

# SMALL CARNIVORE CONSERVATION



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Mustelid, Viverrid & Procyonid Specialist Group



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Male Tropical cacomixtle (*Bassariscus sumchrasti variabilis*) from Honduras.  
Photo by I. Poglayen-Neuwall



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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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# Report on a little-known procyonid, *Bassariscus (Jentinkia) sumichrasti* (de Saussure, 1860)

Ivo POGLAYEN-NEUWALL

## Introduction

In contrast to its well-known relative, the northern Ringtail (*Bassariscus astutus*), limited information has been published about the tropical Cacomixtle (*B. sumichrasti*). Hall (1981) deals with the latest taxonomic status, Kortlucke (1984) describes the distribution and morphology of the genus *Bassariscus*, and Poglayen-Neuwall (1973, 1991, in press) reports on behavior and reproduction of captives during a period of 23 years. Alvarez del Toro (1991), and especially Estrada & Estrada-Coates (1985) report on the ecology of the free-ranging "Guya-noche" in Chiapas and Veracruz respectively.

This report describes ranges and habitats in Mexico. Apart from personal observations of free-ranging animals by the author and his research assistant (1974/75, 1988/89), also information obtained from reliable sources such as biologists, teachers, owners of fincas or local hunters and animal dealers is included. Information from Indians had to be taken with caution. Mixup of different species by the natives, even when shown photographs of the species in question, is widespread. Local names of one species are numerous and change from region to region often within the same province; different species may be known by the same name. Examples are 'Cacomixtle', 'Mico Rayado' (also for *Potos*), 'Mico Varcino', 'Wilo', 'Goyo', 'Wuku' (Lacandon Mayas), 'Wet' (Textli Indian), 'Cerero', 'Gregorio' (Chiapas), 'Guya-noche' (Chiapas and Guatemala), 'Marta Gris' (Guatemala), 'Mico Leon' (also for *Potos*; Chiapas and Guatemala), and 'Mico de Noche' (also for *Potos*; Veracruz).

Most natives are afraid to leave their huts to penetrate the forest after dark and therefore seldom associate calls with the proper species. An important help in locating cacomixtles in the 'Selva' (wilderness) was our taperecorder. Generally, when an animal entered the hearing range of the played recording (about 100-200 m, depending upon terrain, density of forest/undergrowth, and direction of wind) it responded to the taped alarm calls ('long calls' after Estrada & Estrada-Coates, 1985; 'resounding calls' Poglayen-Neuwall, 1973), and often approached the source of the calls. In the distance other cacomixtles would answer. Alvarez del Toro (pers. comm.) lured cacomixtles to his camp site with open fire. They would never come near when artificial lights (lanterns) were on. When we played the recording too loud the approaching animal would rapidly retreat while vocalizing, in response to the presumed presence of the 'super-cacomixtle'. Soon after dark cacomixtles start vocalizing, and in areas of high population density their calls could be heard coming from different locations. It is possible that the long calls also have a 'spacing' function.

On the occasion of an expedition in the spring of 1977 we visited a moist evergreen forest NW of Tuxtla Gutiérrez. Spring (March-June) is the period of the most intensive vocal activity of the species. We timed the long calls beginning at 19.50 h; the calling, with intervals of 10 to 25 min. lasted until 2.00 h. Probably up to four individuals participated, but not all called at the same time or speed. We have heard single *Bassariscus* calling, or alternating with another individual, sometimes throughout the night.

## Ranges and habitats

The geographical distribution of *Bassariscus sumichrasti*, including the zone of overlap with *B. astutus*, is known (Hall, 1981), but location, size and densities of *B. sumichrasti* are still open to speculation and may change dramatically in many regions due to human activities.

Various categories of habitats are exploited by *B. sumichrasti*, from sea level to over 2,500 m. Preferred habitats are evergreen, broadleaf premontane and montane forests (1,200-1,700 m ASL), cloud forests (above 1,700 m), moist evergreen forests (over 2,000 mm annual rainfall), lowland rain forests (under 800 m), and seasonally dry deciduous or semideciduous forests (less than 2,000 mm rainfall) from southern Mexico to western Panama. Avoided are pure oak- or pine forests, secondary forest, motorrál and chaparrál (probably because of scarcity of fruits and/or tree hollows), and altitudes above 2,800 m. Local seasonal migration occurs at the "Reserva El Triunfo", Sierra Soconusco (Chiapas), where *B. sumichrasti* inhabits the entire range (500-2,400 m) during the rainy season, but these animals move to lower elevations (below 1,500 m) to avoid exposure to (mild) frost in winter (M. Alvarez del Toro, pers. comm.).

The peak of the Sierra Santa Marta (southern Veracruz) is covered with a transition of rain forest to montane forest; inroads by logging and burning are visible. There is a small population of *B. sumichrasti*. Two animals were captured with the help of natives. The outlook for this forest's and its fauna's future is grim; there are no plans to protect this range. A contrasting situation was found at the Estación de Biología "Los Tuxtlas" of the National University. Located near Catemaco, the property covers 700 ha of fine, tall rain forest, which extends onto Volcán San Martín, with an additional 10,000 ha, which enjoy a discrete measure of protection. Estrada & Estrada-Coates (1985) list 12 mammals, including 2 procyonids, *B. sumichrasti* and *Potos flavus*. In their studies on various aspects of the local fauna, these researchers divide the forest into three major height classes: lower level 0-10 m, middle level 10-20 m, and upper level > 20 m. They observed five cacomixtles intermittently for about a year, and qualitatively and quantitatively analyzed their food consumption.

The vertical preferences for both cacomixtles and kinkajous were found to be identical, namely 60% middle layer and 40% upper layer. These observations of preferred strata in the forest correspond with ours. While statistically insignificant it should be noted that cacomixtles do descend to the forest floor. In Campeche we collected a fresh carcass of a young-adult male, hit by a vehicle on a road through a dry deciduous forest with locally abundant chicle (*Manilkara zapota*) trees in fruit. In a moist evergreen forest in eastern Oaxaca we observed a cacomixtle crossing the road at 20.00 h. These observations are indicative of *B. sumichrasti* (like *Bassaricyon*, C. O. Handley, pers. com.) being not disinclined to descend to the ground when a clearing has to be transversed. Alvarez del Toro (1991) made similar observations of cacomixtles. We have no information of *Potos* voluntarily descending to the ground.

