of the striped weasel in the Kalahari Gemsbok National Park, a further range extension (Stuart & Stuart, 1990). We also have an unconfirmed, but fairly secure sighting, of this mustelid from the central Great Karoo (3123AC), which is a mix of short scrub mixed with grass. The fact that it is now recorded from grassland types, lowland rainforest, semi-desert, and Cape Macchia indicates that it has a much broader habitat tolerance than previously thought.

Meller's mongoose (*Rhynchogale melleri*) has a seemingly patchy, disjunct, distribution but it has always been our feeling that this is more an indication of scarcity and under-recording than actual true distribution pattern. The patchy distribution is certainly not due to habitat restriction as its known range and areas in between is covered with its favoured habitat of open woodlands adjacent to savannah. Dense cover and proximity to water are important requirements.

A road casualty was photographed (Penny Meakin & John Carlyon) about 5 km south of Kariba Village (in the direction of Makouti and Karoi; 16°42'S, 29°15'E) in northern Zimbabwe in early 1996 (exact date unknown). These photographs are lodged at the AAWRC office and are clearly of this species. The area is predominantly covered by *Brachystegia* woodland and is close to Lake Kariba and the Zambezi River. This record forms the "missing link" between Zimbabwe Midlands records and that of the miombo woodlands of Zambia that lies on the north bank of the Zambezi River.

Reference

Stuart, C. T & Stuart, M. D. 1990. Striped weasel, *Poecilogale albinucha*, recorded from the Kalajari Gemsbok National Park. *Koedoe* 33(1):112-113.

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Sumatran Small Carnivore Project

Background

Sumatra was highlighted as a core area for mustelid and viverrid conservation in 1989 by Schreiber *et al*. To date, however, no detailed study has been undertaken on the small carnivore community of Sumatra. To address this imbalance a two year field project endorsed by the IUCN/SSC Mustelid, Viverrid and Procyonid Specialist Group is being planned. The project is to take place in the Kerinci Seblat National Park which, being Sumatra's largest remaining continuous area of rain forest, extends 345 km along the volcanic Barisan mountain chain. With an altitude range of 35 to 3,805 m ASL the National Park could harbour target species for conservation (Schreiber *et al.*) such as the Otter civet (*Cynogale bennettii*), Sumatran collared mongoose (*Herpestes semitorquatus uniformis*) and the Indonesian mountain weasel (*Mustela lutreolina*). All species of viverrid, mustelid and herpestid will be studied including species such as the Banded linsang (*Prionodon linsang*), Banded palm civet (*Hemigalus derbyanus*), Binturong (*Arctictis binturong*), Hog-nosed badger (*Arctonyx collaris*), Malay badger (*Myolaus javanensis*), Oriental small-clawed otter (*Aonyx cinerea*) and smooth-coated otter (*Lutra perspicillata*).

Aims

- Calculation of home range size and use.
- Population size and variation with altitude and habitat type.
- Estimation of population densities and distributions.
- Determination of diet and prey selection.
- Calculation of prey density and biomass.
- Inter-specific comparison to evaluate mode of niche partitioning between small carnivore species.
- Investigate the effects of habitat type and fruiting cycles on populations.
- Production of recommendations for future conservation efforts on the small carnivore community of Sumatra.

Methods

Diurnal and nocturnal transects to establish carnivore and prey densities.
Remote camera-trapping to establish presence and distribution of species.
Radio-tracking to determine home range size and use.
Faecal analysis to investigate the diet of each carnivore species.
Small mammal trapping to calculate rodent densities and so prey biomass.
Vegetation surveys to establish habitat type and fruit availability.

Logistics

All work is to be carried out in close collaboration with the Directorate General for Forest Protection and Nature Conservation (PHPA) and the Indonesian Institute of Sciences (LIPI). Indonesian students will be heavily involved in the project and local guides will be employed. The project manager will be Dr. D. J. Chivers of the University of Cambridge Wildlife Research Group.

Funding

Some funding has been obtained from the Zoological Society For The Conservation of Species and Populations, but more is required before the project can commence. Anyone interested in receiving more details of the project or able to help with information, advice or financial assistance I would be grateful to hear from.

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The European badger

Griffiths, H. I. & Thomas, D. H. 1997. The conservation and management of the European badger (*Meles meles*). Council of Europe Publishing, Nature and Environment N°90 :1-77. (exists also in French)

This document contains the "Revised results of an enquiry into the species, originally presented as a report to the Standing Committee of the Convention on the Conservation of European Wildlife and natural Habitats, on the population and management status and conservation needs of the species in the Western Palaearctic".

After a "General Introduction" this very useful publication gives "National Accounts" (distribution with maps), legal status, conservation and management, and recommendations) of the badger in : Albania, Austria, Belarus, Belgium, Bosnia-Hercegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxemburg, the former Yugoslavic Republic of Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, and Yugoslavia.

"Badgers in a modern world" deals successively with 'Badgers as pests', 'Badgers as game', Badgers and disease', 'Road traffic mortality', 'Landscape changes', 'The effects of pollutants', 'Badgers as a source of commodities', and 'Illegal 'Sports' : badger baiting'.

"Badger population biology : a brief review" includes 'Population models', 'Causes of natural mortality', and 'Density dependence and habitat colonisation'.

The "Conclusions" contain 'Conservation-based recommendations' and 'Management-based recommendations'.

After the "References" the 'Names and affiliations of correspondents in national accounts', the 'Scientific names of species cited in the text', and 'Distribution maps' are given in "Appendices".

IUCN Red List of treatened animals

IUCN. 1996. *The IUCN 1996 Red List of threatened animals*. IUCN, Gland & Cambridge. 448 pp.

