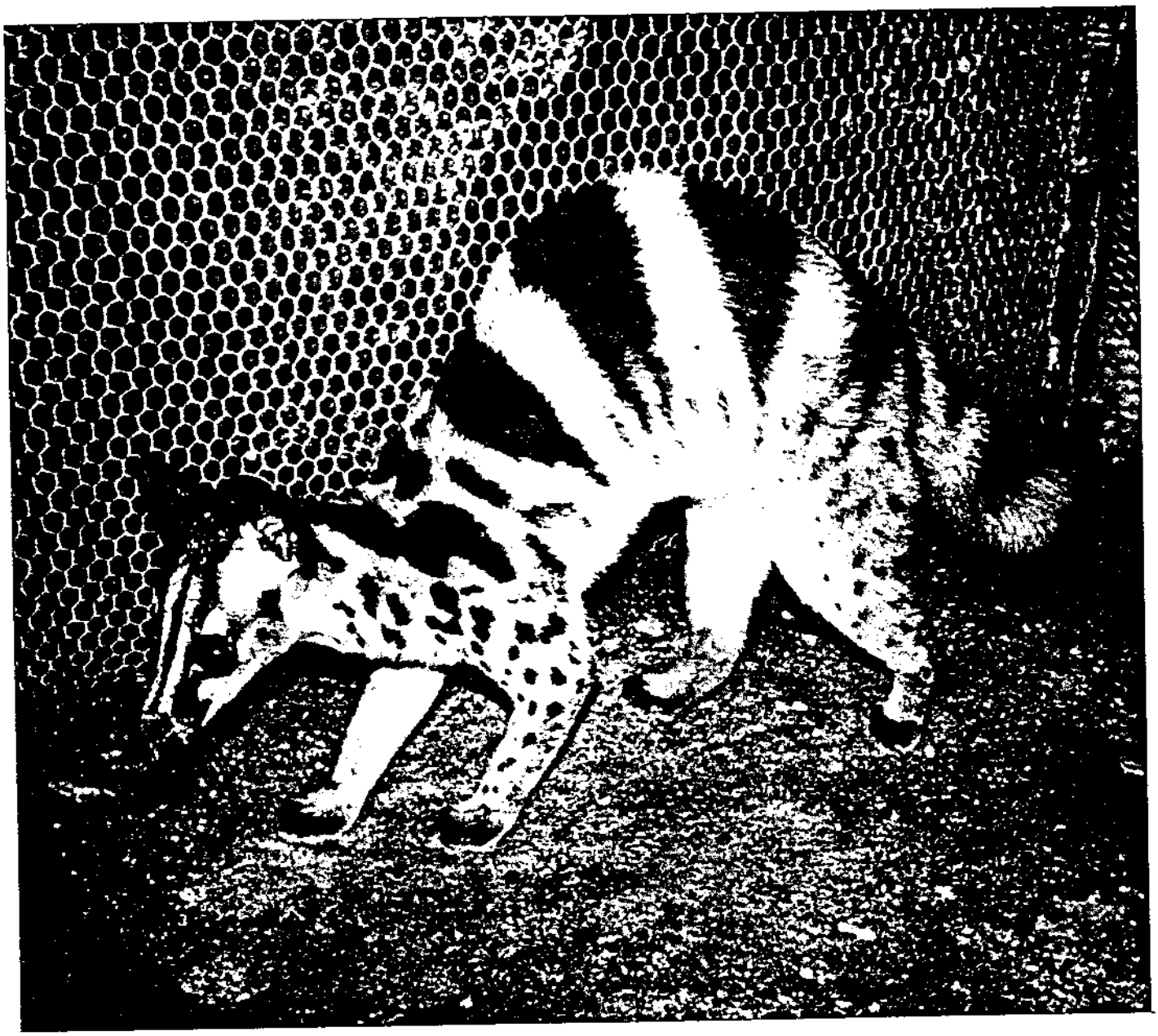
MUSTELID & VIVERRID CONSERVATION

The Newsletter of the IUCN/SSC
Mustelid & Viverrid Specialist Group

Number 4 April 1991



Owston's palm civet *(Chrotogale owstoni)*.
This rare palm civet was photographed for the first time in Vietnam. Photo by H. J. Adler.

This number was produced with the support of
the "Royal Zoological Society of Antwerp", Antwerp, Belgium,
and the "Metropolitan Toronto Zoo", West Hill, Ontario, Canada.

Mustelid & Viverrid Conservation

The Newsletter of the IUCN/SSC Mustelid & Viverrid Specialist Group

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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 newsletter is to offer the members of the IUCN/SSC M&VSG, and those who are concerned with mustelids or/and viverrids, brief papers, news items, abstracts, and titles of recent literature. All readers are invited to send material to:

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Aspects of the biology of the Small grey mongoose *Galerella pulverulenta*

C.T. STUART

Abstract

The small grey mongoose *Galerella pulverulenta* is a common, diurnal predator throughout much of its limited range. In the present study 34 individuals were marked and released within a 200 ha area, with the home ranges of four animals being between 5 ha and 36 ha in extent. The estimated density was 1 mongoose/12.5 ha and there was considerable range overlap. Ninety two percent of the 163 sightings were of solitary animals. Food consists mainly of small murids and insects. Comparative notes are presented on the Yellow mongoose *Cynictis penicillata*.

Introduction

The Small grey mongoose *Galerella pulverulenta* (Fig. 1) is a small, generally solitary, diurnal viverrid, restricted in its distribution to the Cape Province south of the Orange River, Orange Free State, and marginally in Natal, Lesotho and Namibia (Lynch, 1981; Stuart, 1981).

Despite its abundance, particularly in the south-western part of its range, little attention has been given to this mongoose by research workers. Lynch (1981) has discussed the taxonomic status of this species and limited aspects of its biology have been briefly examined by Crawford *et al.* (1983) and Stuart (1981). This paper reports the results of a home range, behaviour and diet study of the small grey mongoose on the Vrolijkheid Nature Conservation Station.

Fig. 1. Small grey mongoose (*Galerella pulverulenta*, also kown as *Herpestes pulverulentus)*

Study area

The study area was situated in the Vrolijkheid Nature Conservation Station in the extreme eastern portion of the Robertson Karoo, part of the Little Karoo system. Of the 200 ha study area some 40 ha consisted of cultivated and unused farmland. The southern boundary of the area was formed by the Keisers' River, behind which rises a steep and rocky hillside. A tarred road divides the study area and extensive vineyards and orchards bound the southern sector. The study area consisted of low karroid scrub and succulent vegetation on broken, rocky outcrops. The eastern and northern boundaries abutted on to steep, rocky hillslopes. The southern area consisted of open, eroded and overgrazed scrubland. Five small earth-walled dams were located in the western sector of the study area and one in the east. Only two of the dams held water throughout the year. The faunal and floral components of the area have been covered in some detail by Stuart (1974).

Methods

Between April 1978 and July 1980 a live-trapping programme was undertaken to determine the small carnivore population of the study area, with special emphasis on the small grey mongoose. Trapping was undertaken at regular intervals, with a total of 7260 trap days (20 traps for 363 days), with single-door live-traps (75x36x36 cm). Eight traplines were marked out and each line consisted of 20 equally spaced markers (50 m between markers). Trapping was undertaken in each line for three days every 65 days. Six traplines ran from east to west and two from north to south (Fig. 2). Traps were baited with a blood-based scent lure and raw meat. In order to reduce disturbance traps were fixed in the open position between trapping periods.

All animals trapped were sexed, aged (juvenile, sub-adult or adult), measured, weighed, marked and released. Each mongoose was marked with numbered aluminium poultry wing-tags placed close to the base of each ear. Direct observations of free-ranging animals were made on an irregular basis. Scats of the small grey mongoose were collected and prey fragments identified in the laboratory as described by Stuart (1981).

Results

Home range and movement

A total of 34 individual small grey mongooses were trapped (Fig. 2), marked and released, of which 18 were male and 16 female. Thirteen (38%) of the animals were caught in the first two months of trapping and a total of 20 (59%) had been taken by the end of the seventh month. Only 16 animals were recaptured after marking, with one of the males being trapped 22 times and a female 12 times. Sufficient recaptures for estimating home range were only available for two males and two females (Fig. 3).

The established home range sizes were calculated using the "minimum home range" method (Mohr, 1947). These ranged from 5 ha (female B) to 36 ha (male C). From the limited information obtained it would seem that there is considerable overlap in home ranges within the study area.

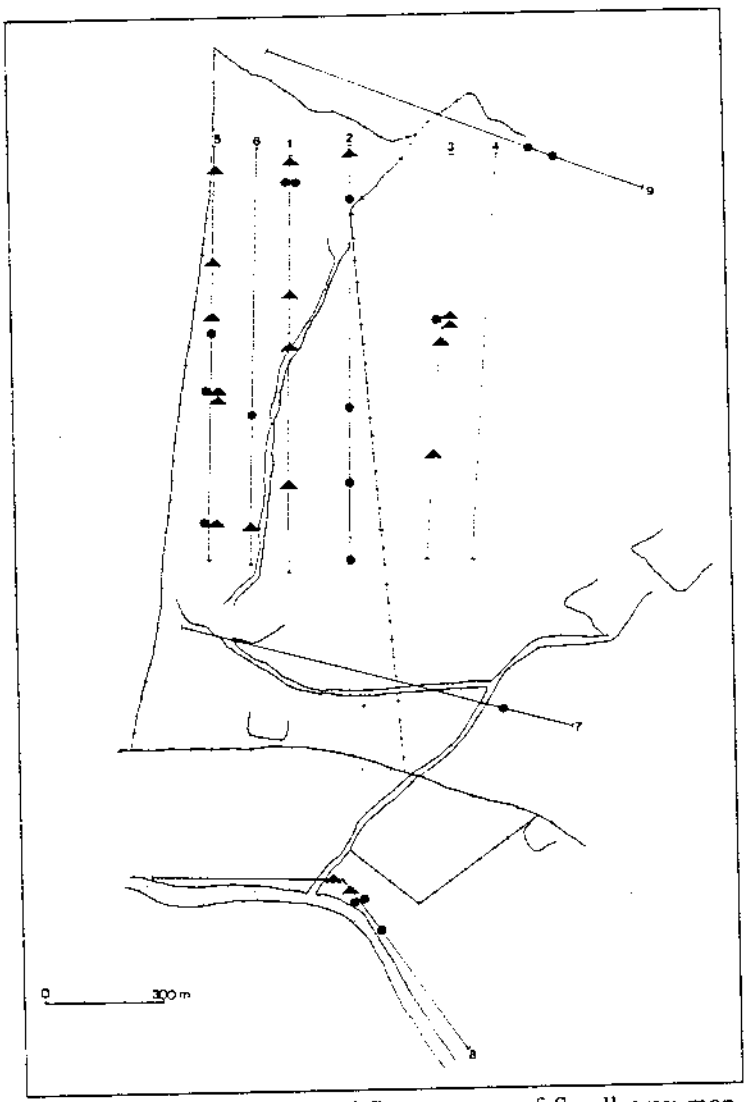

Fig. 2. Spatial distribution of first captures of Small grey mongoose within the study area. Triangles: males; circles: females. The nine traplines and topographical features are also indicated. Dams and water courses are indicated by stippled overlay.

The longest linear movement recorded between captures was by male C, of 1800 m. Most other recorded movements between captures were, however, considerably less than this, with a mean of 350 m.

Social organisation and behaviour

A total of 163 sightings were made during this study, of which 151 were of solitary animals, seven were of pairs and five were of groups of three individuals. Three of the pairs and four of the groups of three consisted of an adult accompanied by one, or two sub-adults.

Food searching appears to be of an opportunistic nature and this is borne out by the diet analysis. Both sight and smell appear to play a significant role in food searching (Pers. obs.). Most attention is concentrated on searching the area at the bases of bushes and rocks.

Only on one occasion was an aggressive encounter observed. Two adult mongooses were observed walking towards each other on the same path. Both animals (A & B) were involved in food searching, each unaware of the presence of the other. Animal A stopped, defecated and was about to continue when B came within sight of A. Animal A raised the hair on its tail, holding the tail low to the ground and ran at B, with B turning and A chasing it for approx. 10 m.