Oaxaca: we travelled extensively on several occasions (1958, 1975, 1977, 1989) through the western part of the Isthmus de Tehuantepec, but became ever more disappointed about the human ravages of the region, where in the 1940's a number of cacomixtles were still taken by museum collectors. Today this area is largely developed for agriculture and cattle ranching. Excellent rain forest, however, exists in the eastern region of this state.

Chiapas: most of our time in the Neotropics was spent in this state. In the area of Sepultura (15 km N. of Arriaga) where tropical deciduous forest changes to humid forest in higher elevations, we observed four cacomixtles and -with a drug capture rifle- obtained two of them alive, and one unfortunately dead. In the higher elevations the forest is still intact and boasts a diverse fauna, including the Tapir (*Tapirus bairdi*).

At Las Minas, SW of Rizo de Oro (6 km E. of the Oaxaca/Chiapas border), the higher altitudes are covered with open pine stands. The plateau is dissected by a number of narrow "Cañadas" and somewhat wider "Barrancas" where both deciduous and evergreen trees form a dense growth and a semi-humid microclimate prevails. C. A. Guichard, curator at the regional zoo (ZOOMAT) in Tuxtla Gutiérrez, pointed out a totoposte tree (*Licania arborea*, fam. Rosaceae), about 35 m high, where a large, partially hollow branch served a *B. sumichrasti* as a continuous day-retreat for at least the last five years. Whether it was always the same individual (which we captured) is not certain.

In the region of Frontera Comalápa (S. of Comitán near the Guatemalan border) we found large tracts of disjunct mixed forest (deciduous and evergreen) with good populations of *B. sumichrasti*. Our local companion, a veterinary student, had seen a feeding aggregation of eight cacomixtles in a tree. We later observed four individuals in a fruit-bearing chicozapote tree. The animals were apparently not part of a cohesive group, did not visibly or acoustically interact and eventually departed into different directions. Since *B. sumichrasti* are solitary animals, have only one offspring per litter, and pairing may be brief (Poglayen-Neuwall, 1991, in press), the social structure excludes formation of "family groups".

In the area of Volcán de Tacaná (4,057 m; extreme eastern Chiapas, NW of Union Juárez) the lower ranges are extensively cultivated with coffee and banana plantations. Higher elevations support dense montane forest and cloud forest in the upper range. Here is found the cacomixtle's highest known occurrence at 2,800 m (Hall, 1981). We could not find any evidence of cacomixtles at that elevation; occasionally a cacomixtle is observed by campesinos visiting the banana plantations.

The 'nubliselva' or cloud forest reserve "El Triúnfo" (2,400 m), Sierra Soconusco (SW Chiapas, part of the Sierra Madre Occidental) was founded and developed by the meritorious conservationist-naturalist Miguel Alvarez del Toro. It is one of the last refugia of the rare and threatened Horned guan (*Oreophaps derbianus*), and is inhabited by thriving populations of *Bassariscus* and *Potos*. Unlike most other National Parks "El Triúnfo" is protected by well-trained rangers. They told us about the cessation of calling by cacomixtles in this area during the rainy season.

Parque Nacional "Selva Lacandona" is still a region of largely pristine rain forest, although there are growing inroads by peripheral human settlements and forest exploitation and destruction. Surprisingly only modest numbers of *Bassariscus* have been located in this forest by Alvarez del Toro (pers. comm.).

A large area in NW Chiapas and eastern Oaxaca "Los Chimalapas", covering approximately 600,000 ha holds great promise. This is untouched rain forest, biologically unexplored. Logging companies are poised to invade the forests, but efforts, spearheaded by Alvarez del Toro, are being made to have this tract of land declared a Reserve or National Park by the appropriate authority in the capital as quickly as possible. Aerial photographs of this uninterrupted forest are impressive.

## Feeding ecology

Direct observations and analyses of scats (collected near sleeping sites), as well as from free individuals and newly captured animals, revealed a prevalence of fruits with emphasis on *Ficus* spp. and *Manilkara* sp. Insects (katydids, Gryllidae, Coleoptera) represented 20 to 30% of the total intake, and vertebrates constituted no more than approximately 10%. These values probably vary somewhat from one habitat to another. The findings of Estrada & Estrada-Coates (1985) for the rain forest of "Los Tuxtlas", Veracruz, show that fruits constitute 40% and animal matter 60% of the total consumption. Unlike ours (winter/spring samples), their observations extended over 12 months. Experiments with three recently captured animals at the regional zoo (ZOOMAT) in a natural setting outside Tuxtla Gutiérrez, demonstrated that only small warmblooded animals such as doves, week-old chicks and mice, as well as small lizards are considered "prey". Any animal of larger size has an intimidating effect on *B. sumichrasti*. Therefore we think that the widespread tales of cacomixtles raiding chicken coops are grossly exaggerated, and most are probably attributable to other small predators. Furthermore *B. sumichrasti* is no technophile species like *Procyon* or to some extent *B. astutus*, and does not live within or very close to human settlements.

Below follows in alphabetical order a list of fruits observed being eaten by cacomixtles in the wild or found in scats, and those of potential food value, palatability and accessible to the species (Table 1). Some of this information and identification has been collected in Central America on previous expeditions.