For more than thirty years, the Species Survival Commission (SSC) has been assessing the conservation status of species and subspecies on a global scale in order to highlight taxa threatened with extinction, and therefore promote their conservation. For the first time, all mammal species have been assessed and from these we have selected the mustelids, herpestids, viverrids, and procyonids.

1. THREATENED SPECIES:

MUSTELIDAE

- *Gulo gulo* (wolverine): **VU-A2c**, Canada, Estonia, Finland, Mongolia, Norway, Russia, Sweden, USA.
- *Martes gwatkinsii* (Nilgiri marten): **VU-B1+2c**, India.
- *Melogale everetti* (Kinabalu ferret-badger): **VU-B1+2c**, Malaysia.
- *Mustela felipei* (Colombian weasel): **EN-B1+2ce**, Colombia, Ecuador.
- *Mustela lutreola* (European mink): **EN-A1ace**, Belarus, Estonia, Finland (ex?), France, Georgia, Latvia, Lithuania (ex), Poland (ex?), Romania, Russia, Spain.
- *Mustela lutreolina* (Indonesian Mountain weasel): **EN-B1+2c**, Indonesia.
- *Mustela strigidorsa* (Back-striped weasel): **VU-C2a**, Bhutan, China, India, Laos, Myanmar (Burma), Thailand, Vietnam.
- *Mydaus marchei* (Palawan stink badger): **VU-B1+2c**, Philippines.

HERPESTIDAE

- *Bdeogale jacksoni* (Jackson's mongoose): **VU-B1+2cd**, Kenya, Uganda.
- *Galidictis fasciata* (Broad-striped mongoose): **VU-A1cd+2cd**, Madagascar.
- *Galidictis grandidieri* (Giant-striped mongoose): **EN-B1+3b**, Madagascar.
- *Liberiictis kuhni* (Liberian mongoose): **EN-B1+2c**, Côte d'Ivoire, Guinea, Liberia.
- *Mungotictis decemlineata* (Narrow-striped mongoose): **VU-B1+2c**, Madagascar.
- *Salanoia concolor* (Brown-tailed mongoose): **VU-B1+2c**, Madagascar.

VIVERRIDAE

- *Chrotogale owstoni* (Owston's palm civet): **VU-A1cd**, China, Laos, Vietnam.
- *Cryptoprocta ferox* (Fossa): **VU-B1+2e**, Madagascar.
- *Cynogale bennettii* (Otter-civet): **EN-A1ce, C2a**, Brunei, Indonesia, Malaysia, Singapore?, Thailand, Vietnam.
- *Diplogale hosei* (Hose's palm civet): **VU-B1+2c**, Malaysia.
- *Eupleres goudotii* (Fanaloue): **EN-B1+2c**, Madagascar.
- *Genetta cristata* (Crested genet): **EN-B1+2c**, Cameroon, Nigeria.
- *Macrogalidia musschenbroekii* (Sulawesi palm civet): **VU-A2c**, Indonesia.
- *Paradoxurus jerdoni* (Jerdon's palm civet): **VU-B1+2c**, India.
- *Viverra civettina*: **CR-C2a**, India.

PROCYONIDAE

- *Bassaricyon lasius*: **EN-D1**, Costa Rica.
- *Bassaricyon pauli*: **EN-D1**, Panama.
- *Nasua nelsoni*: (Cozumel Island coati): **EN-D1**, Mexico.
- *Procyon insularis*: **EN-D1**, Mexico.
- *Procyon maynardi*: **EN-C2a**, Bahamas.
- *Procyon minor*: **EN-C2b**, Guadeloupe.
- *Procyon pygmaeus*: **EN-C2a**, Mexico.

2. LOWER RISK: NEAR THREATENED

PROCYONIDAE

- *Bassaricyon beddardi*: Guyana, Venezuela?
- *Bassaricyon gabbii*: Colombia, Costa Rica, Ecuador, Nicaragua, Panama.
- *Bassariscus sumichrasti*: Belize, Costa rica, El Salvador, Guatemala, Honduras?, Mexico, Nicaragua, Panama.

3. EXTINCT AND EXTINCT IN THE WILD

MUSTELIDAE

- *Mustela nigripes* (Black-footed ferret): **EW**, USA.

PROCYONIDAE

- *Procyon gloveralleni*: **EX**, Barbados.

4. DATA DEFICIENT

MUSTELIDAE

- *Mustela africana* (Tropical weasel): Brazil, Colombia?, Ecuador, Peru.

VIVERRIDAE

- *Genetta abyssinica* (Abyssinian genet): Djibouti, Ethiopia, Somalia.
- *Genetta johnstoni* (Johston's genet): Côte d'Ivoire, Guinea, Liberia.
- *Mungos gambianus* (Gambian mongoose): Côte d'Ivoire, Gambia, Ghana, Niger, Nigeria, Senegal, Sierra Leone, Togo.
- *Osbornictis piscivora* (Aquatic genet): Congo (Kinshasa).

PROCYONIDAE

- *Nasuella olivacea*: Colombia, Ecuador, Venezuela.

5. SUBSPECIES AND POPULATIONS

MUSTELIDAE

- *Conepatus mesoleucus telmalestes* (Big thicket hog-nosed skunk): **EX**, USA.
- *Eira barbara senex* (Greyheaded tayra): **VU-C1**, Belize, Guatemala, Mexico.
- *Martes flavigula robinsoni* (Javan yellow-throated marten): **EN-B1+2c**, Indonesia.
- *Martes melampus tsuensis* (Tsushima Island Marten): **VU-C2b**, Japan.
- *Martes zibellina brachyura* (Japanese sable): **DD**, Japan.
- *Melogale personata orientalis* (Javan ferret-badger): **LR**, Indonesia.
- *Mustela eversmanni amurensis*: **VU-A2cd**, China, Russia.
- *Vormela peregusna peregusna* (European marbled polecat): **VU-A1cd**, Bulgaria, Greece, Romania, Turkey, Ukraine, Yugoslavia (former).