Density

With 34 individual mongooses having been marked within the study area, the density was approximately one mongoose per 6 ha. Eighteen animals were trapped once only and may have been non-resident within the study area, or they learned to avoid the traps. If these animals are excluded from the calculations the resident population would have been 16 animals and therefore a possible density of one mongoose per 12.5 ha. If one takes into account that 40 ha of the area consisted of marginally utilised habitat, the actual density would have been greater.

Food

Small grey mongoose scats were deposited singly, or in small, scattered accumulations along pathways and on dam walls. The content of 316 scats is summarised in Table 1. Rodent remains occurred in all ten monthly samples, ranging from 65% to 100% of the content. Of the 43 individual rodents identified to species level only two, *Rhabdomys pumilio* and *Otomys unisulcatus* occurred in significant numbers. The remaining four rodent species identified were much more limited in their distribution within the study area.

Discussion

There are few data with which to compare the findings of this study, with only one previous estimate of home range size for this mongoose having been made (Crawford *et al.*, 1983). This was based on casual observations of a single animal believed to range over 75 ha.

The only other comparable solitary and diurnal viverrid that has been studied, the slender mongoose, *Galerella sanguinea*, which had estimated home range sizes of 100 ha in the Serengeti National Park in Tanzania (Rood & Waser, 1978). Kingdon (1977) is, however, of the opinion that in some areas home ranges of the slender mongoose are considerably smaller.

Gorman (1979) working on the closely related Small Indian mongoose *Herpestes auropunctatus* in Fiji found that males had a mean home range of approximately 39 ha and females 22 ha. In a similar study in Puerto Rico Pimentel (1955) found that the same mongoose had home ranges of 0.5 ha and 1.2 ha resp., whereas Tomich (1969) found that the small Indian mongoose in Hawaii had home ranges of between 50 ha and 200 ha. These studies serve to demonstrate the variability of home range size within the same species in different areas.

In the current study the small grey mongoose home ranges were estimated from between 5 ha and 36 ha and with a density probably greater than one mongoose per 12.5 ha.

Solitary viverrids have two advantages: exploitation of small rodents as a food source requires hunting by stealth and is best accomplished when the individual hunts alone.

Approximately 70%, by mass, of the prey taken by small grey mongoose in the study area were vertebrates. In addition, the individual gains an intimate knowledge of its foraging range and this is particularly important in a species which exploits invertebrates as a food source. Although invertebrates are abundant they generally have an aggregated and local distribution (Gorman, 1979). Insects were by far the most important invertebrate group represented in the present study, followed by myriapods and arachnids.

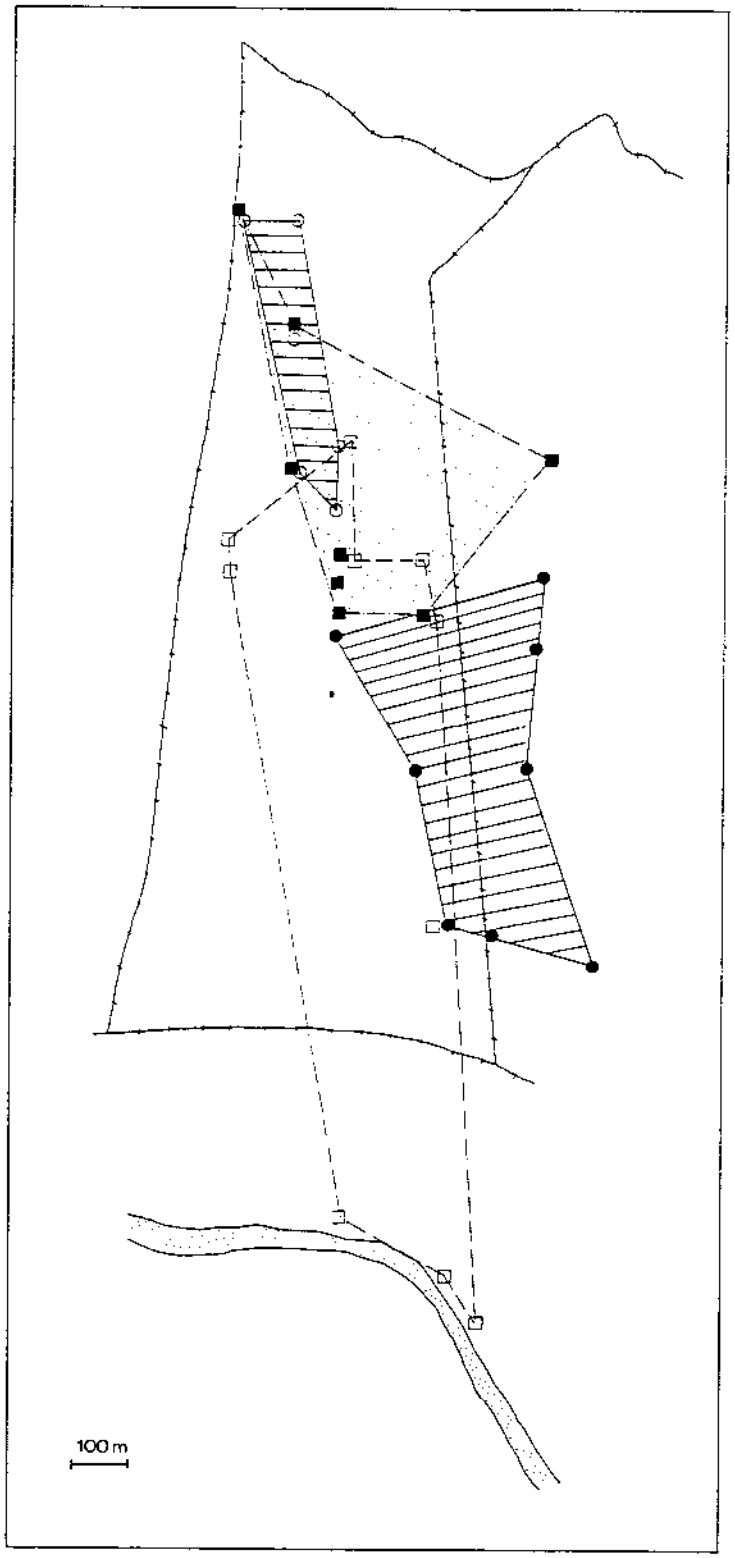

Fig. 3. Estimated home ranges of two male (solid and closed squares) and two females (solid and open circles) Small grey mongoose within the study area.

Table 1. Percentage occurrence of different food categories from Small grey mongoose scats through the months of the year.

	J	F	M	A	M	J	J	A	S	O	N	D
No. of scats	22	10	96	20	12	-	4	-	48	34	46	24
Rodents	100	100	73	70	83	-	(4)	-	92	88	65	92
Amphibians	-	-	4	10	-	-	-	-	-	-	-	-
Birds	9	-	6	20	-	-	-	-	6	12	26	8
Reptiles	9	-	2	10	-	-	-	-	-	6	17	8
Insects	73	80	94	100	67	-	(4)	-	100	94	22	67
Arachnids	-	-	2	10	-	-	(2)	-	-	6	13	-
Myriapods	18	20	-	40	-	-	(2)	-	-	6	13	-
Molluscs	18	-	-	40	-	-	-	-	-	-	9	-
Plants	45	20	17	10	-	-	-	-	-	6	4	42

Note: No percentages were calculated for the small July sample.

Small grey mongooses were rarely observed in the cultivated areas, or fallow land, but these were heavily utilised by the diurnal Yellow mongoose, *Cynictis penicillata*. Of the eight species of carnivores occurring within the study area only the small grey mongoose and the yellow mongoose are diurnal, solitary foragers. Two colonies of yellow mongoose, with an estimated total of 12 individuals, were located within the study area. There were no observed interactions between the two mongoose species during the present study. The yellow mongoose is an open area feeder but usually forages in fairly close proximity to its burrow systems, whereas the small grey mongoose shows a marked preference for feeding amongst, or close to, bush and scrub cover. In the present study it was found that the diet of the small grey mongoose was dominated by small murids and insects but that the diet of the yellow mongoose consisted mainly of insects and other invertebrates (Table 2). It is suggested, therefore, that the small grey mongoose and the yellow mongoose avoid competition by utilising largely different habitats and feeding niches.

Table 2. Yellow mongoose scat contents from Vrolijkheid Nature Conservation station. A=abundant; P=present.

	Jan.	Feb.	Apr.	May	Jul.	Sep.	Nov.
Sample size	38	42	15	22	25	19	2
Coleoptera	A	P	A	A	A	A	A
Orthoptera	A	A	A	A	A	-	P
Isoptera	P	-	-	P	P	-	P
Myriapoda	-	-	A	A	P	P	-
Scorpiones	P	P	-	-	P	-	-
Aves	-	-	P	-	-	P	-
Rodentia	-	-	-	-	-	P	-

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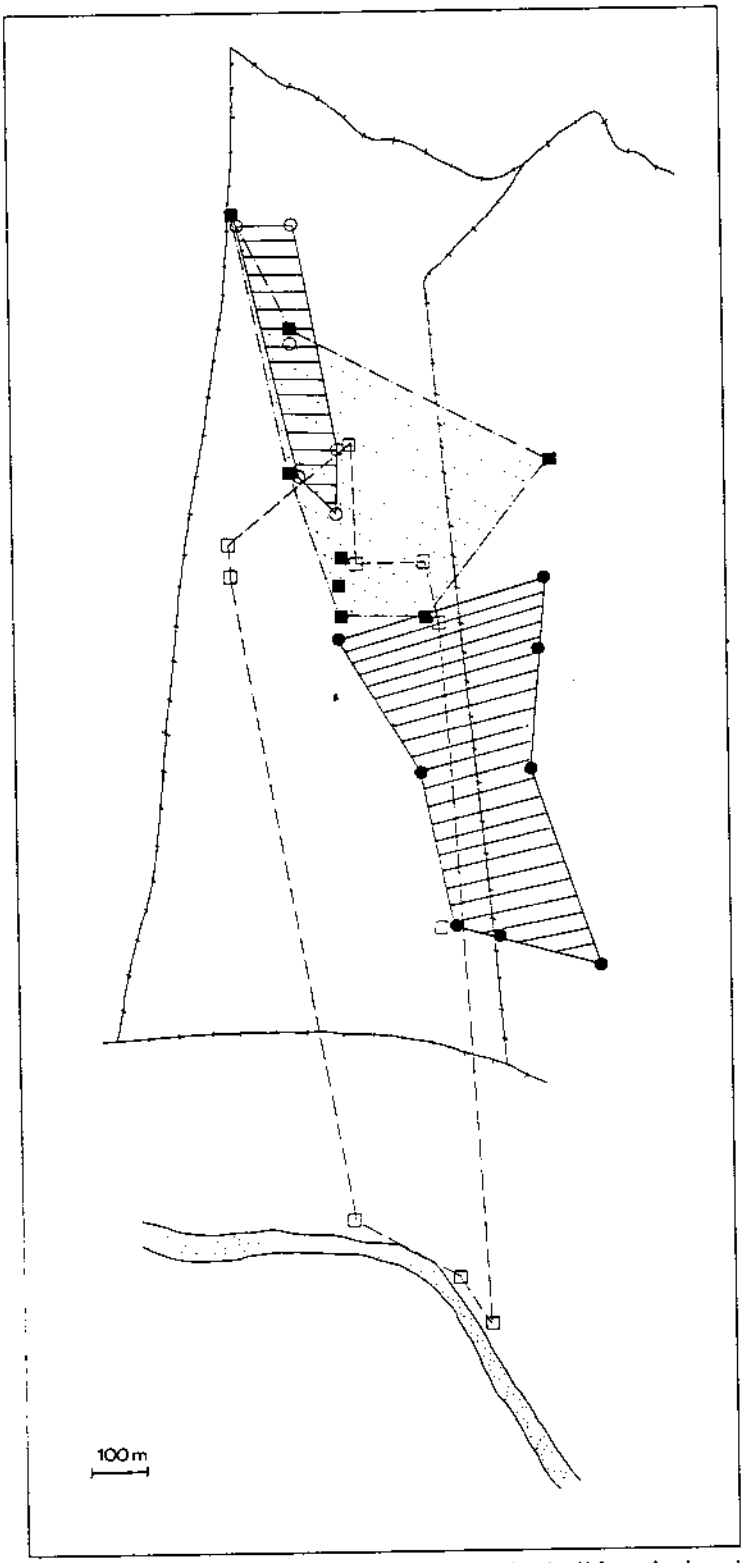

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Scorpiones	P	P	-	-	P	-	-
Aves	-	-	P	-	-	P	-
Rodentia	-	-	-	-	-	P	-

Ackowledgements

Financial and logistical support was provided by the Directorate of Nature and Environmental Conservation, Cape Province, South Africa. B. Munnik, J. Adendorf, and F. Williams provided technical assistance and P. Norton commented on an early draft of this paper. Tilde Stuart is thanked for drawing the figures.