Table 1. Uncultivated fruits edible for *Bassariscus sumichrasti*

Scientific name	Family	Common local names
<i>Annona</i> ssp.	Annonaceae	Anona, Chincuya
<i>Brosimum alicastrum</i> *	Moraceae	Mujú
<i>Capparis</i> sp.*	Capparidaceae	Amolillo, Cashimbo
<i>Carica</i> sp.	Cecaceae	Papaya silvestre
<i>Cecropia obtusifolia</i> *	Moraceae	Gerumbo
<i>Diospyros digyna</i> *	Erbenaceae	Zapote negro
<i>Dipholis minutiflora</i>	Sapotaceae	Zapotillo
<i>Eugenia</i> sp.*	Mirtaceae	Chasa
<i>Ficus glabrata</i> *	Moraceae	Amate, Mato palo
<i>Ficus</i> spp.*	Moraceae	Igo
<i>Manilkara zapota</i> *	Sapotaceae	Chicle, Chicozapote
<i>Morisonia americana</i>	Capparidaceae	Zapote blanco
<i>Poulsenia armata</i>	Moraceae	Chirimoya
<i>Pouteria sapota</i> *	Sapotaceae	Mamey, Zapote colorado
<i>Psidium quajava</i>	Rubiaceae	Guyaba
<i>Quararibea cordata</i> *	Bombacaceae	?
<i>Sideroxylon tempisque</i> *	Sapotaceae	Tempisque
<i>Spondias mombin</i>	Moraceae	Ocote

\* identified from scats or observed consumption

At 'Rancho Bonito' in Sepultura on a moonlit night we observed a *B. sumichrasti* rummaging among the showy blossoms of a leafless *Capparis* tree for 9 min. It was probably searching for the numerous insects attracted by this source of nectar, if not the nectar itself, tearing some of the blossoms in the process. At another occasion we noticed a kinkajou (*Potos flavus*) inspecting the large flowers of a Bals tree (*Myroxylon balsamum*). In all likelihood both species are pollinating agents, as already suggested for *Bassaricyon* and *Potos* on *Quaribea cordata* blossoms by Janson *et al.* (1981).

## Habits

The circadian rhythm (strict nocturnality) and the solitary status of the species (outside the breeding context and maternal care) were confirmed. It was not possible to census populations by long-range calls as in some primate species (Thorington, 1972), since animals move often while calling or during intervals of calling and sometimes few or none respond to taped calls. It appears that the season of sparse calling (October-January; in June-September at "El Triunfo") alternate with periods of intense calling (main reproductive season). Estimates of population densities by means of trapping/markings failed because of the extremely cautious nature of these animals (very different from *B. astutus*), which avoid entering traps. Those captured were taken during daytime out of tree hollows by agile natives under difficult circumstances. Once alarmed, an animal may not return for several days to its den. Tree hollows may be used continually by *B. sumichrasti* for several years, yet there are indications that some animals do change dens within their home range, perhaps to use them again some time later, much like *B. astutus* (Toweill & Teer, 1980). During the period November-May no females were seen with young of the year, nor did we ever obtain an obviously pregnant or a lactating one. Copulations in the wild were observed in late April in Chiapas (P. Alegría, pers. comm.) and on 15th January by F. Sumichrast (A. Gardener, pers. comm.) in Veracruz.

There is no convincing evidence available on a restricted breeding season for this species and statements on the number of young range from one to four. Information from the old zoo in Tuxtla Gutiérrez, Autosafari Chapín, Guatemala, and six births in the collection of the author establish that litters consist of singletons only. From available data and our own experience I have records of oestrus for every month of the year (with a majority for February-May) and births occurring in the months of January, April, May, June, July, and October (Poglayen-Neuwall, 1991, in press). Furthermore it seems that *B. sumichrasti* females frequently have a postpartum oestrus after an early loss of their young, unlike *B. astutus* where postpartum oestrus is the exception.

## Conclusions and recommendations

The 6-month study in Mexico, reinforced by the experience from several previous exploratory trips to Mexico and Central America between 1956 and 1989, and by reports and discussions with knowledgeable trained biologists has convinced us that *Bassariscus sumichrasti* is not imperiled in Mexico or elsewhere at this time (with the possible exception of Costa Rica). There is of course danger that continued slash and burn activities in the forests, spreading settlements and urbanization, development of dams and power plants will greatly reduce suitable living space, eventually leading to the species' extinction. The tropical cacomixtle has never been well represented in the Selva Lacandona; in the SE portion of the Chiapan "Depression Central" the numbers of

cacomixtles have drastically declined since the establishment of the Presa la Angostura (dam) and the clear-cutting in this region. In some areas the animals are killed for food, wantonly or as a retaliation for their alleged raids on poultry. The species does no serious damage to orchards or plantations.

Elsewhere in Central America the situation of the animals/habitats resembles that in Mexico. Apart from Costa Rica it is particularly critical in large parts of Nicaragua. Encountered in fair numbers in NE Nicaragua still in the 1960's (L. G. Clark, pers. comm.) *B. sumichrasti* now has become so rare that I was unable in 1975 to see or hear a cacomixtle nor to locate a single skin, or a person who had ever seen one or recognized it from a photograph; this included the foremost dealer in wild animals in Managua. The species seems to have completely disappeared from western Panama.

Long-term studies of *Bassariscus sumichrasti* in the field should be undertaken soon, aided by darting and radio-telemetry equipment, and natives skilled in manual capture technique for daytime capture. Not nearly enough is known of the species' population dynamics and -density, its social structure and habits.

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# Status and economic importance of the North American badger, *Taxidea taxus* (Schreber)

Charles A. LONG

The North American badger, *Taxidea taxus* (Schreber, 1778), lives an independent, lonely life as far from people as possible. Inhabiting some remote desert or treeless pasture, a drained marsh, or a grassy highland this badger prowls about, making its excavations in search of rodent prey. Seldom seen, its conspicuous and abundant diggings and the entrances to the dens (burrows), often large and with characteristic ellipsoid shape, signify its presence on road embankments, weedy dikes, or grassy hillsides. The badger is a fossorial hunter, and owing to its predatory activities it is beneficial to humankind. It is important in controlling rodent populations, which destroy agricultural crops and spread diseases. Other benefits are soil development, providing ready-made dens for many other furbearers, killing venomous snakes, and eating carrion and insects (Long, 1973; Long & Killingley, 1983; Messick, 1987). The badger seldom dwells in cultivated fields, but occasionally commits some damage (Minta & Marsh, 1988).

The badger is so fossorial that one was observed to dig itself underground through an asphalt road. One taken as an unwilling mascot to a Wisconsin high school football game escaped and meandered under the sod of the playing field raising up many humps and ridges (Long, 1987). In nature, the badger digs into rodent burrows (Lampe, 1976) feeding extensively on pocket gophers *Geomys* and *Thomomys*, ground squirrels (*Spermophilus*) and other sciurids, mice and rats, a great variety of other small vertebrates (including snakes, toads, frogs), insects and their grubs, wasps and bees, worms, and occasionally feeding on vegetal foods such as corn or oats. One was seen catching fish in a shallow stream, and another feeding on crayfish (Long & Killingley, 1983). Although predatory, the badger is opportunistic in eating such a wide variety of foods, but often feeds almost exclusively on any rodent that is abundant.