HERPESTIDAE

- *Bdeogale crassicauda omnivora* (Sokoke bushy-tailed mongoose): **EN-B1+2c**, Kenya, Tanzania.

VIVERRIDAE

- *Arctictis binturong whitei* (Palawan binturong): **VU-B1+2c**, Philippines.
- *Arctogalidia trivirgata trilineata* (Javan small-toothed palm civet): **EN-C2a**, Indonesia.
- *Crossarchus ansorgei ansorgei* (Angolan cusimanse): **DD**, Angola.
- *Genetta genetta isabellae* (Ibiza genet): **VU-B1+2c**, Spain (Balearic Is.).
- *Paradoxurus hermaphroditus lignicolor* (Mentawai palm civet): **VU-A2c**, Indonesia.
- *Poiana richardsonii liberiensis* (Leighton's linsang): **DD**, Côte d'Ivoire, Liberia, Sierra Leone.

The new IUCN Categories and criteria: Abbreviations and acronyms (see above mentioned publication for more details)

CATEGORY:

CR, Critically Endangered; **EN**, Endangered; **VU**, Vulnerable. **LR:cd**, Lower Risk, conservation dependent; **LR:nt**, Lower Risk, near threatened; **EX**, Extinct; **EW**, Extinct in the Wild; **DD**, Data Deficient;

CRITERIA **(A,B,C,D,E)** and SUBCRITERIA **(1,2,a,b,c,d,e)**:

A, Declining population: **1**, Population reduction observed, estimated, inferred, or suspected in the past; **2**, Population decline projected or suspected in the future based on **a**, direct observation; **b**, an index of abundance appropriate for the taxon; **c**, a decline in area of occupancy, extent of occurrence and/or quality of habitat; **d**, actual or potential levels of exploitation; **e**, the effects of introduced taxa, hybridization, pathogens, pollutants, competitors, or parasites. **B**, Small distribution and decline or fluctuation; **1**, either severely fragmented (isolated subpopulations with a reduced probability of recolonization, if once extinct) or known to exist at a number of locations; **2**, continuing decline in any of the following: **a**, extent of occurrence; **b**, area of occupancy; **c**, area, extent and/or quality of habitat; **d**, number of locations or subpopulations; **e**, number of mature individuals; **3**, fluctuating in any of the following: **a**, extent of occurrence; **b**, area of occupancy; **c**, number of locations or subpopulations; **d**, number of mature individuals; **C**, Small population size and decline: **1**, rapid decline rate; **2**, continuing decline and either: **a**, fragmented or **b**, all individuals in a single subpopulation; **D**, Very small or restricted either **1**, number of mature individuals or **2**, population is susceptible.

It should be noted that there is no complete conformity with the CITES list:

- ANNEX I:
  MUSTELIDAE: *Mustela nigripes*; VIVERRIDAE: *Prionodon pardicolor.*
- ANNEX II:
  MUSTELIDAE: *Conepatus humboldtii*; VIVERRIDAE: *Cryptoprocta ferox, Cynogale bennettii, Eupleres goudotii, Fossa fossana, Hemigalus derbyanus, Prionodon linsang*; PROCYONIDAE: *Ailurus fulgens.*
- ANNEX III:
  MUSTELIDAE: *Eira barbara* (Honduras), *Galictis vittata, Martes foina intermedia* (India), *Martes gwatkinsi* (India), *Mellivora capensis* (Botswana, Ghana), *Mustela altaica* (India), *Mustela kathiah* (India), *Mustela sibirica* (India); HERPESTIDAE: *Herpestes auropunctatus* (India), *H. edwardsii* (India), *H. fuscus* (India), *H. smithii* (India), *H. urva* (India), *H. vitticollis* (India); VIVERRIDAE: *Arctictis binturong* (India), *Civettictis civetta* (Botswana), *Paguma larvata* (India), *Paradoxurus hermaphroditus* (India), *P. jerdoni* (India), *Viverra megaspila* (India), *Viverra zibetha* (India), *Viverricula indica* (India); PROCYONIDAE: *Bassaricyon gabbii* (Costa Rica), *Bassariscus sumichrasti* (Costa Rica), *Nasua nasua* (Honduras), *Nasua nasua solitaria* (Uruguay); *Potos flavus* (Honduras).

IUCN/SSC Wildlife Trade Programme and Small Carnivores

The MVPSG are aware of the wildlife trade in mustelids, viverrids and procyonids and the potential impact this may have on the conservation status of many small carnivore species. The major economic value of mustelids, viverrids and procyonids is mainly from their fur, and despite the ability to establish commercial fur-farms (as with mustelids) using captive-bred animals, this has not prevented trapping of wild fur-bearing species in considerable quantities. There are also other important considerations in the control of fur-farming to prevent the inadvertent or deliberate escape or introduction of alien species, which threatens the stability of native biodiversity in many parts of the world. A most notable victim of the invasive species problem created by the fur industry is the European mink *Mustela lutreola*, (as readers of this newsletter will know) which is close to extinction due to the compounded effects of the introduced American mink *Mustela vison* to continental Europe, with its more robust and opportunistic nature, the American mink outcompetes the native European mink and so prevents the recovery of *M. lutreola* where the two species come into contact. The humane ranching of small carnivores can relieve the pressure on wild populations, nevertheless, the harvesting of wild fur-bearers is a sound ecological method of meeting market demands for fur if there are effective controls in the sustainable use of harvested species, and conducted humanely. At the moment such proven methods of sustainability appear to be only achieved in parts of North America. In all other regions of the world which obtain fur from wild trapped animals it is found to be either unsustainable or the evidence to evaluate sustainable harvest is imprecise or simply does not exist.