Footnote

There are indications that *Galerella pulverulenta* is extending its distribution range, particularly in the eastern sector of South Africa. Bronner (1990) has recorded the capture of a female near Wakkerstroom, Transvaal, some 200 km north-east of records in Natal and Lesotho. This area was extensively surveyed by Roberts (1951) but no trace of this mongoose was found at the time. Local farmers were not familiar with *Galerella*. There are also uncorfirmed sightings of this species in areas north of the Orange River (Cape Province) where they would overlap with *Galerella sanguinea*, another small diurnal predator with similar dietary patterns. We will, hopefully, be able to investigate these apparent range extensions as part of the African Carnivore Survey.

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Abstracts

Small Indian mongoose in Yugoslavia.

Seven mongooses from three Adriatic islands (Mljet, Korcula, and Hvar) off the coast of Yugoslavia were examined. Comparison with material of *Herpestes auropunctatus*, *H. edwardsi*, *H. sanguineus*, *H. javanicus*, and *H. pulverulentus* showed that they belong to *H. auropunctatus*. The history of their introduction since 1910, present distribution, and biological remarks are given. No recent data on their presence are available on Brac Island, but they are frequent on the three above mentioned islands and on the Peninsula of Peljesac. The Adriatic population of *H. auropunctatus* is the only one of its kind in Europe.

Tvrtkovic, N. & Krystufek, B. 1990. Small Indian mongoose *Herpestes auropunctatus* (Hodgson, 1836) on the Adriatic Islands of Yugoslavia. *Bonn. Zool. Beitr.*, 41(1):3-8.

The mongooses of the genus *Galerella* in southern Africa.

Galerella sanguinea (Rüppel, 1836), also known as *Herpestes sanguineus*, was investigated for intra-population and geographical variation in southern Africa by means of univariate and multivariate methods. The analyses of intra-population variation indicated the presence of sexual dimorphism in skull size, with males being larger than females. No evidence was found to justify the recognition of subspecies in *G. sanguinea* from southern Africa. It is proposed that all of the 16 subspecies described for southern Africa be regarded as synonyms of *G. sanguinea cauui*, except for *G. swalius* which is regarded as a monotypic species, occurring sympatrically with *G. sanguinea* in the central and southern parts of Namibia.

In the genus *Galerella* following species are now recognized: *G. pulverulenta*, *G. sanguinea*, *G. nigrata*, and *G. swalius*, while the status of *G. swinnyi* is still considered uncertain on morphometric grounds.

The results of geographic variation analyses showed that:

1) Pelage colour is very variable geographically and correlates with substrate colour and humidity
2) An east-west decrease in skull size is present in *G. sanguinea*.

Watson, J. P. 1990. The taxonomic status of the Slender mongoose, *Galerella sanguinea* (Rüppel, 1836), in southern Africa. *Navors. Nas. Mus. Bloemfontein* 6(10):351-492.

Siberian ferrets used as surrogate Black-footed ferrets in release study

Black-footed ferrets (*Mustela nigripes*) are an endangered mustelid that once spread across the Great Plains of North America. The last known population was decimated by canine distemper in 1985. Captive breeding has been successful and the next step in recovery of the species is the reintroduction of captive-raised, black-footed ferrets in the fall of 1991. Using a congeneric surrogate, the Siberian ferret (*Mustela eversmanni*), development of predator avoidance abilities, hunting effectiveness, and release techniques were tested. Even though the captive-raised Siberian ferrets often exhibited the correct behavioral responses, they did not always perform them as efficiently as wild-raised animals. Mortality will probably be heavy with any release of captive-raised animals. For a captive-raised carnivore the size of a black-footed ferret, it will be no easy task to locate and kill a prey as large as a Prairie dog and not be killed by a larger predator in the process.

B. Miller. 1991. *CBSG News* (Newsletter of the IUCN/SSC Captive breeding Specialist Group) 2(1):10-11.

ome notes on terrestrial mustelids in the central Paraguayan chaco

Dan BROOKS

There are three extant genera of terrestrial mustelids in the Paraguayan chaco today. These are the Lesser grison (*Galictis cuja*), the Tayra (*Eira barbara*), and Molina's hog-nosed skunk (*Conepatus chinga*).

Over the course of a year, random status surveys were made and data were collected on terrestrial mustelids in the central Paraguayan chaco. Current status for *G. cuja* is indeterminate. *E. barbara* status is undetermined, but may well be endangered, as none were encountered. Density studies for *C. chinga* were done along a frequently traveled route. Most mustelids in this region are endangered by hunting, human disturbance, and/or habitat destruction.

Methods

From August 1989 to August 1990 stationed at Estancia Toledo (22°33'S, 60°30'W; 35 km west of the Mennonite Colony Filadelfia, Boqueron, Paraguay), numerous random surveys were made and data were collected on the terrestrial mustelids in this area (Fig. 1). All localities and areas were driven to by vehicle, and surveyed on foot. Density studies for *C. chinga* involved driving a specific length of measured road, determining the overall area in square km, and thus obtaining one *C. chinga*/number of square km.

Habitat

The majority of the central Paraguayan chaco has been cleared for cattle land. Other reports and sightings indicate this to be the case throughout much of the chaco, some areas more so than others.

Most of the modified land in the central chaco is typical of capoeria savannah and to a lesser extent caatinga -many short, thorny bushes, shrubs, and cacti; with a scattering of trees up to 13 m high.

The dense forest canopy, secondarily frequent to pasture-land, is mid-height, and contains thorny, impenetrable foliage. Small segments of the thick forest are sometimes left in tracts when the land is being cleared for agrarian purposes.

The Lesser grison (*Galictis cuja*)

Status

This species is found most frequently on savannah peripheries. Not as stable as the hog-nosed skunk, but more common than the tayra, the grison is often blamed for eating poultry, and thus is hunted.

The species is important to farmers, as its diet includes a high content of granivorous rodents. In some regions *Galictis* has been kept to control rodent populations, or for sport hunting similar to European ferreting.

Behavior

Most likely this species forms seasonal familial groups. On May 25(late fall) a single individual was seen. On August 1 (late winter) a group of five, including adults and juveniles was seen. The lesser grison was observed to be diurnal, as both recordings were in morning daylight, between 0745 and 0900 hours. These animals are more inquisitive than most carnivores, but are quick to flee at the first sign of danger, scampering through the tall grass. The energetically expensive retreat involves a high metabolism, with slow progress, as the body is low to the ground, and the legs are considerably short.

G. cuja population density is lower than for *Conepatus chinga* (i. e. < one individual/1.4 km^2).

The Tayra (*Eira barbara*)

Status

The generic name for this species is derived from the Guarani's Indian language name, E'ira. Not one sign of evidence was found for this species. By the same token, the locals were not overly familiar with the E'ira. One old mounted specimen resides in Filadelfia's Unger museum; thus it occurred in this area to some extent historically.

Although this species is highly adaptable in other areas of its range, it is possible that the conversion of forest to cattle land was a leading cause for its disappearance in the Paraguayan chaco. No doubt if this species was present, it would be blamed for killing lifestock, and thus hunted frequently. As tayras are very energetic, they are capable of destroying fruit trees while foraging, and thus in some areas are frequently shot for this reason.

The tayra holds an important place in folklore for many cultures. In some areas, various body parts of this species are used for aphrodisiacs and other ethnic products. It would be worthwhile to initiate an intensive study on this species, which would yield interest by the local community to help conserve the tayra.

Molina's hog-nosed skunk (*Conepatus chinga*)

Status

The pelage of *C. chinga* in this area is very similar to the Andean dwelling *C. rex*, in that both species exhibit white along the dorsum, from the forehead to the tip of the tail.

Most concentrated in grass-savannah habitat of the central chaco, *C. chinga* is the most stable of the three mustelids, and among the most abundant of carnivores in the area. The infamous odor does not give this species a bad reputation, as is the case in North America. Road-kills are the major cause of mortality. This species is sometimes shot for eating poultry eggs or for other reasons.

This skunk is economically important, as its diet includes a high content of crop-damaging insects. Historically more than today, various parts from this species were used for ethnic medicine and pelt material.

Behavior

Like other skunks, this species erects its large white 'tail plume' as an indicator to ward off potential predators. This species is solitary, as only monogamous individuals (more than nine) were

recorded. Skunks were observed to be active diurnally just as much as nocturnally.

On July 10, 1990 at 1240 h, one individual was seen catching and consuming a small green tegu lizard. Although lethargic locomotion is typical of *C. chinga*, the prey item was seized quickly. After a little quarrel, the dying prey was carried in the mouth to a shaded area bush, where the then dead lizard was held in the forepaws and slowly eaten. Eating lasted 23 min, whereupon the skunk slowly left the area through long grass.

Seasonal demography

For one year, signs of *C. chinga* were recorded at project base Estancia Toledo and a 30 km radius surrounding the area. Evidence of this species was found from July-November (mid winter-late spring), and April-May (mid-late fall). The species was seen most frequently during July and August (mid-late winter). This vicinity is among the most developed areas in the chaco.

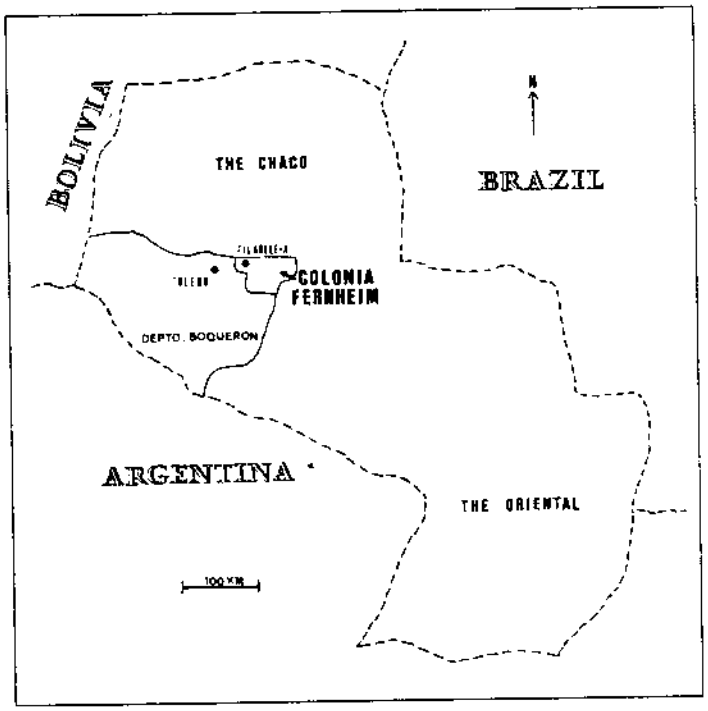

Fig. 1. Schematic map of Paraguay indicating the survey area.

Density

Hog-nosed skunks were seen along a route from Estancia Toledo to Filadelfia (22°33'S, 60°12'W). All live individuals sighted within 10 m of the center of the road (70 km round trip) were counted, obtaining an area of 1.4 km^2/trip. Thus estimating a density of one individual/1.4 km^2 in a region that is highly developed for cattle land (Estancia Toledo and Colonia Fernheim).

Conclusions

From a year of random surveys we may conclude that in the area of the central Paraguayan chaco, the lesser grison is indeterminate or threatened, the tayra is endangered, and Molina's hog-nosed skunk is stable at present. Average density for *Conepatus chinga* in this area is one individual/km^2, while *Galictis cuja* density is considerably lower. Some behavioral observations were made on *G. cuja* and *C. chinga*, and habitat is described generally.

There are substantial threats to the terrestrial mustelids of this region. All species are blamed for some form of agricultural damage, and thus are persecuted. A local expression is 'Carry a gun, if it moves shoot it'; thus these species are also hunted for sport. The tayra is probably most threatened with habitat destruction in this area. A further potential threat to all species is human disturbance (i. e. road-kills).