Resembling a short-legged, shaggy and medium-sized dog, the badger is identified by its huge foreclaws (up to 5 cm in length) and prominent head markings. The so-called "badges" are brown or blackish patches on the cheeks. There is a bold median white stripe on the black head which continues onto the nape of the neck, and to the base of the tail in the small southern badgers (*Taxidea*

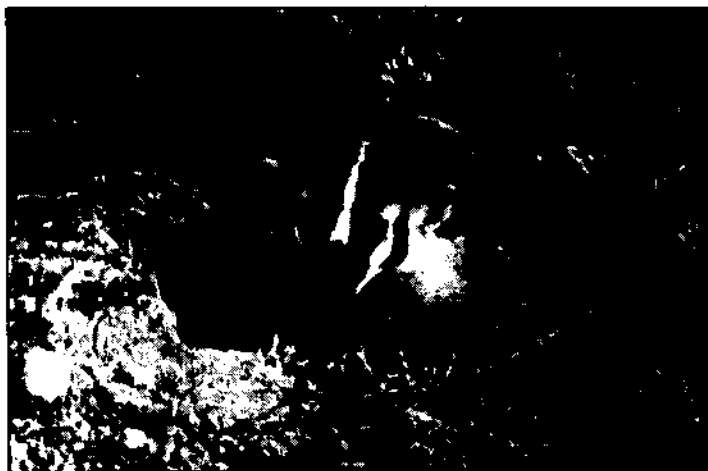


Fig. 1 North American badger, *Taxidea taxus*.  
Photo by Bill Wilkinson.

*taxus berlandieri* Baird, 1858). The northern subspecies are larger animals, all ranging northward into Canada, including the western *Taxidea taxus neglecta* Mearns, 1891, characterized by reddish color, large size, and prominently broad skull with elongate post-orbital processes, inhabiting the mountainous regions from British Columbia and southward into California, where it partially encircles the small *berlandieri* ranging into the great central valley of California, and ranging to the Grand Canyon in southern Utah; the nominate subspecies *Taxidea taxus taxus* (Schreber, 1778), type locality fixed by Long (1972) in Manitoba, characterized by more hoariness and narrower skull and ranging southward into Texas on the Great Plains; and the Great Lakes subspecies *Taxidea taxus jacksoni* Schantz, 1946, resembling the nominate subspecies in cranial characters but fur darker, often with much blackish intermixed into the pelage.

In contrast to the boldly marked head the body is usually drab grayish brown with whitish, black brown, buff, rust, tan, creamy buff, even orange intermixed in the dorsal fur, which is variable from place to place. The feet are dark blackish brown, and the short tail resembles the dorsal fur but is a little paler. There is a great deal of individual and microgeographic variation, but the four races are distinctive over wide regions. Young badgers are much paler, tending more to buff than to the pale grayish white seen in *Meles* (Long & Killingley, 1983).

*Taxidea* bears the inner accessory tubercle on the upper carnassial which characterizes all the true badgers (Long & Killingley, 1983), and resembles *Meles* in size, pelage and other superficial characters. This resemblance results from parallel evolution. The great differences in reproductive patterns (Wright, 1966), social behavior (Kruuk, 1978a, 1978b), dental and cranial characters (Long, 1965b, 1972, 1973, 1978, 1987; Long & Killingley, 1983) result from the isolation of *Taxidea* in North America since the mid- or late Pliocene epoch. As in all badgers there are anal scent glands, used in defence, mating, and possibly in other functions. The scent is hardly offensive and not very powerful.

From other North American carnivores *Taxidea* differs in low, broad wedge-shaped skull, triangular upper carnassial and upper molar, low auditory bullae, short ears defended with coarse bristly hair, and a squat body with shaggy fur fluffed out and rotated about when the badger hisses, grunts and threatens. The baculum is unique: elongate, bent or hooked distally, and the triangular tip is twisted. Body weights may range to 11.5 kg in northern adults, occasionally even more, in captives to nearly 18 kg. The males are significantly larger than the females (Long, 1972; Long & Killingley, 1983; Messick & Hornocker, 1981).

Some of the interesting morphological peculiarities of this badger, which add to its aesthetic value, are adaptive to fossorial behavior. A large nictitating membrane protecting the eye, partially webbed toes, Pacinian corpuscles in the foreclaws (suggesting an uninvestigated subterranean sense of feeling by the claws), and self-sharpening teeth are noteworthy (Long, 1965a, 1972, 1973; Long & Killingley, 1983).

The North American badger is usually born in a natal den with one or two, occasionally three brothers and sisters. By summer the young emerge from the den to play outside, usually in the evenings. The mother brings dead rodents for the young to eat. She fiercely protects her young, but the male goes his own way (except during pair bonding or copulation). Weaning occurs in late summer. The young-of-the-year females occasionally breed about this time, and young of both sexes must fatten themselves and find a winter den. Often it is a re-worked den of a fox or woodchuck.

Badgers sleep through the winter, but are active on warm days. The torpor lasts about 29 hrs on average (Harlow, 1981). The body temperature falls about 9°C, and the bradycardia is about half the normal rate. This torpor is called *Winterschlaf* by German naturalists, and it is not true hibernation. It is of great interest, allowing the badgers to range northward into severely cold latitudes. Many of the phenomena, such as fats in the blood, differ from non-hibernators (Harlow & Varnell, 1980). Hibernation fat is laid on in the fall, and seldom used up by spring (Long & Killingley, 1983).

After copulation in the summer or fall, the conceived blastocysts show arrested development, and implantation is delayed until February. About five weeks later in March or April the young are born, furred and helpless. The eyes open after four to six weeks. The young are taught to hunt after they are weaned, after attaining about two-thirds growth. The offspring are dependent on their mother nearly the entire year, counting the period of delayed implantation. Age classes have been defined by Long (1975).