Hunting of viverrids for meat is widespread in parts of Africa and Asia. Small carnivore meat is locally important, especially for village communities in tropical countries, and in some areas this may pose a threat to several species. Perhaps of greater concern is the large-scale exploitation known to occur throughout Asia, where palm civet meat is a delicacy, or perceived as having medicinal properties, in many homes and restaurants. Recent economic growth in Asia has seen a dramatic increase in the consumptive trade of basically all wildlife, including civets. For example, confiscations at the Hanoi Rescue Centre over a 10 week period listed over 460 animals, of which 80 comprised of small carnivores (mainly *Paradoxurus hermaphroditus*) and this graphically illustrates the enormity of the trade that mainly goes undetected or is blatantly unenforced and tolerated.

Other derivatives of small carnivores, provided by wildlife trade, include the extraction of civet oil as a raw substance for use in the perfume industry, a common practise in the past and still in use today. Civet-farms mostly use wild-caught animals, but there is a small number of farms becoming established using captive-bred animals.

The pet trade is usually of local importance, especially with viverrids in Asia. The trade in wild-caught animals for zoos mostly occurs in regions that have not developed co-ordinated species management programmes, as found in North America, Europe, Japan and Australasia, that mainly utilise captive-bred animals.

Recently the MVPSG has been approached, along with other specialist groups, by the IUCN/SSC Wildlife Trade Programmes to assist them with their activities, and it has been agreed to improve communication and co-operation by providing more information and direction on the status of small carnivores that might be in danger of unsustainable trade.

The Wildlife Trade Programme (previously the Trade Specialist Group) was initiated over 10 years ago to enhance the SSC's scientific input to CITES and provide information to national and international policy makers; and the programme works in collaboration with its partner organisations, TRAFFIC and WCMC. The major focus of the programme has been to identify species threatened in trade and to recommend actions to address these threats.

In order to fulfil part of the Wildlife Trade Programme objectives, it is important that they are provided with a focal point for trade issues in each taxonomic Specialist Group to ensure that SSC can provide the detailed information required. The MVPSG have agreed to identify a person or persons within or outside the existing membership who is willing to take on the role as the focal point on trade issues involving small carnivores. We are therefore asking MVPSG members who have the relevant expertise or interest to come forward or who can recommend others for recruitment to the MVPSG to specifically deal with small carnivore trade issues.

For the moment Paul Robinson is acting as the focal point for co-operation between the Wildlife Trade Programme and the MVPSG, until someone is willing to take on this role. Please contact Paul Robinson if you are interested or with any details on the trade in small carnivores.

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Paul Robinson and Roland Wirth

The Krebs Report on badgers and bovine TB

The Krebs review of 'The great badgers and bovine TB debate' has now appeared but is a very disappointing reflection on the failure of politically inspired pseudoscience to address either the key issues of objective science, or a practical solution to the problem of bovine TB in cattle which is after all the object of the exercise !

The Report and the Minitry of Agriculture both admit that it is not known how, or if, badgers might pass TB to cattle where it starts as a respiratory long infection. And it also accepts uncritically the myth that only gross lesion cattle cases are infectious so that badgers are not merely catching TB from cattle. This myth has very sadly been repeated by MAFF in the 'bible' for badger students (Cheeseman, 1996).

The Report also fails to explain the dramatic upswing in cattle TB since 1986, and spread to Midlands areas where TB has been absent from both badgers and cattle for decades. TB badgers occurred at a prevalence of up to 70% *after* these herd breakdowns which is the clearest evidence of spillover *to* badgers from mistested/untraced cattle.
Two absurdly simple solutions to the problem are evident :
1. MAFF's computer data could show a parallel between herd TB severity and badgers with TB from these herds, given the political will. This could be both quick and cheap to carry out.

Cattle TB will continue to rise until the over-thirty-month 'cattle cull' of BSE (Mad Cows) catches up and removes older cattle with TB too. This has already halved TB 1996-97 but will be claimed as proof that 'badger culls' work.

2. Cattle testing costs £ 11 million/year already and will have to be increased. So it is illogical to spend £ 12 million on a new 5 year badger cull/research scheme, purely on MAFF's own admitted 'assumption' that badgers are guilty. £ 3,000/TB badger must be lunatics economics, better spent on farmer compensation.

Sadly, the politics of pseudoscience have overcome common sense as I pointed out previously (*Small Carnivore Conservation* 13 :5, 11 :25). Amusingly, neither the *Veterinary Record* nor *New Scientist* are willing to publicise the idea that maybe badgers are merely catching TB from cows... and the Krebs report doesn't cite even one of my 50 odd papers on the subject !

Reference

Cheeseman, C. 1996. *Badgers*. Poyser (P. 202-203 by Cheeseman of MAFF)

M. Hancox, 17 Nouncells Cross, Stroud, Glos. GL5 1PT, UK

Mustelids

Abramov, A. V. & Baryshnikov, G. F. 1995. The structure of os malleus in Palaeoarctic Mustelidae (Carnivora). *Zool. Zh.*, 74:129-142. (In Russian)

Alcala, L. *et al.* 1994. New large mustelids from the late Miocene of the Teruel Basin (Spain). *C.R. Acad. Sci. Sér. II.* 319:1093-1100. (In French)

Alterio, N. & Brown, K. 1997. Secondary poisoning of mustelids in a New Zealand *Notofagus* forest. *J. Zool.*, 243:863-869.