All three species have historically played an important role to South American people. These species are economically important to agriculturists for crop-predator control. Various body parts have been used for ethnic medicine or for pelts. The lesser grison was once used for a hunting sport, similar to ferreting in Europe. As the tayra has played an important role in traditional folklore in many areas, it may be feasible to develop a conservation oriented program for this species.

Acknowledgements

Financial support was provided by Dr. Kurt Benirschke and the Foundation for Endangered Animals. Local logistics were provided by the Zoological Society of San Diego's C.R.E.S. through the support of Proyecto Tagua (the Tagua Project).

409 University, # 204-N, Lubbock, Texas 79401, USA

Coming events

The Biology and Management of Martens and Fishers
Laramie, Wyoming, USA, May 29 - June 1, 1991.

A Symposium bringing together biologists and managers from North America and Eurasia. Other conference activities will include panel discussions, a field trip, banquet, picnic, mini-tours, etc. Registration forms and information available from:

Marten-Fisher Symposium Organizing Committee
Department of Zoology and Physiology
University of Wyoming, Laramie, WY 82071-3166, USA
Tel. (307)766-2357

The 6th International Colloquium on the Ecology and Taxonomy of Small African Mammals

Mitzpe Ramon, Israël, 11 - 16 August, 1991

Information available from:

Abraham Haim
University of Haifa
Oranim
P.O. Kiryat Tivon, 36910
Israel

Owston's palm civet, *Chrotogale owstoni*, in captivity

Nguyen Xuan Dang, Pham Trong Anh, Ngo Bich Nhu, and Le Chan

Owston's palm civet is the sole living representative of the genus *Chrotogale*. The species is endemic in northern Vietnam, northern Laos, and a small adjoining area of China. The IUCN/SSC Mustelid & Viverrid Specialist Group has listed it as one of the highest "Conservation Priority Species" (Schreiber et al., 1989). In Vietnam, Owston's palm civets still survive in small numbers in some areas of their former range. Cuc Phuong National Park is the only reserve where the occurrence of the species can be confirmed. But, at present, considerable hunting pressure on *Chrotogale* still exists.

The "Institute of Ecology and Biological Resources" in Hanoi is now conducting a programme of conservation of Owston's palm civet in Vietnam. The first attempt of captive breeding of the species is being carried out as a cooperative Captive Breeding Project between the Institute and Hanoi Zoo.

The cages in which the animals are kept are 2 m long, 1.5 m wide, and 2.5 m high; they are made of steel and covered with fine wire-netting to prevent rats and mice from entering the cages. The roof is covered with palm leaves. Some bamboo sheets are covering the sides to avoid direct sunshine in summer and strong and cold wind in winter. Inside the cages there are some thick branches for climbing and either a wooden box (0.4 m x 0.6 m x 0.4 m) or a piece of a big tree trunk with a large central hole for nesting. The floor is cleaned every day. Each cage contains one or two animals.

The captive animals prefer fresh lean meat and sweet soft fruits, especially ripe bananas. The usual diet consists of beef meat, chicken, both in small pieces, earthworms and ripe bananas. Occasionally small birds, chicken's eggs, frogs, insects (grasshoppers, crickets, etc.) and other fruit like ripe papaya are given. The daily diet includes both fruit and meat. The animals are fed two times a day: between 9 and 10 and at 16.30. The meat is given only in the afternoon feeding. In general the animals only eat a part of the food given. Fresh drinking water is always available and is changed every morning.

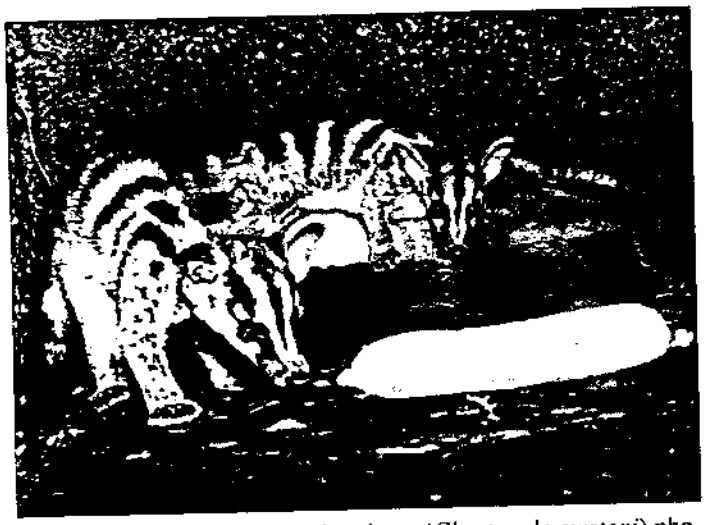

Fig. 1. First live Owston's palm civets (*Chrotogale owstoni*) photographed. Two one month-old females (Vc-2 and Vc-3, see text), one of them lying on adult female (Vc-1). Photo by Nguyen Xuan Dang .

Table 1. Growth and weight gain of Owston's palm civets in captivity.

Name	Date	Body weight g	Head+ body lenght mm	Tail mm	Ear mm
Vc-1: adult female	20.07.1990	2.300	630	430	50
	20.08.1990	2.600	630	430	50
	21.09.1990	2.900	630	435	50
	22.10.1990	3.400	635	440	55
	28.11.1990	4.200	635	440	55
Vc-2: young female	20.07.1990	320	380	290	25
	20.08.1990	800	400	290	30
	16.09.1990	1.500	450	350	35
	Died				
Vd-1: adult male	20.07.1990	2.500	618	415	58
	20.08.1990	2.800	620	420	60
	7.09.1990	2.700	625	425	60
	Died				
Vc-3: young female	20.07.1990	310	370	285	25
	Died				
Vd-2: subadult male	28.10.1990	1.400	450	350	35
	22.12.1990	2.000	620	400	40
Vc-4: adult female	28.10.1990	3.000	630	430	50
	22.12.1990	3.800	635	440	56
Vc-5: adult female	25.12.1990	2.100	600	400	40

Table 1 shows the growth rate and weight gain of the seven kept animals. All specimens showed weight gain but unfortunately three died.

The young females Vc-2 and Vc-3 (Fig. 1) have been kept since they were about one month old. They were kept in the company of adult female Vc-1 whose young died in an accident just before captivity. The young females fed on both milk of female Vc-1 and on the given diet. After a week young Vc-3 suddenly died of an unknown disease. The animal which looked alright and was normally active suddenly became weak, was found lying down and died after two hours. Autopsy did not reveal any disease symptoms. Young Vc-2 grew well until she was three months old and then also died of unknown causes. Two days before her death the animal showed paralysis in one hind leg. The next morning the other hind leg was also paralysed. Treatment with penicilline and streptomycin gave no result and after becoming paralysed in both fore legs also in the afternoon, the animal died during the night.

Adult male Vd-1 was kept since May 1990. During its capture the animal was severely bitten and two wounds of ca. 20 mm diametre remained on each side of his pelvis. During its captivity the animal's health had slightly improved but the wounds did not heal in spite of the antibiotic treatment. On 6 Sept. 1990 the animal became very weak and died the next day. Adult female Vc-1 sometimes showed diarrhoea but each time recovered after biseptol treatment. Earlier on, Hanoi Zoo had kept some Owston's palm civets but all the animals died of unknown causes.

Conservation program of *Chrotogale owstoni* Thomas, 1912: Some first results

H. J. ADLER

In this issue of the newsletter Nguyen Xuan Dang *et al.* report the first expierences in keeping Owston's palm civets. Thus the status in captivity is no longer "no records" (Schreiber *et al.*, 1989). This is a first important step to inquire into the almost unknown habits of these animals.

As reported in the a. m. article, *Chrotogale* have been kept at Hanoi Zoo several times, but not always under the conditions described by N. X. Dang. When inquiring after the situation of *Chrotogale* in Hanoi in November 1990 at the suggestion of IUCN/SSC M&VSG chairman R. Wirth, I found three animals at the zoo, two of them being kept under provisional conditions. My conclusion was that a more severe infestation with endoparasites caused by stress may be an important cause of death. The responsible colleagues at the Institute of Ecology & Biological Resources and at the zoo, however, endeavoured to improve the conditions for keeping the animals. Another reason for the high losses may be an incorrect diet. As described,the *Chrotogale*'s diet included a high percentage of fruit, but it is supposed that the diet should consist mainly of insects, worms and perhaps small vertebrates. This hypothesis is supported by the fact that the labels of two collected specimens carry the information that the stomachs contained earthworms (as mentioned by Nowak & Paradiso, 1983). Pham Chong Ahn (1980) also stated: "Chiefly insects, worms, frogs, and less than 20% fruit".

All these facts as well as the situation in the wild show that a conservation program aiming at improved conservation of wild populations and including a general status survey of the species is urgently needed. Part of the general project should be to improve conditions for a pilot captive breeding attempt to allow Vietnamese scientists to study the biology of the species. Therefore a training program for the staff being entrusted with captive breeding in Vietnam is also necessary. But all these efforts are beyond the possibilities of the Vietnamese colleagues due to the country's extremely bad economical conditions and to their low rank in the official Governmental Programs. Therefore it is very meritorious that Dr. R. Faust, chairman of the Zoologische Gesellschaft Frankfurt von 1858 e. V., is prepared to finance, together with the Wildlife Preservation Trust, Jersey, a training program for Nguyen Xuan Dang. The director of the Institute of Ecology & Biological Resources in Hanoi has declared his great interest in future projects.

I was also shown an island about 100 km from Hanoi where a breeding project for the Vietnamese Sika deer (*Cervus nippon pseudaxis*) has already started and which is planned to be also the location for a *Chrotogale* breeding station. Under a special agreement the Zoological Gardens of Frankfurt will receive the first specimens of *Chrotogale* this year in order to support the efforts for conservation of this species in Vietnam by a research and breeding project. Moreover, the Zoologische Gesellschaft Frankfurt von 1858 e. V. will participate in financing the intended Conservation Program.

My last year's stay in Hanoi and in the Cuc Phuong National Park was financially supported by the Zoologische Gesellschaft für Arten- und Populationsschutz, Munich. The conversations and reached agreements justify the hope for the realization of concrete conservation efforts for *Chrotogale owstoni*.

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Allwetterzoo Münster, Sentruper Str., 309, W-4400 Münster, Germany

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Continued from page 7

Recommendations & Appeal for international cooperation

Chrotogale owstoni being a very rare and endangered animal in the wild, their losses in captivity should also be prevented as much as possible. We obtained some results in keeping this species but our losses have been great. One reason is that we have no sufficient financial support to provide our animals with better conditions. The other reason is that we have not enough experience in keeping this kind of carnivores. In view of this international collaboration in captive breeding of Owston's palm civet is of the utmost importance and a training programme in techniques of captive breeding of endangered species for our staffs is a necessity.

We are most grateful to the Directorates of IEBR and Hanoi Zoo for constant support for Project implementation. Our many thanks are due to R. Wirth, R. Ratajszczak, R. Cox, and H. Van Rompaey of the IUCN/SSC Mustelid & Viverrid Specialist Group for their encouragement and invaluable recommendations.

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Nguyen Xuan Dang and Pham Trong Anh, Institute of Ecology and Biological Resources, NCSR Vietnam, Nghia do-Tu Liem-Hanoi, Vietnam.

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Restoration of the endangered Black-footed ferret

Tim W. CLARK

The current Black-footed ferret restoration effort is now in its 10th year. Much of the progress is summarized in two annotated bibliographies (Casey *et al.*, 1986; Reading & Clark, in press).

Discovery of a small ferret population near Meeteetse, Wyoming, in 1981 brought hope for species recovery (Clark, 1989). About 300 ferrets were studied, with a peak population of 129 in 1984. In 1985, a catastrophe struck when canine distemper killed most ferrets. The species reached a low in early 1986 of about 10 individuals. The ferret is extinct in the wild today and only exists in three captive populations totalling about 186 animals. Continued increases in captive populations, reintroduction, and successful management offer an opportunity for species restoration.

Discussion about how to restore ferrets was part of the Meeteetse conservation work from the beginning. In 1983, Richardson *et al.* (1986) first formally examined recovery strategies and strongly recommended the captive-rearing/translocation option.