Home range is greater in males than in females, and young of the year do not maintain a territory or home range. The area of wanderings shrinks from mating until winter, when it is minimal size. Density is not well known, the studies were summarized by Long & Killingley (1983) and Messick (1987). Messick & Hornocker (1981) found in areas of abundance the badgers reached densities of 3-5/km<sup>2</sup>.

Natural predation on badgers, seldom observed, probably is not common, and it seemingly affects the young most (Messick & Hornocker, 1981; Long & Killingley, 1983). Starvation seems an adverse factor for the young (Messick, 1987) and the very old (Long & Killingley, 1983). Diseases doubtless are detrimental to badgers, but they have not been investigated much (Messick, 1987). The effects of herbicides, insecticides, PCB's, and other chemicals remain unknown.

The greatest enemy of badgers is humankind, responsible for destruction of badger habitats and heavy mortality from trapping, hunting, and automobiles (Long & Killingley, 1983; Messick, 1987). Governmental conservation agencies in misguided programs of "predator control" have poisoned badgers intentionally or incidentally (in eradicating wolves and coyotes). In South Dakota, bounties were paid for badger carcasses from 1951 to 1961. Attitudes are not much improved there, where badgers are thought not to control rodents and to cause alleged harm to livestock. There and in other western states, young men driving about in pickup trucks often shoot badgers they encounter, not appreciating their value in the scheme of nature. Many badgers are trapped incidentally by trappers trapping for other furbearers, usually coyotes (Messick, 1987).

Although God himself prized badger fur and ordered his holy tabernacle to be tented with it (Long & Killingley, 1983;

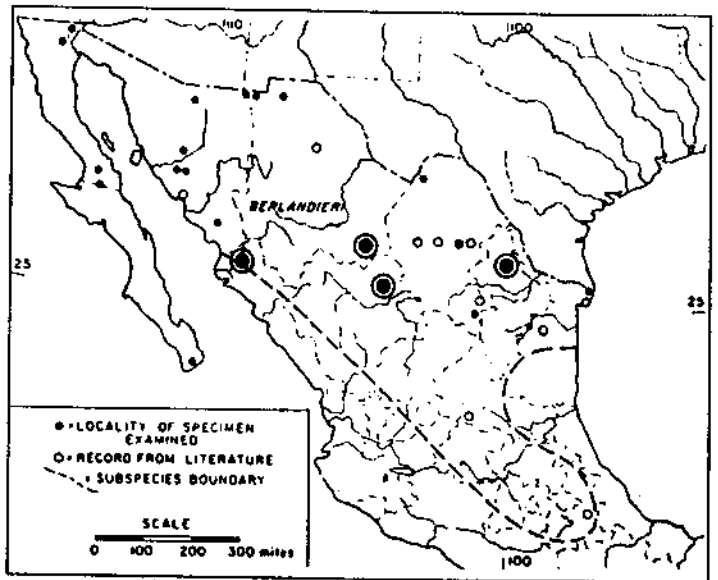


Fig. 2 Geographic range of the North American badger in Mexico. Modified from Long (1972). Bull's-eyes represent new records mentioned in text.

Long, 1987) the fur of most badgers, including *Taxidea*, is not much prized by trappers. Fur of *Taxidea* has occasionally been used for badger shaving and paint brushes (Neal, 1977; Long & Killingley, 1983) but most of them are made from the pelage of *Meles*. Tanned hides are used as attractive wall hangings, and in the fur trade the coarse guard hairs are used in "pointing" other furs or as trim. In Wisconsin, where the caricature "Bucky Badger" is the mascot of athletic teams at the University of Wisconsin-Madison, some people wear overcoats of badger fur to football games (Long & Killingley, 1983).

When badger fur is in style the value of pelts goes up, and reached a high once of 100 US\$ each. They are not worth nearly that much now. Trapping pressure when the price for badger fur is high leads to declines in the abundance of badgers in some states (Long & Killingley, 1983). The density of pelts per given area was mapped by Novak and Satterthwaite (see Messick, 1987). The states and Canadian province where most pelts were taken are Minnesota, North and South Dakota, and Saskatchewan. The lowest harvests, where the badger is given full protection, was British Columbia, Wisconsin, Illinois, and Michigan. The entire range of badger trapping (north of Mexico) was estimated at 6,154,000 km<sup>2</sup>.

Long & Killingley (1983) report the status of badgers up to that year from state and provincial agencies throughout the range of the badger. There are new populations established outside the normal range, as far eastward as New York (Nugent & Choate, 1970). One report from the Yukon has been questioned, and its status is unknown. The range remains about the same as it was in early historic times. After a decline in badgers owing to overhunting and destruction of habitats, lack of appreciation of the badger's usefulness, and poisoning campaigns aimed at predators, the badgers declined but have come back as these adverse factors were diminished. The regional densities may be declining in some states (Montana, California, New Mexico, and Missouri) according to some data collected by Long & Killingley (1983), and may be declining somewhat even though expanding into new habitats in Missouri (Messick, 1987, 1988). Some of the apparent expansion of geographic range is the extension of known range (Long & Killingley, 1983), for example in Mexico where some new records of occurrence have been published (see Fig. 2).

The badger seems in peril in British Columbia, where it receives protection, the subspecies *T. t. jacksoni* is endangered in Ontario, the one place where this subspecies is found in Canada, and it is hardly protected there (Snyder, 1935; Bartlett, 1955; Lintack & Voight, 1983; Long & Killingley, 1983). The 30 records of badgers observed recently in southwest Ontario (Waterloo, Haldimand-Norfolk, Kent, Lambton, Middlesex, and Grey counties) were based in part on collections of 14,000 furbearers taken by more than 200 trappers and hunters. Nineteen were caught in traps set for *Vulpes* and *Procyon*. Other records included 5 road kills, 2 shot, 1 clubbed to death, 2 sightings, and 1 trapped by mammalogists. Only 6 of 18 marketable pelts were sold, because the badger is considered rare and interesting. Predator "control" agents have killed them; a Mr. J. D. McCabe reportedly killed or released 20-25 badgers in Elgin, Middlesex, and Lambton counties in the 25 years preceding the study. There was and is open season on badgers from 15 October until 31 December, and levies were levied on all pelts. A primary vulnerability to this population of badgers lies in the confined peninsular geographic distribution.