Alterio, N. & Moller, H. 1997. Diet of feral cats *Felis catus*, ferrets *Mustela furo*, and stoats *M. erminea* in grassland surrounding yellow-eyed penguin *Megadytes antipodes* breeding areas, South Island, New Zealand. *J. Zool.*, 243:869-877.

...arspul, T. & Zoon, C. 1997. Een actieplan in mergelland. Kansen voor de boommarter. *Zoogdier* 8(3):19-22. (*Martes martes*)

...ard, A. P., McRae, A. C. & Rawlings, N. C. 1997. Reproductive efficiency in mink (*Mustela vison*) treated with the pesticides lindane, carbofuran and pentachlorophenol. *J. Reprod. Fertil.*, 111:21-28.

...mmisch, P. *et al.* 1997. Occurrence of non-ortho, mono-ortho and di ortho substituted PCB congeners in polecats, stone martens and badgers from the state of Baden-Wurtemberg, Germany. *Chemosphere* 34:2293-2300.

...n David, M., Flynn, R. W. & Schell, D. M. 1997. Annual and seasonal changes in diets of martens: Evidence from stable isotope analysis. *Oecologia* 111:280-291.

...ks, J. D. 1997. A volunteer-based system for sampling variations in the abundance of polecats (*Mustela putorius*). *J. Zool.*, 243:857-863.

...rks, J. D., Davison, A. & Jermyn, D. L. 1997. Studies on the status and ecology of the polecat in Britain. *Vincent Wildl. Trust. Rev.*, 1966:32-38.

...ackman, S. 1997. Where bedbugs can't bite. *BBC Wildlife* 15(5):20. (*Meles meles*)

...risov, V. I. *et al.* 1997. Developmental stability of the mink *Mustela vison* under the impact of PCB. *Acta Theriol.* Suppl. 4:17-26.

...utin, S. *et al.* 1995. Population-changes of the vertebrate community during a snowshoe hare cycle in Canada boreal forest. *Oikos* 74:69-80. (*Gulo gulo*)

...owman, J. C. 1997. An arboreal encounter between a Long-tailed weasel, *Mustela frenata*, and three red squirrels, *Tamiasciurus hudsonicus*. *Can. Field-Natur.*, 111:480-481.

...remle, G., Larsson, P. & Helldin, J. O. 1997. Polychlorinated biphenyls in a terrestrial predator, the pine marten (*Martes martes* L.). *Environm. Toxicol. Chem.*, 16:1779-1784.

...ochier, B. *et al.* 1997. Epidemiosurveillance of rabies in Belgium: 1996 assessment. *Ann. Med. Vet.*, 141:399. (*Meles meles*)

...ares, S. & Pavel, V. 1997. The effect of nestling condition on risk-taking in meadow pipits. *Anim. Behav.*, 54:1531-1534. (*Mustela nivalis*)

...apin, T. G., Harrison, D. J. & Phillips, D. M. 1997. Seasonal habitat selection by marten in an untrapped forest preserve. *J. Wildl. Manage.*, 61:707-717.

...raik, C. 1997. Long-term effects of N. American mink *Mustela vison* on seabirds in western Scotland. *Bird Study* 44:303-309.

Dragoo, J. W. & Honeycutt, R. L. 1997. Systematics of mustelid-like carnivores. *J. Mamm.*, 78:426-443.

Drew, G. S. & Bissonette, J. A. 1997. Winter activity patterns of American martens (*Martes americana*): Rejection of the hypothesis of thermal-cost minimization. *Can. J. Zool.*, 75:812-816.

Edwards, R. 1997. At the mercy of mink. *New Scientist* 156(2110):26.

Enders, A. C. & Mead, R. A. 1996. Progression of trophoblast into the endometrium during implantation in the western spotted skunk. *Anat. Rec.*, 244:297-315.

Fenske-Crawford, T. J. & Niemi, G. J. 1997. Predation of artificial ground nests at two types of edges in a forest-dominated landscape. *Condor* 99:14-24.

Garcia, N., Arsuaga, J. L. & Torres, T. 1997. The carnivore remains from the Sima de los Huesos Middle Pleistocene site (Sierra de Atapuerca, Spain). *J. Hum. Evol.*, 33:155-174.

Gaynor, J. S. *et al.* 1997. A comparison of sevoflurane and isoflurane for short-term anesthesia in polecats (*Mustela eversmanni*). *J. Zoo Wildl. Med.*, 28:274-279.

Greenwood, R. J. *et al.* 1997. Population and movement characteristics of radio-collared striped skunks in North Dakota during an epizootic of rabies. *J. Wildl. Dis.*, 33:226-241.

Hansen, B. & Berg, P. 1997. Mink kit growth performance in the suckling period. 2. Estimates of sources of variation. *Acta Agri. Scandin.*, 47(A):240-246.

Harris, S. 1997. Badger hole reveals chaos. *BBC Wildlife* 15(8):30. (*Meles meles*)

Henry, K. S. *et al.* 1998. Concentrations and hazard assessment of organochlorine contaminants and mercury in smallmouth bass from a remote lake in the Upper Peninsula of Michigan. *Arch. Environm. Contam. Toxicol.*, 34:81-86. (*Mustela vison*).

Hirzel, D. & Mead, R. A. 1997. Leukemia inhibitory factor in the uterus of the western spotted skunk. *Biol. Reprod.*, 56(S1):439.