The 1988 Fish and Wildlife Service Recovery Plan objective is: "To ensure immediate survival of the black-footed ferret by: (1) Increasing the captive population of black-footed ferrets to a census size of 200 breeding adults by 1991; (2) establishing a prebreeding census population of 1500 free-ranging black-footed ferret breeding adults in 10 or more populations with no fewer than 30 breeding adults in any population by the year 2010; and (3) encouraging the widest possible distribution of reintroduced black-footed ferret populations" (Fish and Wildlife Service 1988:19). Ferret numbers currently in captivity and plans for reintroduction approximate these goals.

Captive breeding efforts got off to a dismal start but have since been very promising. Eighteen wild ferrets constituted the entire founder population. In 1990, 66 young were born and at the start of 1991, 180 animals are in captivity. Ferrets are now at the Conservation and Research Center, a branch of the National Zoological Park, the Henry Doorly Zoo, and a Wyoming Game and Fish Department Facility where they have been for several years. Additional populations are now at the Louisville Zoo, Louisville, Kentucky (12 animals) and Cheyenne Mountain Zoo, Colorado Springs, Colorado (10 animals). Much of the success of the captive breeding effort is due to advice and assistance provided by the Captive Breeding Specialists Group of the IUCN/SSC.

Reintroducing the Meeteetse ferrets to several new sites was part of the first conservation and research plans for the newly discovered ferrets (Clark, 1981) and was formally recommended in 1983 and 1985, with the reports of Richardson *et al.* (1986) and Forrest *et al.* (1985). Reintroduction became formalized as the basic recovery strategy in government plans in 1987 and 1988 (Wyoming Game and Fish Department 1987, Fish and Wildlife Service 1988). A Black-footed ferret Interstate Coordinating Committee was established in 1986. The Committee meets at least once yearly and otherwise communicates through a Fish and Wildlife Service Secretariat.

Black-footed ferret (*Mustela nigripes*)

Several reintroduction sites have been located throughout the western United States. One of the biggest is in northcentral Montana, estimated to be capable of supporting about 500 ferret families. Restoring ferrets to the wild is now a matter of developing successful reintroduction techniques and subsequent management procedures.

Many details remain to be worked out before ferrets can be restored. Successful reintroduction and management of the black-footed ferret is an opportunity to restore the unique prairie dog ecosystem (Clark *et al.*, 1989; Miller *et al.*, in press). Hopefully, beginning in 1991 with the first introductions, and extending over several years, ferrets will be reestablished to the prairies and intermountain basins of North America. All involved hope ferret restoration will go smoothly and quickly.

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Chicago Zoological Society, Brookfield, IL 60513
Northern Rockies Conservation Cooperative, Box 2705, Jackson, WY 83001, USA
School of Forestry and Environmental Studies, Yale University, New Haven, CT 06511, USA

Recent publications

Encyclopaedia of the carnivores of France

We would like to draw our readers' attention to a highly interesting series of publications in French: the "Encyclopédie des carnivores de France: espèces sauvages ou errantes, indigènes ou introduites, en métropole et dans les dom-tom". All issues are published by the "Société Française pour l'Etude et la Protection des Mammifères (S.F.E.P.M.), Bohallard, Puceul, 44390 Nort sur Erdre, France. For information write:

Mad. D. Thévenot, Grand-rue, 54200 Lagney, France.

Following issues on viverrids and mustelids have already been published:

Henry, C., Lafontaine, L. & Mouches, A. 1988. Le blaireau (*Meles meles* Linnaeus, 1758). N° 7:35 pp.

Labrid, M. 1986. La martre (*Martes martes* Linnaeus, 1758). N° 9:22 pp.

Delattre, P. 1987. La belette (*Mustela nivalis* Linnaeus, 1766) et l'hermine (*Mustela erminea* Linnaeus, 1758). N° 11 & 12:73 pp.

Camby, A. 1990. Le vison d'Europe (*Mustela lutreola* Linnaeus, 1761). Maizeret, C. 1990. Le vison d'Amérique (*Mustela vison* Schreber, 1777). N° 13 & 14:44 pp.

Roger, M., Delattre, P. & Herrenschmidt, V. 1988. Le putois (*Mustela putorius* Linnaeus, 1758). N° 15:38 pp.

Livet, F. & Roeder, J.-J. 1987. La genette (*Genetta genetta* Linnaeus, 1758). N° 16:33 pp.

Charles-Dominique, P. & Moutou, F. 1987. Les carnivores des Départements et Territoires d'Outre-Mer. N° 20 & 21:2[illegible] pp.

Several issues on the canids, ursids, procyonids, and felids have been and will be published.

Populationsökologie Marderartiger Säugetiere

The papers presented at the "Mitteleuropäisches Symposium zur Populationsökologie von Mustelidenarten" held in Spremberg, Germany from 12 to 16 April 1989 were edited by Michael Stubbe and published as "Populationsökologie Maderartiger Säugetiere" Vol. 1 & Vol. 2 (647 pp.), Kongress- und Tagungsberichte der Martin-Luther-Universität Halle-Wittenberg 1989/37 (P 39). Halle (Saale), 1989.

All the "no-otter" papers are listed separately in the "Recent literature" section of this number.

The Gambian mongoose: A forgotten species ?

Harry VAN ROMPAEY

Together with the Banded mongoose (*Mungos mungo*), the Gambian mongoose (*Mungos gambianus*) makes up the African genus *Mungo*. Both are small mongooses, similar in general form but easily recognized by their different coat pattern. Whereas the banded mongoose is the only mongoose with cross-banding on its back, the Gambian mongoose is distinguished by its generally uniform colour (Fig. 1) and the yellowish-white throat (Fig. 2).

They do not only belong to the same genus but seem to prefer similar habitats and probably have similar lifestyles. Both are diurnal, terrestrial, and gregarious, living in packs in open grass-woodlands.

Then why is it that the Gambian has a distribution limited to West Africa while the banded can be found from Senegal in the west to Eritrea in the east and the northeastern Cape and Natal (South Africa) in the south? Why, also, is the banded mongoose (together with the dwarf mongoose, *Helogale parvula* and the Suricate, *Suricata suricatta*) one of the most studied and consequently best known mongooses while the Gambian has been left unstudied? And why are banded kept in countless zoos while we know of no zoo which is currently keeping the Gambian?

The following is all that we know about this beautiful mongoose:

Distribution

The type specimen, originally described as *Herpestes gambianus* by Ogilby in 1835, was collected on Cape St. Mary in Gambia. Until 1939 (G. M. Allen) it was sometimes named *Crossarchus* before finally being designated as *Mungos gambianus*. This still proves somewhat of a misnomer as Gambia is the farthest west this species is (or was) distributed. For a mongoose which Booth in 1960 found "easily the most abundant carnivore in the Guinea savannah zone of West Africa", remarkably few observations have been made, few specimens have been collected, and as few localities are cited in the literature. Rochebrune (1883) stated that it occurred on the banks of the Gambia and Casamence

Fig. 1. Gambian mongoose (*Mungos gambianus*), showing the generally uniform colour.

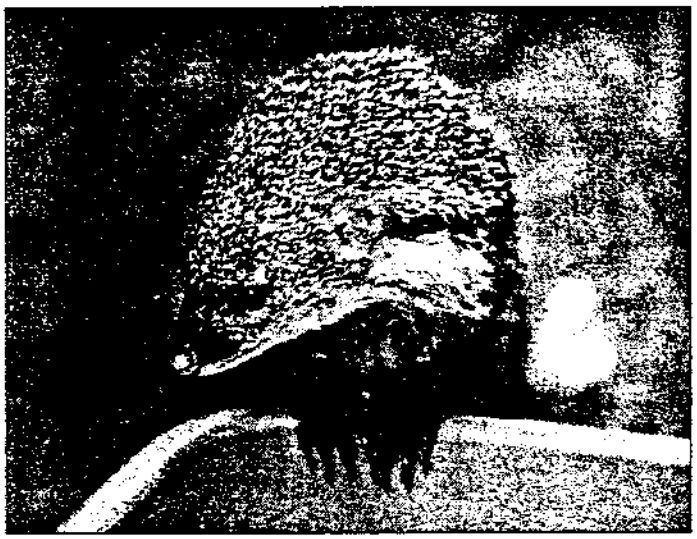

Fig. 2. Gambian mongoose, showing the yellowish-white throat.

Rivers and around Albreda (Albadarr) where it was rare. Dekeyser (1956) cited an unconfirmed record of a specimen in Niakolo-Koba NP, **Senegal**. The Powell-Cotton Museum (UK) holds a specimen from the region of the Sèli River, approx. 23 km southwest of Gabu in **Guinea Bissau**. The Berlin Natural History Museum holds a specimen collected in 1900 from Sokodé in **Togo**, and two specimens from Haho Baloe (or Hahoe Baloel), possibly the present-day Hohoe in **Ghana**. Of the 15 British Museum specimens two originated from **Gambia** (as late as 1894 they appeared to be the only known specimens; Pousargues, 1894); two from **Sierra Leone**: one from Iunbumba or Dumbaia and one from Bonthe Island; nine from **Ghana**: four from Ejura, one from Bole, one from Kete Krachi; one from Tara Brenias, and two from the Mole Game Reserve, and one from the Ogun Forest Reserve, south of Sepetari, in **Nigeria**. Coetzee (1977) stated that it occurred in Nigeria to the north of the coastal forests and mainly south and west of the Niger River. Child (in Rosevear, 1974) recorded that "packs were not infrequently seen in the dry season throughout the Borgu Reserve area in western Nigeria". Here it is also cited as occurring in the Yankari Game Reserve (Afoloyan & Ajayi, 1980), and from Igangan FR and Kainji Lake NP (Happold, 1987). The National Museum of Natural History (Washington) holds a specimen from Sienso, **Ivory Coast**, where specimens were also collected near Lamto (Bourliere *et al.*, 1974), and recorded from Toumodi (Hoppe-Dominik, in prep.), Comoë NP (Roth *et al.*, 1979), and Sangbé NP (Minner, 1983).

Strangely enough (as other authors stated Nigeria to be the extreme eastward distribution limit), Jeannin (1936) found them to be rather common in **Cameroon**, and especially in the north above the Bénoué River.

It occurs almost exclusively in the Guinea woodland zone just inland of the high forest but may penetrate into the rather similar Doka belt (Rosevear, 1974). It also seems to occur in areas with sand ridges and sparse grass (Bonthe Island off the coast of Sierra Leone), and coastal scrub such as is found on the Accra plains, Ghana, where Cansdale (1946) found them to be fairly common.

Description

Coarse, rather long, harsh pelage. Underfur completely lacking (also in *mungo*). Upperside brownish-grey, brightly speckled with yellow. Most conspicuous character is the yellowish-white throat and on each side a black and white line stretching from the ear to the foreleg. Snout, ring around the eyes, back of forefeet, digital area of hindfeet, and tip of tail black. Sole of hindfoot naked to the heel. The anal scent glands have not been described but will probably be similar to those of *M. mungo*. Length of head and body: 295-360 mm. Tail-length: 200-220 mm. Hindfoot-length: 55-71 mm. Weight: average 1,500 g (Jeannin, 1936).

The skull is very much like that of *M. mungo*, but Rosevear (1974) cited several differences. He considered the *gambianus* skull somewhat narrower but this difference may be small and possibly non existent if a sufficient number of *gambianus* skulls could be examined. Six adult *gambianus* skulls had an average zygomatic breadth/condylobasal length ration (per cent) of 53 (range 52 to 54) against 54 (range 51 to 57) for 28 adult *mungo* skulls (from Zaire, Rwanda, and Burundi). Rosevear also found that in *mungo* the postdental palate is generally slightly broader than long while in *gambianus* the difference is more marked, the length being only about half the breadth. Seven adult *gambianus* skulls had an average breadth/length postdental palate ratio (per cent) of 44 (range 41 to 54) against 49 (range 35 to 58) for 26 adult *mungo* skulls. Not only does the difference seem small but there is complete overlapping. Rosevear noted that the most obvious difference between the two species lies in the teeth: in *gambianus* they are remarkably small, when compared to the similar sized mongoose spp. The average length of the P^4 was 4.27 mm (range 4.2 to 4.3) for seven *gambianus* and 4.93 (range 4.5 to 5.4) for 25 *mungo*. With a P^4 that is on the average 15% longer in *mungo* than in *gambianus* (and no overlapping), the size of the teeth may be the most significant skull difference. Hayman (in Sanderson, 1940) could differentiate between *mungo* and *gambianus* because in the latter "the carotid foramen in the basisphenoid is small and almost obscured from view by a peculiar irregularly formed angular projection forward of the antero-internal angle of the bulla". This structure appeared, to Hayman, to be unique in the carnivores, but Rosevear (1974) found it from time to time in other mongoose skulls, a. o. *Herpestes ichneumon* and *Crossarchus ansorgei*.