Although not endangered in the following states, there is no protection at all for badgers: Wyoming, Arizona, Oregon, Idaho, Montana, Utah, Nevada, Nebraska, and Minnesota. Reportedly, the badger numbers are studied in Idaho (Long & Killingley, 1983).

Throughout the entire country of Mexico the badger is always rare, seems decreasing in numbers at the one place it was studied (Lopez Soto, 1980), and is hardly known even to exist in most of its Mexican range. Here is where the badger deserves full protection and a great deal of scientific investigation. The badgers of western Mexico were described as a new subspecies, *T. t. sonoriensis* Goldman, 1939, based on a series of young with milk teeth present. There is a clinal trend toward reddish color westward in Mexico, but Long (1972) referred all Mexican badgers to the small, long-striped *berlandieri*. Badgers range the length of the peninsula in Baja California, and southward west of the Sierra Madre Occidentale into Sinaloa, as far as Choix and probably Badiraguato (Armstrong *et al.*, 1972). Eastward, Anderson (1972) listed badgers from San Luis Mountains, Colonia Diaz, 30 km S Moctezuma, 12 km NW Escalon, 1357 m elevation, and possibly SW Chihuahua. Baker & Greer (1962) reported badgers from open lands in eastern Durango, and a specimen from Canatlan. Anderson referred a badger to San Pedro, Coahuila. Other records (Fig. 2) are listed in Long (1972).

One of the great salvations for wild animals is public education, exemplified especially in Britain where attention was drawn to and appreciation developed for the pathetically abused badgers. The "Wind in the Willows" and other children's literature, many educational magazine and news articles favorable for badgers, and governmental support of badger conservation brought a new compassion for wildlife in Britain, evidenced by culverts under highways for the unfettered dispersion of badgers, and prohibitions against badger cruelty (including gassing their setts, poaching, badger-digging, badgering the animals with dogs, and so on (Neal, 1977; Long & Killingley, 1983; and a host of articles by British badger conservation groups).

In North America, there are some magazine articles and nature books that have encouraged protection for badgers in Wisconsin and elsewhere, but much more education is needed especially in Mexico. Unfortunately, books are not so effective anymore, because of television, and I have seen no TV documentaries in favor of badgers.

Long & Killingley (1983) reported that of 19 states important for their numbers of badgers, nine reported no recent education communications disseminated to the public concerning the benefits of the badger as a predator valuable in natural ecosystems, as a predator controlling harmful rodents, as an aesthetic and extremely interesting animal, or even as a potentially important source of fur. In fact, some states disseminate the myth (perhaps true in some places) that badger burrows cripple livestock and tip over tractors. No one mentions how often other valuable furbearers take over abandoned badger dens, or that the very word "badger" in our vocabulary has a cruel origin and has enhanced modern compassion for wildlife.

Although Jackson (1961) denied it, some American badgers have been pitted against dogs in the east and in California (Long & Killingley, 1983), and owing to their fierce and admirable courage the practice of trapping them in steel traps is nothing less than cruelty (see Long & Killingley, 1983). Not many American children read "Wind in the Willows", or comparable books, because most today are city children with other interests. There is a greater need today than ever before to develop public interest in conservation of wild species, especially those beneficial to agricultural practices.

On the other hand, in Wisconsin, the "badger state" (named that for the mining excavations and the dugout homes the miners often lived in as pioneers in southwest Wisconsin), conservation officials appraised the badger as having aesthetic value exceeding that of the fur. The evaluation did not even take into account rodent control or the beauty of the wild animal seen in its natural home. As a result, the badger has recovered from "perilously low numbers" until it is again abundant and is ranging into new areas where it was previously unknown (Peterson, 1975).

It is a sorry tale, but the U.S. federal government and numerous misguided state agencies have poisoned countless predators over vast regions of the American West, devastating beneficial predators such as badgers, *Lynx lynx*, swift fox *Vulpes velox*, and others (Howell, 1930; and others). Long & Killingley (1983) and Messick (1987) reviewed the pros and cons of poisoning in respect to badger populations. Some political agencies are in need of education. For example, and more could be cited, Long & Killingley (1983) reported the effects of predator poisoning of badgers in the state of California, where ten times as many beneficial badgers were poisoned as were harvested for fur.

One must be mindful, though favoring protection for the badgers wholeheartedly, that hunting and trapping actually benefits many wild animals. Lands are set aside for them, hunting is prohibited in some seasons, only the licensed hunters and trappers are allowed to kill the animals, and most importantly the animals are censused and managed so that the harvest is regulated to be less than the natural surplus. In many states the badgers maintain abundance from this limited protection, and those states appreciate licence fees and tax revenues for conservation purposes. The people who pay for the privilege to hunt or trap benefit from that, and there are tangential benefits of tourism and related jobs that justify to many the roles of hunting and trapping in society.

Some other benefits to badgers, that arose unexpectedly from the activities of people, which are so often disastrous for nature, include clearing of forests and expansion of meadows and pasturelands, extensive building of road rights of way that generally are treeless and grassy, the draining of wetlands and their

replacement by wet meadows and prairies, erosion and abandonment of agricultural land, practices of leaving fields fallow, the failing and abandonment of small farms and concomitant growth of large-scale agri-business (with less contact between people and wild animals). All of these created habitats for badgers. Even the abundance of the pest *Rattus norvegicus* introduced into central Illinois seems to have provided a new food for badgers there.

To sum up, the badger is highly beneficial to humankind in North America, and that has been the general view by mammalogists for many years who have studied this interesting fossorial member of the Mustelidae. Special attention must be given to preserving the species in Mexico, and to improving conditions in Ontario. In British Columbia, New Mexico, California, and elsewhere, even in South Dakota where the badger is abundant, more education and management must be accomplished to improve conditions for the badger, wherever the species is not fully accorded its proper function as an interesting and beneficial component of the North American fauna.