Hraste, A. *et al.* 1997. Histological and histochemical characteristics of the glandulae profundae plicae semilunares conjunctivae among some carnivores. *Z. Jagdwiss.*, 43:120-124. (*Martes*)

Jefferies, D. J., Strachan, C. & Strachan, R. 1997. Studies on the status and ecology of the water vole and its interaction with the European mink; *Vincent Wildl. Trust Rev.*, 1996:42-46.

Jones, C. P. *et al.* 1997. Environmental pollutants as actiological agents in female reproductive pathology: Placental glycan expression in normal and polychlorinated biphenyl (PCB)-exposed mink (*Mustela vison*). *Placenta* 18:689-699.

Klemola, T. *et al.* 1997. Small mustelid predation slows population growth of *Microtus* voles: A predator reduction experiment. *J. Anim. Ecol.*, 66:607-614. (*Mustela nivalis*)

Kruuk, H. 1998. On thin ice. *BBC Wildl.* 16(2):64-70. (*Mustela lutreola*)

Kurki, S. *et al.* 1997. Breeding success of black grouse and capercaillie in relation to mammalian predator densities on two spatial scales. *Oikos* 79:301-310.

Landa, A. *et al.* 1997. Wolverines and their prey in southern Norway. *Can. J. Zool.*, 75:1292-1299.

Larivière, S. & Messier, F. 1966. Aposematic behaviour in the striped skunk, *Mephitis mephitis*. *Ethology* 102:896-992.

Larivière, S. & Messier, F. 1966. Field anesthesia of striped skunks, *Mephitis mephitis*, using halothane. *Can. Field-Natur.*, 110:703-705.

Larivière, S. & Messier, F. 1996. Immobilization of striped skunks with Telazol. *Wildl. Soc. Bull.*, 24:713-716.

Larivière, S. & Messier, F. 1997. Characteristics of waterfowl nest depredation by the striped skunk (*Mephitis mephitis*): Can predators be identified from nest remains? *Amer. Midl. Natur.*, 137:393-396.

Linell, J. D. *et al.*, 1997. Translocation of carnivores as a method for managing problem animals: A review. *Biodiv. Conserv.*, 6:1245-1257.

Lodé, T. 1996. Trophic status and feeding habits of the European polecat *Mustela putorius* L. 1758. *Mamm. Rev.*, 27:177-184.

Lynch, J. M. *et al.* 1977. Craniometric variation in the eurasian badger, *Meles meles. J. Zool.*, 242:31-44.

Mabelis, B. 1997. Boommarter in de broek. *Zoogdier* 8(2):33-34.

Malmkvist, J., Houbak, B. & Hansen, S. W. 1997. Mating time and litter size in farm mink selected for confident or timid behaviour. *Anim. Sci.*, 65:521-525.

Maran, T. 1997. Schutz des Europäischen Nerzes (*Mustela lutreola*). *Mitt. Zool. Gesells. Arten Populationsschutz* 13(1):7-9.

Martin, S. W. *et al.* 1997. The association between the bovine tuberculosis status of herds in the East Offaly Project Area, and the distance to badger setts, 1988-1993. *Prev. Vet. Med.*, 31:113-125.

Masuko, T. S. *et al.* 1996. Ultrastructural analysis of the parotid and submandibular glands of the marten. *J. Dent. Res.*, 75:1085.

Messsenger, J. E., Birks, J. D. & Davison, A. 1997. The status of the pine marten in England and Wales. *Vincent Wildl. Trust Rev.*, 1996:24-31.

Morris, C. J. & Birks, J. D. 1997. Preliminary monitoring work on stoats and weasels. *Vincent Wildl. Trust Rev.*, 1996:39-41.

Newell, D. G., Clifton-Hadley, R. S. & Cheeseman, C. L. 1997. The kinetics of serum antibody responses to natural infections with *Mycobacterium bovis* in one badger social group. *Epidemiol. Infection* 118:173-180.

Pei. K. & Wang, Y. 1995. Some observations on the reproduction of the Taiwan ferret badger (*Melogale moschata subaurantiaca*) in southern Taiwan. *Zool. Studies* 34:88-95.

Pekkarinen, P. & Heikkila, J. 1997. Prey selection of the least weasel *Mustela nivalis* in the laboratory. *Acta Theriol.*, 42:179-188.

Powell, R. A. & King, C. M. 1977. Variation in body size, sexual dimorphism and age-specific survival in stoats, *Mustela erminea* (Mammalia, carnivora) with fluctuating food supplies. *Biol. J. Linn. Soc.*, 62:165-194.

Poysa, H., Milonoff, M. & Virtanen, J. 1997. Nest predation in hole-nesting birds in relation to habitat edge: An experiment. *Ecography* 20:329-335. (*Martes*)

Ramos-Vara, J. A. *et al.* 1997. Sarcocystis in mink (*Mustela vison*). *J. Parasitol.*, 83:1198-1201.

Ratz, H. 1997. Identification of footprints of some small mammals. *Mammalia* 61:431-441. (*Mustela erminea*).

Rogers, L. M., Cheeseman, C. L. & Langton, S. 1997. Body weight as an idencation of density-dependent population regulation in badgers (*Meles meles*) at Woodchester Park, Gloucestershire. *J. Zool.*, 242:597-604.

Rogers, L. M. *et al.*, 1997. The demography of a high-density badger (*Meles meles*) population in the west of England. *J. Zool.*, 242:705-728.

Roper, T. J. & Kemenes, I. 1997. Effect of blocking of entrances on the internal environment of badger *Meles meles* setts. *J. Appl. Ecol.*, 34:1311-1319.