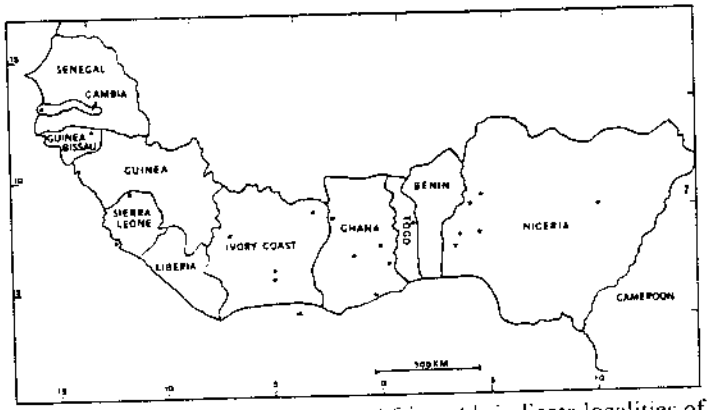

Fig. 3. Schematic map of western Africa. ★'s indicate localities of collected specimens of the Gambian mongoose. The '?' indicates the region mentioned by Jeannin (1936).

Except for the skull, only the palatine tonsil has been studied (Het 1928).

Habits

Rosevear (1974) stated: "To all intents and purpos nothing is known of these and not a single field note beir provided by any collector. It is therefore not known whether th species shares in any way the communal habits of *mungo* and t similar kusimanse. It can only be assumed from the small size the teeth that the food is weak and soft, probably almost entire insects". Booth (1960) added lizards and mice to the diet and stat that up to 25 animals may be encountered together, and comm nicate while moving through thick cover, by frequent twitterir which clearly helps pack cohesion. Packs of five to six individu are normal in Ghana (Cansdale, 1946), in Nigeria they are rarc observed and packs normally contain only 10 to 15 individu (Happold, 1987), while in Ivory Coast up to 31 have been observ (Bourlière *et al.*, 1974).

The practice of smashing objects by throwing them agai something hard, either horizontally backwards through the hir legs or vertically down to the ground, has been observed in White-tailed mongoose (*Ichneumia albicauda*), the Marsh m goose (*Atilax paludinosus*), and the banded mongoose. This haviour was also described in the Gambian mongoose, in whic was first observed at ca three months without the animal e having seen such action before (Darchen, 1988).

Jeannin (1936) stated that "they hunt at night" (which certainly incorrect), and that "they prefer to live in termite hil They apparently tame easily and become very affectionate captivity (see also Darchen, 1988).

A hookworm, *Arthrocephalus gambiensis*, was descri from the intestine of a captive Gambian mongoose that die London Zoo (Ortlepp, 1925); another specimen died from rach (Scott, 1928).

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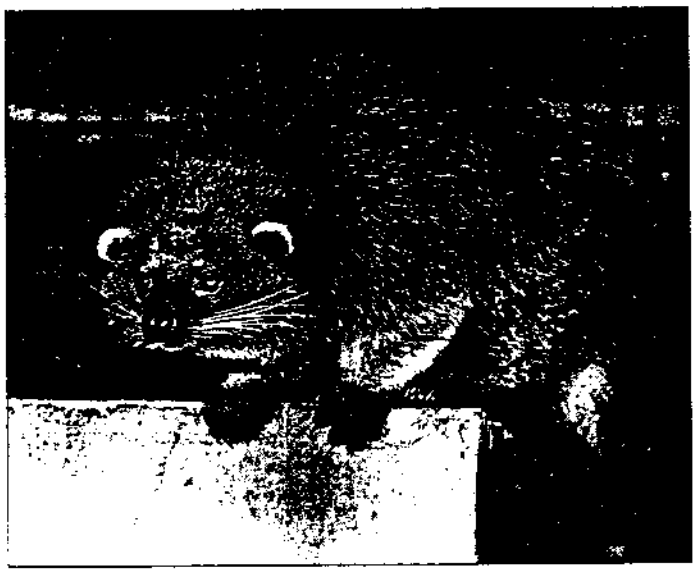
Palawan binturongs in captivity



Palawan binturong. Photo: Russell A. Mittermeier

The binturongs (*Arctictis binturong whitei*) on the island of Palawan (Philippines) are probably threatened, though little is actually known on their status. Also, there has been no recent taxonomic revision of the binturong subspecies thus leaving us in the ignorance which of the various described subspecies are valid.

Dr. Russ Mittermeier, Director of "Conservation International", Washington D.C., USA, has kindly sent us a number of photographs of Palawan binturongs in the possession of Mr. Antonio de Dios. Mr. de Dios has one of the largest and most successful parrot breeding facilities in the world and in addition keeps a few native mammals of the Philippines.

The pictures provided by Dr. Mittermeier all show binturongs with grey fore and hind legs contrasting with the darker body colour. The underparts of one animal, which is pictured climbing up the wire netting of the enclosure, are buffy. Although certainly more animals need to be seen to evaluate individual colour variation (which can be fairly extensive in binturong populations), these observations support the statement by J.A. Allen that there may be external features distinguishing Palawan binturongs from other populations.

The occurrence of the binturong on Palawan I. has been known since 1883 when A. Marche collected two specimens near Puerto Princesa.

In 1910 J. A. Allen found the differences with other forms so important that he created a new species, *Arctictis whitei*. He gave an extensive description of the pelage and stated that "the Palawan binturong is notably different in details of tooth structure from the Indian and Sumatran forms, and in the colour of the head, which is of the same general colour as the rest of the dorsal surface". Pocock in 1933 gave it subspecific status and found it "closely related to *penicillatus* (Java and Borneo), but apparently distinguished by its smaller and lower skull".

The present status of mustelids and viverrids in Japan

Hiroshi SASAKI

Ten species of mustelids and two species of viverrids inhabit Japan. Licensed hunters are legally permitted to hunt the Eurasian badger *Meles meles*, the Japanese marten *Martes melampus melampus*, and males of the Siberian weasel *Mustela sibirica* and the Japanese weasel *Mustela itatsi* during the hunting season. In Japan the hunting season of these mustelids has been set for two months in winter. In case animals damage agricultural products or people, they can be hunted all the year round with permission. Among the mustelids and viverrids, the American mink *Mustela vison* and the Masked palm civet *Paguma larvata* have been hunted as pests.

The Environmental Agency categorized wildlife in Japan in four categories, "extinct", "endangered", "vulnerable", and "rare" in 1989. There is a difference between the definitions formulated by IUCN and Japan. "Rare", as defined by the Japanese government, includes the "rare", "indeterminate", and "insufficiently known" categories of IUCN because of the scarcity of information on many species. In the Japanese classification the Japanese otter *Lutra lutra whiteleyi* belongs in the "endangered" category, the Tsushima marten *Martes melampus tsuensis* in the "vulnerable" category, and the Stoat *Mustela erminea* and the Sea otter *Enhydra lutris* in the "rare" category.

The Agency for Cultural Affairs legally designated the Japanese otter and Tsushima marten as special natural monuments in 1965 and 1971 respectively.

1. *Mustela itatsi*, *M. sibirica coreana*, and *M. vison*

The Japanese weasel *Mustela itatsi* was regarded as a subspecies of the Siberian weasel *Mustela sibirica*, but Watanabe *et al.* (1985) concluded from genetical studies that the Japanese weasel should be classified as a separate species.

The Japanese weasel *Mustela itatsi* includes three subspecies, *M. i. itatsi* (Honshu, Shikoku, and Kyushu), *M. i. sho* (Yakushima and Tanegashima), and *M. i. asaii* (Izuoshima). About 1900 the Japanese weasel had extended its range together with the expansion of the Japanese colonization of Hokkaido. Recently its range has decreased in Hokkaido because American minks escaped from fur farms and spread their range especially along rivers (Uraguchi & Saito, 1988).

The increase of human population density modified and made the urban areas unsuitable for the Japanese weasel, so that it disappeared in the urban areas. In the western part of Japan, the Siberian weasel has extended its range in the urban areas from which the Japanese weasel has vanished.

Japanese weasels were introduced to Hokkaido, Honshu, Kyushu, and Nansei Shoto (Ryukyu Archipelago) as rat controllers from 1925 to 1977 and their offspring is still present in many areas.

Mustela sibirica coreana is distributed in the Korean peninsula and on Tsushima (Japan), which is located between Korea and Kyushu. Many individuals of this subspecies are supposed to have escaped from fur farms near Osaka around 1930. They also accidently invaded Kyushu being brought by ship from Korea around 1945. They have extended their range in Kyushu, Shikoku, and the western part of Honshu.

The numbers of hunted Siberian and Japanese weasels are rapidly decreasing. As illegal hunting of these species is very popular the official number of 4127 hunted animals in 1987 is an underestimation.

2. *Mustela erminea*

The stoat *Mustela erminea* includes two subspecies, *M. e. orientalis* and *M. e. nipon* in Japan. *Mustela erminea orientalis* is distributed in north-east Siberia and in Hokkaido where it is rare. *Mustela erminea nippon* is distributed in the centre and the north-east of Honshu, where its habitat is mainly the high mountain area.

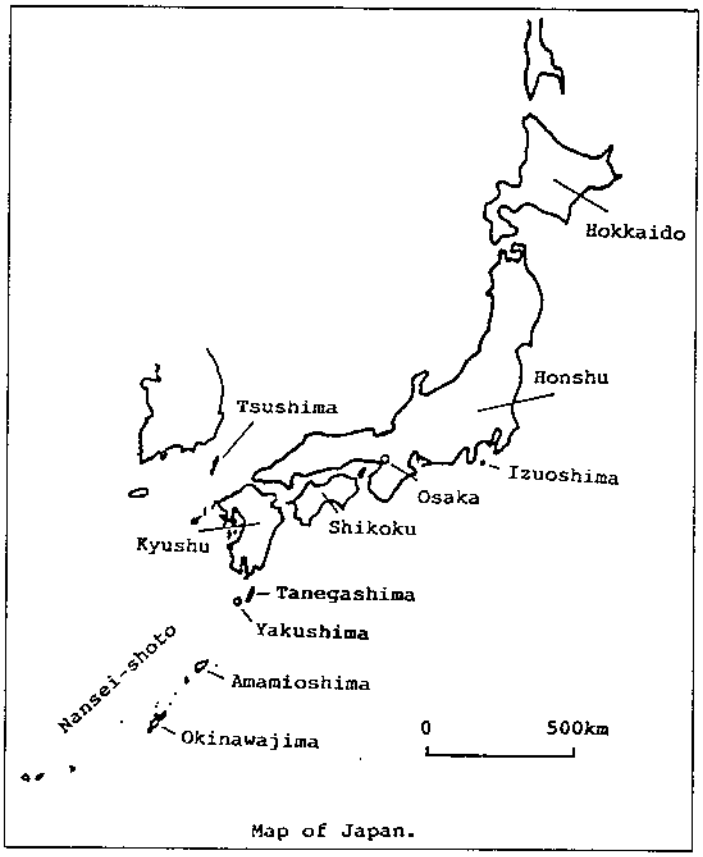
3. *Mustela nivalis namiyei*

Mustela nivalis namiyei is distributed in Kuriles, Sakhalin, Hokkaido, and the northern part of Honshu. This subspecies is common in Hokkaido but its range is limited in Honshu. There is little information on this subspecies, especially in Honshu.

4. *Martes melampus*

The Japanese marten *Martes melampus* includes two subspecies in Japan (*M. m. melampus* and *M. m. tsuensis*), and one subspecies in the Korean peninsula (*M. m. coreensis*).

Martes melampus melampus is distributed in Honshu, Kyushu, and Shikoku, but has recently been found in Hokkaido too.



Schematic map of Japan

Here they are supposed to have been intentionally released. About ten thousands of these martens are hunted each year.

The Tsushima marten *Martes melampus tsuensis* is endemic only in Tsushima. It is legally prohibited to hunt this subspecies. It is common in Tsushima but categorized as "vulnerable" by the Environmental Agency as it lives on small and confined islands.