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## STONE MARTENS *MARTES FOINA* IN SIENA, ITALY

Stone martens often live close to human habitations. During 1989, local newspapers frequently reported the presence of stone martens within the city walls of Siena (Central Italy; about 56,000 inhabitants). Citizens complained about damage to roofs and noise during the night. In 1991 a survey was therefore undertaken to evaluate: 1. the distribution of this species in town; 2. the possible presence of a stable population; 3. the reciprocal impact between stone marten and man. A questionnaire was sent to a random sample of families (535, i. e. 10% of families within the city walls). 193 questionnaires (i. e. 36% of those sent) were returned, of which 183 were correctly filled in. Only 16 forms reported the presence of stone martens. The majority of sightings was in the warm season (7), whereas 3 were in the cold season (6 were unclassified). The distribution of sightings was evenly spread in town. Complaints

included: damage to roofs (3); noise during the night (2); killing of pet cats (1); and predation of eggs and chicks (1). Informal interviews revealed that some people used poison to stop this. A few scats opportunistically examined during summer 1991 revealed that stone martens frequently utilized the fruit trees common in city gardens (plums, figs, and cherries). We concluded that stone martens are not abundant in Siena; presumably, they come to town only sporadically, to exploit good food sources (especially fruits) and possibly also nesting sites. In spite of this, persecution by man may be severe.

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# The White-tailed mongoose in Oman, eastern Arabia

Michael GALLAGHER

The only viverrid species known in the Sultanate of Oman, eastern Arabia, are the White-tailed mongoose *Ichneumia a. albicauda*, and the genet *Genetta felina granti*. This note concerns only the mongoose, whose distribution in Oman was mentioned briefly by Gasperetti *et al.* (1985), the late A. D. Alkhalili (1990), and Harrison & Bates (1991); this is summarized in more detail with fuller references here, the current spelling of place names being used.

The species is Afrotropical in origin (Delany, 1989) and it was to be expected in Dhofar, Oman's southern region; however, reports were not forthcoming until recently. Its spread northeastward probably occurred before the onset of the present arid climatic phase, leaving it as a scarce relict in suitable habitat in the north. This summary therefore follows this direction (Fig. 1).

From the southern region of Dhofar, the Oman Natural History Museum (opened December 1985) has four specimens which have been found dead on the tarmac road which crosses the Dhofar mountain range of Jabal Qara and links Salalah, the regional capital, with the desert interior: 5 April 1984 (R. H. Daly, a male, ONHM-89); 26 June 1986 (R. P. Whitcombe, a male, ONHM-574); 24 June 1988 (I. J. A. Brown, a male, ONHM-1011); and in late 1990 (A. Hunter-Choat, an unsexed specimen, ONHM-1713). The 1984 specimen is also mounted in a diorama in the Museum; the others are retained in deep freeze.

Ian McLeish told me on 6 March 1992 of three live records in Dhofar. One mongoose was brought in on 2 June 1987, together with a genet *G. felina* and an Indian crested porcupine *Hystrix indica*, by a trapper, who was promptly told to take them back and release them. One male was caught in a cat trap at Razat Farm, east of Salalah, in May 1989, and was released there. The third, or possibly the same male, was caught at Razat Farm killing parrots in October 1991 and was released at Ayn Razat, in the foothills nearby.

Nearer central Oman and during the Oman Wahiba Sands Project of 1985-87, Ian Linn trapped two specimens alive in *Prosopis* woodland at Qarhat Mu'ammur in the eastern extremity of the Wahiba Sands 15 km west of the coast, the first records between the populations of northern Oman and Dhofar. Linn remarks that although the species shows no obvious desert adaptations, it seems likely that its presence is only possible because of the relatively rich habitat which develops under the protection of the trees in this part of the Wahiba (Linn, 1988). One escaped, but the other (a multiparous female) was fitted with a radio collar, released and radio-tracked (Linn, in prep.).

Early records were from the coastal plain and associated foothills of northern Oman. Gasperetti *et al.* (1985) and Harrison (1968) give details of three specimens (two of them males) in the British Museum (Natural History) from Muscat in 1888 and 1889 (at a time when the name "Muscat" was applied to the northern coastal region as well as to the capital city); also a male at Al Khawdh on 6 November 1891, and a female at Ruwi (now heavily developed, near Muscat the capital) on 26 October 1891.

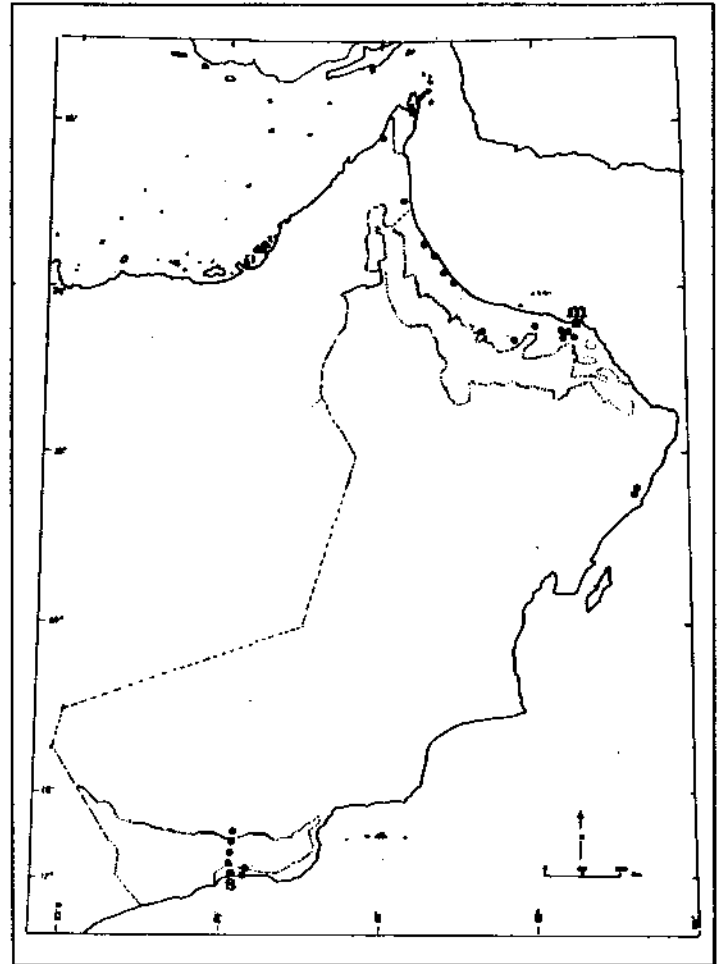


Fig. 1. The Sultanate of Oman, showing the known distribution of the White-tailed mongoose *Ichneumia albicauda*. M = Muscat, S = Salalah.