Rouvinen, K. I., Anderson, D. M. & Alward, S. R. 1997. Effects of high dietary levels of silver hake and Atlantic herring on growing -furring performance and blood clinical-chemistry of mink (*Mustela vison*). *Can. J. Anim. Sci.*, 77:509-517.

Ruiz-Olmo, J. *et al.* 1997. Distribution, status and colonization of the American mink *Mustela vison* in Spain. *J. Wildl. Res.*, 2(1):30-36.

Schropfer, R., Wiegand, P. & Hogrefe, H. H. 1997. The implications of territoriality for the social system of the European pine marten (*Martes martes*). *Z. Säugetierk.*, 62:209-218.

Sokolov, V. E., Chernova, O. F. & Rozhnov, V. V. 1997. A finding of plantar glandular organs in a marbled polecat *Vormela peregusna* (Mustelidae, Mammalia). *Doklady Akad. Nauk* 354:846-849. (In Russian)

Stewart, P. D., Ellwood, S. A. & Macdonald, D. W. 1996. Remote video-surveillance of wildlifz -an introduction from experience with the European badger *Meles meles. Mamm. Rev.*, 27:185-204.

Stubbe, M. & Stubbe, A. 1997. Der Mauswiesel (*Mustela nivalis*) bejagt oder geschützt? Seine Stellung im Ökosystem und im Gesetz. *Beitr. Jagd Wildforsch.*, 22:257-262.

Sutherland-Smith, M. R. *et al.* 1997. Vaccine-induced canine distemper in European mink, *Mustela lutreola. J. Zoo Wildl. Med.*, 28:312-318.

Swinton, J. *et al.* 1997. Comparison of fertility control and lethal control of bovine tuberculosis in badgers: The impact of perturbation induced transmission. *Philos. Trans. Roy. Soc. London* 352(B):619-631.

Tauson, A. H. 1997. Prolactin profiles of pregnant, lactating and non-lactating female mink (*Mustela vison*). *J. Reprod. Fertil.*, 51(S):195-201.

Tauson, A. H., Fink, R. & Chwalibog, A. 1997. Can gas exchange measurements be used for calculation of nutrient oxidation in mink (*Mustela vison*) exposed to short-term changes in energy supply? *Z. Ernahrungswiss.*, 36:317-320.

Thome, H. & Geiger, G. 1997. A comparison of two methods based on tooth wear used to determine age in wild carnivores of known age. *Anat. Histol. Embryol. J. Vet Med. Ser. C* 26:81-84.

Tryjanowski, P. 1997. Food of the stone marten (*Martes foina*) in Nietoperek Bat Reserve. *Z. Säugetierk.*, 62:318-320.

Turchin, P. & Hanski, I. 1997. An empirically based model for latitudinal gradient in vole population dynamics. *Amer. Natur.*, 149:842-874.

Vink, H. & Groenendijk, D. 1997. Winterse activiteit van dassen automatisch geregistreerd. *Zoogdier* 8(3):14-18. (*Meles meles*)

Wamberg, S., Elnif, J. & Tauson, A. H. 1997. Rates of urinary water electrolyte and nitrogen excretion in fed and fasted female mink (*Mustela vison*). *Z. Ernahrungswiss.*, 36:358.

Ward, J. F. *et al.* 1996. Physiological response of the European hedgehog to predator and non-predator odor. *Physiol. Behav.*, 60:1469-1472. (*Meles meles*)

White, P. C., Lewis, A. J. & Harris, S. 1997. Fertility control as a means of controlling bovine tuberculosis in badger (*Meles meles*) populations in south-west England: Predictions from a spatial stochastic simulation model. *Proc. Roy. Soc. London* 264(B):1737-1747.

Wilderness Fund. 1997. Study on the status of the marbled polecat (*Vormela peregusna peregusna* Guldenstädt) in southern Dobrudja (Bulgaria) and elaboration of a plan for the management of its population in the country. Bulgarian-Swiss Biodiversity Conservation Programme.

Wilson, P. R. *et al.* 1998. The role of introduced predators and competitors in the decline of kaka (*Nestor meridionalis*) populations in New Zealand. *Biol. Conserv.*, 83:175-185. (*Mustela erminea*)

Woodroffe, R., MacDonald, D. W. & Cheeseman, C. L. 1997. Endocrine correlates of contrasting male mating strategies in the European badger (*Meles meles*). *J. Zool.*, 241:291-300.

Zalewski, A. 1997. Factors affecting selection of resting site type by pine marten in primeval deciduous forests (Bialowieza National park, Poland). *Acta Theriol.*, 42:271-288.

Zang, D. L. 1997. Studies on isolation, serum-free cultivation and manufacture of mink enteritis virus optimized for vaccine preparation. *Biologicals* 25:103-111.

Viverrids

Barnett, A. A. & Prangley, M. L. 1997. Mammalogy in the Republic of Guinea: An overview of research from 1946 to 1996, a preliminary check-list and a summary of research recommendations for the future. *Mamm. Review* 27:115-164.

Bednekoff, P. A. 1997. Mutualism among safe, selfish sentinels: A dynamic game. *Amer. Natur.*, 150:373-392. (*Helogale parvula*)

Bdolah, A. *et al.* 1997. Resistance of the Egyptian mongoose to sarafotoxins. *Toxicon* 35:1251-1261.

Chuang, S. A. & Lee, L. L. 1997. Food habits of three carnivore species (*Viverricula indica*, *Herpestes urva*, and *Melogale moschata*) in Fushan forest, northern Taiwan. *J. Zool.*, 243:71-79.

Doolan, S. P. & Macdonald, D. M. 1997. Band structure and failures of reproductive suppression in a co-operatively breeding carnivore, the slender-tailed meerkat (*Suricata suricatta*). *Behaviour* 134:827-848.