5. *Martes zibellina brachyura*

Martes zibellina brachyura is distributed in Hokkaido. We do not have enough information on this subspecies but its number might be small. There is a possibility that *M. z. brachyura* has to compete with *M. m. melampus* who invaded Hokkaido. Urgent conservation of this subspecies is needed.

6. *Meles meles anakuma*

Meles meles anakuma is distributed in Honshu, Shikoku, and Kyushu. There are very few studies on this subspecies. About two thousand badgers are hunted every year.

7. *Lutra lutra whiteleyi*

It is legally prohibited to hunt the Japanese otter but there are very few individuals left in Shikoku. We have been studying this species in Kouchi Prefecture and considering the possibility of captive breeding and reintroduction.

Imaizumi & Yoshiyuki (1988) proposed that *Lutra lutra whiteleyi* in Honshu and Shikoku should be considered as a separate species, *Lutra nippon*. I think this proposal needs to be discussed more as they studied only a small number of animals.

8. *Enhydra lutris*

The sea otter *Enhydra lutris* has been observed in the east of Hokkaido every year, usually in summer, for the last ten years. Only solitary individuals staying for a short time are sighted.

9. *Paguma larvata*

The Masked palm civet *Paguma larvata* shows a disconnected distribution pattern in Japan. It is found in Shikoku, and in the central and the northeastern region of Honshu. Whether it is native to or introduced in Japan is under examination. About two hundred masked palm civets are killed every year as pests.

10. *Herpestes edwardsi*

The Indian grey mongoose *Herpestes edwardsi* was introduced to Okinawajima and Tonakijima in 1910 as a predator of rats and of the venomous snake *Trimeresurus okinavensis*, but later became extinct in Tonakijima. A small number of mongoose (*Herpestes* sp.) was recently introduced to Amamioshima.

The author wishes to thank Mr. K. Uraguchi, Dr. Y. Obara, Mr. H. Yashiki, Mr. S. Watanabe, and Dr. M. Harada for the useful information.

List of 10 species of mustelids and 2 species of viverrids known to occur in Japan:

Mustelidae		
Mustela itatsi	Japanese weasel	*M. i. itatsi*
		M. i. sho
		M. i. asaii
Mustela sibirica	Siberian weasel	*M. s. coreana*
Mustela nivalis	Common weasel	*M. n. namiyei*
Mustela erminea	Stoat	*M. e. nippon*
		M. e. orientalis
Mustela vison	American mink	
Martes melampus	Japanese marten	*M. m. melampus*
		M. m. tsuensis
Martes zibellina	Sable	*M. z. brachyura*
Meles meles	Eurasian badger	*M. m. anakuma*
Lutra lutra	Eurasian otter	*L. l. whiteleyi*
Enhydra lutris	Sea otter	
Viverridae		
Paguma larvata	Masked palm civet	
Herpestes edwardsi	Indian grey mongoose	

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Conservation status of the Eastern Spotted skunk

The Eastern spotted skunk is found throughout the midwestern and eastern United States. One subspecies (*Spilogale putorius interrupta*) of this skunk appears to have undergone a rapid decline in numbers throughout most of the Midwest where it once was quite abundant. This subspecies is now listed as endangered in Missouri and as threatened in Kansas and Iowa. It is also listed as a "species of special concern" in Montana, a "species in need of conservation" in Nebraska, and is considered rare by the states of North Dakota and Oklahoma. The status of the spotted skunk is unknown in Louisiana, South Dakota, Mississippi, Arkansas, and Texas.

The reasons for this rapid decline are unknown. The shift to larger farms and the accompanying destruction of fence rows, creek bottoms, small wood lots and dilapidated farm buildings to make way for more and "cleaner" farm land has probably played a contributing role. Field studies were conducted on this species in Iowa in 1948 by W. D. Crabb (*Ecol. Monog.*, 18:201-232). Crabb reported that spotted skunks were abundant on farms with numerous old buildings and wood piles, but were rarely found on well kept farms.

Another subspecies of the eastern spotted skunk (*Spilogale putorius ambarvalis*) is still abundant in southern Florida. Thus, we are currently attempting to use this subspecies as a model to develop methods for captive propagation, thereby insuring that procedures will be available to preserve genetic diversity in remnant populations of the spotted skunk if such action becomes essential.

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Situation of the European and American Mink populations in the Iberian peninsula

Francisco PALOMARES

The lack of knowledge on the distribution, ecology, and biology of both European, *Mustela lutreola*, and American mink, *Mustela vison*, is generally its most outstanding aspect in the Iberian Peninsula.

At present, the European mink is only distributed in the Centre-North of the Iberian Peninsula (Fig. 1). The presence of European mink was not evident for some forty years in the Iberian Peninsula, until three individuals were captured in Guipúzcoa for the first time (Rodriguez de Ondarra, 1955). Youngman (1982) thought that the species spread into Spain from the coastal region of France during the mid 1940's. In the next years captures in places near Alava and Vizcaya provinces, as well as in a locality in Navarra near the Guipuzcoan border, confirmed the presence of this species (Puente Amestoy, 1956; Rodriguez de Ondarra, 1963). In 1970 it was recorded by hunters in Santander and western Navarra provinces (Blas Aritio, 1970). And finally, in 1983, and after not having been detected for more than fifteen years, the species was cited again in Navarra (Senosiain & Donázar). It has been recorded from rivers of both the Mediterranean and Cantabrian basins, and according to recent data its distribution area is expanding to the southeast, a fact seemingly verified by Navarra hunters, who had not met the species until a short time ago. The European mink has been captured in towns and near clean as well as near very polluted rivers. The otter, *Lutra lutra*, was present at the same time at least in two of those rivers in Navara.

Feral populations of American mink have been present in the Iberian Peninsula after escaping from breeding farms for some years (Delibes, 1983). Populations of this species have been reported in central Spain, Galicia (SW Spain), NW Portugal, and in a small area in Barcelona and Gerona provinces (Delibes, 1983; Ruiz-Olmo, 1987; Vidal & Delibes, 1987; Bueno & Bravo, pers. com.). In these last two localities minks have been known to evade from farms in 1983 and 1984 and expanded towards the northwest and southeast. This species has been detected both in woody, quiet places and in the most inhabited ones. Birds and eggs are the principal summer prey in northwest Spain (Vidal & Delibes, 1987), and from one stomach and five scat examinations of northeast populations, the rests of the following have been found: 1 insect (*Notonecta* sp.), 1 Arvicolidae, 1 *Salamandra salamandra*, 1 *Natrix maura*, 1 *Garrulus glandarius*, 3 unidentified birds, and vegetal matter.

The distribution area of *M. lutreola* is restricted to a small zone of the northern Iberian Peninsula, the ecological and/or social factors that determine this range being unknown. On the other hand, the American mink seems to be perfectly adapted to European habitats and has expanded quickly. In the near future the two species will probably get into contact, with the imminent risk of the autochthonous European mink suffering displacement and extinction (see Braun, 1990).

Protective measures towards *lutreola* are urgent and necessary to guarantee its survival and expansion in the Iberian Peninsula. But before taking action the real situation and ecological needs of the two species' populations are to be known. Studies on the following aspects should thus be started:

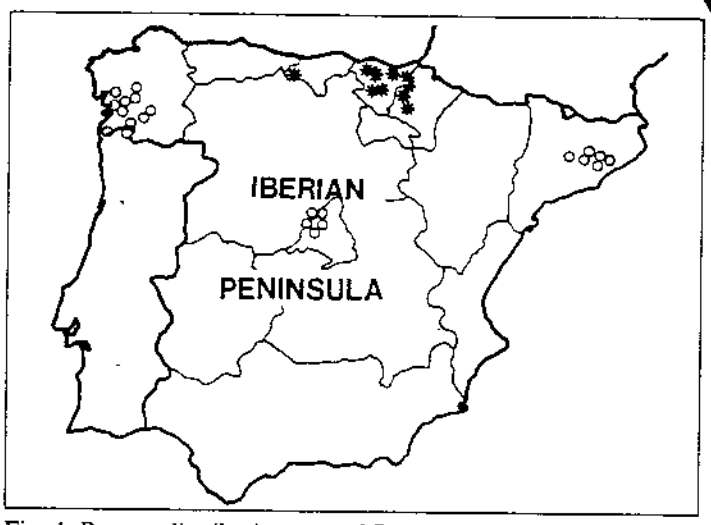

Fig. 1. Present distribution area of European mink, *Mustela lutreola* (asterisk), and American mink, *Mustela vison* (circle) in the Iberian Peninsula.

1. A detailed and accurate study of the distribution of the two species in the northern Iberian Peninsula.
2. An increase in security measures in breeding farms, so as to avoid the escape and expansion of American minks in the wild. These measures must be especially strict in the present known area of distribution of *lutreola*.
3. The beginning of research activities on both species' ecology, mainly aimed at knowing their needs as well as feeding and habitat preferences.

No research activity on any of the two species in the Iberian Peninsula is currently being carried out. It would be important to start activities by Spanish organisms as well as to obtain a cooperation agreement between Spain and France to guarantee the survival of the European mink in western Europe.

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Back-striped weasel in Vietnam

Radoslaw RATAJSZCZAK & Roger COX

The theriofauna of Vietnam, in spite of recent surveys, remains very little known. This applies especially to more secretive mammals like most mustelids and viverrids. Up to now some 20 species of Mustelidae and Viverridae have been recorded from that country. During our survey for threatened primates, conducted in 1989, we have been able to add another species to this list.

There are two museum specimens of the Back-striped weasel (*Mustela strigidorsa*) (Fig. 1.) from Vietnam, both taken quite recently. The first animal, a male, was collected in 1976 within the Le Thuy District, Binh Tri Thien Province, approximately 17°N, 106°30'E (Fig. 2). The skin and skull are preserved in the collection of the Academy of Science in Hanoi. The second one, also an adult male, was discovered in the local museum of Cuc Phuong National Park. According to the director of the NP Mr. Nguyen Ba Thu and the museum custos this animal was captured and killed in a storeroom within the NP headquarters in June 1988.

It seems that the striped weasel is widely distributed over suitable habitats in Vietnam. The fact that the animal was taken within human settlement, in an area with a lot of human activities, surrounded by fields and plantations at a radius of several hundred meters may indicate some degree of tolerance for anthropogenic alternations of habitat.

This would be a good time to draw attention to the importance of the Cuc Phuong NP in regard with the conservation of Mustelidae and Viverridae. There are at least 11 species known to occur in this area. Three of them: the back-striped weasel (*Mustela strigidorsa*), Owston's palm civet (*Chrotogale owstoni*), and the Spotted linsang (*Prionodon pardicolor*) are of great conservation interest. The existing facilities and relatively easy access are sufficient for a ecological and long-term status study.

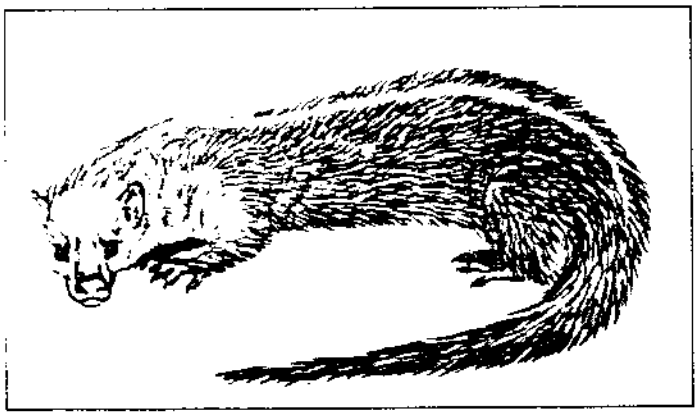

Fig. 1. Drawing of a Back-striped weasel (*Mustela strigidorsa*). From the "Mammals of Thailand" by Boonsong Lekagul and Jeffrey A. McNeely. With the kind permission of Anong Lekagul MD.

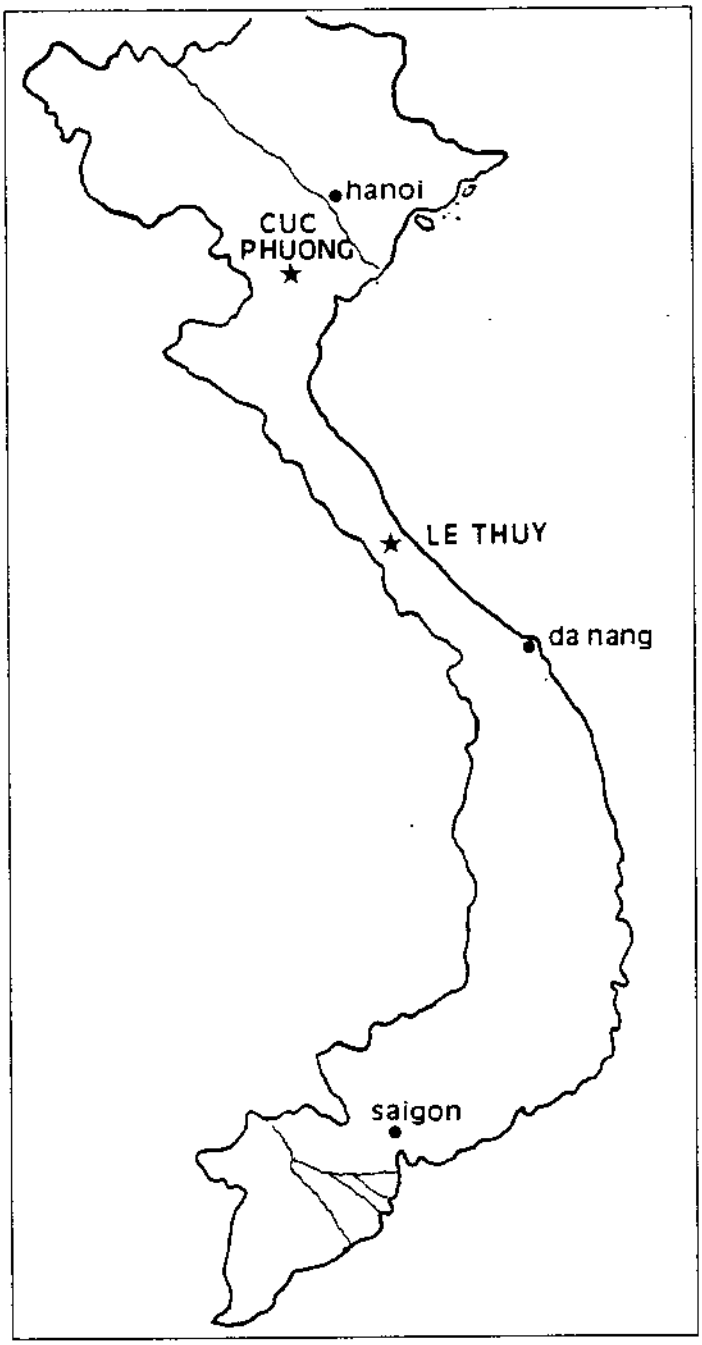

Fig. 2. Schematic map of Vietnam. Stars: two new records for the Back-striped weasel.

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Mustelids in the Eastern Red Data Books

Jerzy ROMANOWSKI

Following the idea of the IUCN Red Data Book, similar publications were later prepared in many countries. These national Red Data Books (RDBs) attracted me as a potential source of information on mustelids and on attitudes towards these animals as well.

I present the status of the mustelids (otters excepted) in so-called Eastern Europe and USSR, based on: 1. national RDBs from Bulgaria (1985), USSR (1985), and Poland (in print); 2. republican RDBs from the Czech S. R. (1983) and eight Soviet Republics (1978-1987)(for a complete list see references). These RDBs differ in official designation. The RDB of USSR is an official document of the Ministry of Agriculture and Academy of Sciences, and it gives legal protection to all listed species. Some RDBs (i. e. Latvian) represent opinions of scientific institutions, and others are signed by teams of authors. Both the scientific basis and quality of presentation vary greatly among RDBs. The national RDBs are professionally done; they include specific data, maps, and good references. Some of the republican RDBs do not, however, maintain that level and give only a general description, sometimes with obvious errors (i. e. incorrect Latin names).

Nine mustelids (besides otters) are listed in the RDBs of East Europe and the USSR. The status of these species is summarized in Table 1. As some of the RDBs used non-standard criteria of status description, I converted them to the nearest IUCN RDB criteria. The Yakutsk RDB included no species from Table 1 and is not listed.

The Marbled polecat (*Vormela peregusna*) is the most frequently listed species (seven times), usually as Rare, and is always protected when listed. The RDB of the USSR protects *V. peregusna peregusna* as a Rare and Decreasing subspecies, and *V. peregusna pallidor* as a Rare subspecies. The former subspecies is also listed in the Armenian RDB, and in Turkmenistan the endemic subspecies *V. peregusna koshernikovi* is protected. The occurrence of the marbled polecat in protected areas is reported by most RDBs; in Bulgaria and Turkmenistan the penalty for killing the animal is established.

The European mink (*Mustela lutreola*) is listed as Extinct in Poland, Czech SR and Bulgaria, and as Rare in Latvia and Kazakhstan. Occurrence in protected areas is not recorded. It seems that protection is often given too late to this species, and not when there are still good chances for survival. The European mink is not protected or even listed in RDBs of USSR, RSFSR, and Byelorussia. Possibly the decision to ignore the status of the European mink is influenced by the great importance of minks to the fur trade.

The Steppe polecat (*Mustela eversmanni*) is recognized as a Rare species in Poland, Bulgaria, and Ukraine. In Poland it is known to occur in protected faunistic reserves. In Bulgaria a penalty for killing the animal is established.

The other six species of mustelids: Stoat, Weasel, Pine marten, Stone marten, Honey-badger, and Badger appear only once or twice in different RDBs (almost only of republican character), usually under the Rare category. The pine marten is classified as Endangered in the Bulgarian RDB, although about 100 animals are still killed annually by hunters. Full protection has been proposed.

The RDBs reflect little interest in protection of the European mustelids. Protection of some endangered species (i. e. European mink) is not established at the national or republican level. Further, surprisingly few species are recognized as Rare or even Indeterminate. The protection measures proposed in the above-mentioned RDBs, with few exceptions, are of such general character (i. e. further studies, better species protection, habitat protection), that they have very little value for promoting conservation actions. Further hindrance of conservation may result from conflicts between protection of mustelids and game policies.

Acknowledgments

Dr. V. Sidorovic provided me with the data on the RDBs of Byelorussia and RSFSR. I would appreciate any additional information on carnivores from other national RDBs.

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Table 1. Mustelids in Red Data Books.
Ex: Extinct; E: Endangered; V: Vulnerable; R: Rare;
+: Protected; *: Game; --: No regulation;
!: indicates protection of selected subspecies only.

	Europ. mink	Marbled polecat	Steppe polecat	Stoat	Weasel	Pine marten	Stone marten	Honey badger	Badger
Poland	Ex+		R-						
Czechosl.	Ex								R
Bulgaria	Ex+	E+	R+			E*			
USSR		V,R+!						R+	
RSFSR		V+							
Latvia	R+			R+	R+				
Byelorus.									R+
Ukraina		R	R						
Armenia		R+							
Kazakh.	R	R				R*	V,R*		
Turkmenia		V+						R+	

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ıe Eurasian badger: An update on status and protective legislation

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The Eurasian badger has a very wide distribution, ranging from Ireland to Japan, and from the Arctic Circle to the latitude of 'Arabia'- the Himalayas - Hong Kong. The status and protection afforded to populations varies greatly within this range, as was indicated in Newsletter No.3 (1990). The situation remains very unclear as regards some countries, particularly in the Middle East and across to southeast Asia. And the position is complicated by sympatry with other badger species in these areas. Thus, the Honey badger (*Mellivora*) occurs in Egypt and 'Arabia' across into southern Russia and India, but the Eurasian badger may have expanded from the good Israeli population into the Sinai and Egypt. The situation is even more confused in southern Asia where Hog badgers (*Arctonyx*) occur, and although *Meles* is known from Afghanistan and Nepal, it is probably absent from Assam, Bhutan, Borneo, Laos, Thailand and Vietnam. Both genera of badgers co-exist in China, Mongolia, Nepal, and Tibet.

Whereas the Eurasian badger is regarded as an agricultural pest in countries such as Sweden and Greece, or as a reservoir of sylvatic rabies in parts of Austria, the species is in need of better protection or enforcement of existing legislation in other areas, digging being a problem in, for example, parts of Britain, Belgium, and Germany. In only two countries does "Full protection" include badger setts, the core area of badger habitat: northern Ireland and some Dutch parishes. The status of some of the island species is probably very precarious (Table 1).

Table 1. Eurasian badger (*Meles meles*), distribution and legal protection ranging from: F= Full, HS= Hunting season (closed season ca December-June), N= None.

Afghanistan: N?, form *canescens*, **Albania**: N?, **Andorra**: N?, **Austria**: HS mostly (N-F), **Balearics**: Majorca: extinct?, form *marianensis*, **Bangladesh**: present?, **Belgium**: F since 1974, **Bulgaria**: HS, **Burma**: rare, **China**: N?, **Corsica**: absent, **Crete**: N, form *arcalus*, **Cyprus**: absent, **Czechoslovakia**: HS (limited?), **Denmark**: HS, Game Act 1967, **EEC**: Bern Convention, **Egypt**: possibly present, **Finland**: HS, **France**: HS - N, by province, **Germany**: HS, **Gibraltar**: absent, **Great Britain**: F, 1911, 1973, 1981, and 1985 Acts, **Greece**: N, **Hungary**: HS, **Iran**: rare, form *canescens*, **Iraq**: rare, form *canescens*, **Ireland, North**: F, Wildlife Order 1985, **South**: F, Wildlife Act 1976, **Israel**: F, form *canescens*, **Italy**: F since 1977, **Japan**: HS, **Jordan**: rare, form *canescens*, **Korea, North**: N?, forms *amurensis* and *melanogenys*, **South**: F, **Lebanon**: rare, form *canescens*, **Liechtenstein**: HS, **Luxemburg**: F, **Malta**: absent, **Monaco**: absent, **Mongolia**: N?, form *amurensis*, **Nepal**: rare, **Netherlands**: F since 1948, **Norway**: HS, **Pakistan**: present?, **Poland**: HS, **Portugal**: HS, **Rhodes**: N, form *rhodius*, **Romania**: N, **Sardinia**: present?, **Saudi Arabia**: present?, form *canescens*, **Sicily**: present?, **Spain**: F, **Sweden**: HS, **Switserland**: HS (F in Geneva canton), **Syria**: rare, form *canescens*, **Tibet**: rare, form *leucurus*, **Turkey**: HS, **USSR**: HS, **Yugoslavia**: HS.

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The badgers of Ashcroft Woods

...and the destructuring of populations

The Eurasian badger (*Meles meles* L.) is a good indicator species of the effectiveness of wildlife conservation measures in any given area, since populations can withstand considerable human disturbance. Chris Ferris'third book on her Ashcroft badgers (1990, Unwin Hyman, London, £ 12.95) contains the prose poem descriptions of the changing seasons worthy of Richard Jefferies or W. H. Hudson which characterised her earlier "Out of the darkness" and "The darkness is light enough". Alas, the account makes depressing reading otherwise, since despite eight years of unremitting vigilance on the reserve, 25 of some 34 known badger deaths (74%) were attributable to human activities: nine lampers and dogs, six shot, four dug out, four road, one snared, and one coppice lorry over sett. And whilst only three boars and six sows achieved more than three years of age, four out of five sows which bred more than once during this period needed rescuing from premature death via snares or poachers.

Human disturbance elsewhere which has resulted in non-breeding and only sporadic occupation of setts, includes S. Edwards' study of Enterkine Wood Reserve in Scotland, E. Ashby's study in the New Forest, R. Paget in Yorkshire, and C. Killinley in the Chilterns. Non-breeding may result simply from lack of an adult boar as in Ashcroft Woods (although delayed implantation may result in some litters despite death of the boar in the meantime), or lack of a replacement sow as at A. Middleton's Mirfield sett in Yorkshire; and disruption of populations by culling may lead to complete non-breeding over several years until social group structure becomes re-established as in the two 'TB-vacuum' areas in southwest England.

The conservation of badgers must hence encompass the minimisation of human disturbance, the protection of core habitat i. e. the breeding sett, as well as the rescue and rehabilitation of injured or orphaned badgers, with captive bred releases or translocations into hazard-free areas to restock depleted populations (see *Int. Zoo News* 207:20, 209:3, 214:16).

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