Goodman, S. M., Langrand, O. & Rasolonandrasana, B. P. 1977. The food habits of *Cryptoprocta ferox* in the high mountain zone of the Andringitra Massif, Madagascar (Carnivora, Viverridae). *Mammalia* 61:185-192.

Hutterer, R. & Ray, J. C. 1997. Bat predation by small carnivores in a central African rainforest. *Z. Säugetierk.*, 62:86-92.

Keane, B., Creel, S. R. & Waser, P. M. 1996. No evidence of inbreeding avoidance or inbreeding depression in a social carnivore. *Behav. Ecol.*, 7:480-489.

Smits van Oyen, M. 1998. Banded together. *BBC Wildlife* 16(3):64-70. (*Mungos mungo*)

Mustelids and viverrids

Alden, P. C., Estes, R. D., Schlitter, D. & Mcbride, B. 1997. *Collins guide to African wildlife*. Haper Collins.

Jayson, E. A. 1996. Rare and endangered mammals of Kerala. *Kerala Forest Research Institute Handbook No. 3* 44 pp. (*Viverra civettina*, *Paradoxurus jerdoni*, *Martes gwatkinsi*)

Pham Trong Anh, Nguyen Dang Khoi & Nguyen Thi Thang Long. 1996. List of mammals in the animal collection of the Biology Institute in Da Lat. *J. Biol. (Hanoi)* 18(1):16-22. (In Vietnamese).

Qumsiyeh, M. B. 1996. *Mammals of the Holy Land.* Texas Tech University Press, Lubbock.

Procyonids

Brown, C. L. & Szakacs, J. G. 1997. Rabies in New Hampshire and Vermont: An update. *Ann. Clin. Lab. Sci.*, 27:216-233.

Craig, L. E. *et al.* 1996. Acquired-resistance and antibody-response of raccoons (*Procyon lotor*) to sequential feedings of *Ixodes scapularis* (Acari, Ixodidae). *Vet. Parasitol.*, 63:291-301.

Fox, J., Yonzon, P. & Podger, N. 1996. Mapping conflicts between biodiversity and human needs in Langtang National Park, Nepal. *Conserv. Biol.*, 10:562-569. (*Ailurus fulgens*)

Gehrt, S. D. & Fritzell, E. K. 1997. Sexual differences in home ranges of raccoons. *J. Mamm.*, 78:921-931.

Ginsburg, L. *et al.* 1997. Discovery of an ancestor of the lesser panda in the Middle Miocene of Madrid (Spain). *C. R. Acad. Sci. Sér. II. Fasc. A - Sci. Terre Planetes* 325:447-451.

Hamir, A. N., Hanlon, C. & Rupprecht, C. E. 1997. Capillariasis in the trachea of a raccoon. *J. Wildl. Dis.*, 33:880-881.

Hewitt, N. & Miyanishi, K. 1997. The role of mammals in maintaining plant species richness in a floating *Typha* marsh in southern Ontario. *Biodivers. & Conserv.*, 6:1085-1102. (*Procyon lotor*)

Kakela, R. & Hyvarinen, H. 1996. Site-specific fatty acid composition in adipose tissues of several northern aquatic and terrestrial mammals. *Comp. Biochem. Physiol.*, 115(B):501-514.

Kerr, C. L., Henke, S. E. & Pence, D. B. 1997. Baylisascariasis in raccoons from southern coastal Texas. *J. Wildl. Dis.*, 33:653-655.

Ladine, T. A. 1997. Activity patterns of co-occurring populations of Virginia opossums (*Didelphis virginiana*) and raccoons (*Procyon lotor*). *Mammalia* 61:345-354.

Meltzer, M. I. 1996. Assessing the costs and benefits of an oral vaccine for raccoon rabies: A possible model. *Emerging Infect. Dis.*, 2:343-349.

Ouellette, J. *et al.*, 1997. Tick-raccoon associations and the potential for Lyme disease spirochete transmission in the coastal plain of North Carolina. *J. Wildl. Dis.*, 33:28-39.

Pedlar, J. H., Fahrig, L. & Merriam, H. G. 1997. Raccoon habitat use at two spatial scales. *J. Wildl. Manage.*, 61:102-112.

Rasmusson, D. D. 1996. Changes in the response properties of neurons in the ventroposterior lateral thalamic nucleus of the raccoon after peripheral deafferentation. *J. Neorophysiol.*, 75:2441-2450.

Ratnaswamy, M. J. *et al.* 1997. Comparisons of lethal and nonlethal techniques to reduce raccoon depredation of sea turtles. *J. Wildl. Manage.* 61:368-376.

Robb, J. R. *et al.* 1996. Use of tree cavities by fox squirrels and raccoons in Indiana. *J. Mamm.*, 77:1017-1027.

Rosatte, R. C. *et al.*, 1997. A proactive prevention strategy for raccoon rabies in Ontario, Canada. *Wildl. Soc. Bull.*, 25:110-116.

Spanner, A., Stone, G. M. & Schultz, D. 1997. Excretion profiles of some reproductive steroids in the faeces of captive Nepalese red panda (*Ailurus fulgens fulgens*). *Reprod. Fertil. Develop.*, 9:565-570.

Wang, X. M. 1997. New cranial material of *Simocyon* from China, and its implications for phylogenetic relationship to the red panda (*Ailurus*). *J. Vertebr. Paleontol.*, 17:184-198.

Wilson, M. L. *et al.* 1997. Emergence of raccoon rabies in Connecticut, 1991-1994: Spatial and temporal characteristics of animal infection and human contact. *Amer. J. Trop. Med. Hyg.*, 57:457-463.

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