The naturalist and collector Surgeon-Lieut. Col. A. S. G. Jayakar, who had been responsible for the preservation of the first three specimens, retired in May 1890 after nearly 30 years in Oman, and there was then a long gap, until a female specimen from Sohar on 11 January 1966 was sent to the Harrison Zoological Museum. Harrison (1968) adds one seen dead at Al Khabourah in 1964, and singles seen alive at Saham and at Liwa.

More recent records start with a live male, believed to have come from gardens at Al 'Alayah, Rostaq, presented by an Omani to M. StC. Baddeley and in turn presented to HM The Sultan's Zoological Garden at Seeb in April 1975. It was later transferred to the Breeding Centre, where it died on 3 November 1984 and was accessioned into the Oman Natural History Museum collection (ONHM-811), and is now on display as a mounted specimen.

Later records from northern Oman include one male killed near Saham on 12 March 1991 (per Dr. Harib, ONHM-1751); and one seen crossing the road near Nakhl (near Rostaq, at 23°23'N, 57°50'E) in June 1991 (Said Salem per R. J. Wood).

This mongoose has been reported from Fujayrah and Ra's al Khaimah, United Arab Emirates (Gasperetti *et al.*, 1985), so it

may yet be found in the neighbouring Oman territory of the Musandam region.

#### Acknowledgements

I am grateful to the collectors named here, and for further information to Ian McLeish (veterinarian, Razat Farm, Salalah), Dr. Harib Said Al-Sumry (veterinarian, Rumais), and R. J. Wood (manager, HM the Sultan's Breeding Centre).

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## RECENT PUBLICATIONS

### Fauna of Byelorussia

Nikiforov, M. E., Kozulin, A. E. & Sidorovich, V. E. 1991. *Game animals and birds of Byelorussia*. Minsk; Urozhai. 240 pp. (Further details: Vadim E. Sidorovich, Institute of Zoology, Byelorussian Academy of Sciences, F. Skoriny St., 27, Minsk-220072, Byelorussia).

This hardback book comprises 240 pages with numerous illustrations and photographs (122 in colour). As the title suggests, the aim of the work is to provide a fauna introduction to the mammalian and avian game species of Byelorussia, with further notes on protected species. Full details of field identification are given, a guide to tracks and signs, and descriptions of individual species ecology. A total of 92 pages is devoted to mammals, the remainder to birds (mainly wildfowl and waders). Mustelid species dealt with are *Martes martes*, *M. foina*, *Mustela putorius*, *M. vison*, *M. lutreola*, *M. erminea*, *M. nivalis*, *Lutra lutra* and *Meles meles* (the last of which is protected). The text is entirely in Russian and without the use of Linnean names. Despite this, generous illustration makes the book easy to follow. Overall, this work provides a valuable insight into the fauna of Byelorussia.

### Feral American mink in Ireland

Smal, C. 1991. *Feral American mink in Ireland*. Office of Public Works, Dublin. 33 pp. (Available free of charge from: Wildlife Service, Office of Public Works, 51 St. Stephen's Green, Dublin 2, Irish republic.)

A short guide to the history, distribution and habits of feral American mink, *Mustela vison*, in Ireland. The booklet is illustrated with 8 monochrome photographs, 7 diagrams, and 2 maps. There is a concise (but detailed) review of mink biology, particularly with respect to feeding and reproductive ecology. A discussion of the status of the mink as a pest follows. Field signs are described, as are those of other similar species. The booklet concludes with a description of trapping techniques, a two page section on the construction of a humane trap, and a short bibliography of 16 references.

### Care of injured badgers

Kilshaw, R. No date. *The care and rehabilitation of injured badgers*. Wildlife Hospital Trust, Ayelsbury. 12 pp. (Available from WHT, 1 Pemberton Close, Aylesbury, Bucks. HP21 7NY, UK. Cost 1 UK £.)

This brief veterinary account deals with how to feed, treat and rehabilitate badgers, particularly those injured by road traffic - a subject of interest to animal welfare workers in the UK and the Netherlands. Although perhaps overly short, there is useful advice on badger first aid, and more importantly, dosages for anaesthetics and antibiotics that can be safely administered to badgers. The account ends with advice on the reintroduction of animals to the wild following veterinary treatment. One important omission, however, is that when administering ketamine hydrochloride (*Vetalar*) to badgers, keep clear for at least five minutes or get bitten!

### Binturong studbook

Robinson, P. 1992. Regional studbook for the Binturong *Arctictis binturong* in the British Isles. Number 4. Southport Zoo, Southport, UK. 58 pp.

For the third time Paul Robinson has updated his "Regional studbook for the Binturong in the British Isles", data current as at 31 December 1991.

The book is getting more and more complete with every edition and now contains a.o. information on following topics: status of the 1991 UK population, status of the 1991 ISIS world population, population changes (births, deaths, transfers), historical list of captive specimens, breeding survey and recommendations, demographic analysis (with census-, fecundity- and mortality reports), and genetic analysis (with a.o. inbreeding coefficient reports). New are notes on the "Binturongs in German zoos" and "Weights of adult binturongs".

As to 31/12/1991 there were 26(14,12) binturongs in captivity in seven collections in the UK. This means an increase of one animal as a result of 5 births (5,0!) to two females at Southport. Although one less young was produced in 1991 than in 1990, the number of surviving young (3) remained the same for both years due to a higher survival rate in 1991.

The genetic summary reveals that the amount of wild genetic diversity lost is currently 23 per cent and the mean inbreeding coefficient is 0.172. In previous recommendations for 1990 and 1991 it was the intention to import unrelated animals into the UK population from both Europe and North America. Unfortunately this has failed due to the uncertainty of subspecific recognition in German zoos and a limited response from North American collections. Additional unrelated animals are still required to expand the number of founders and further attempts will be made to contact breeding facilities in the US as well as in Malaysia. In the mean time the present overall level of inbreeding could be reduced with selected transfers of certain individuals.

### More on badgers

Ferris, C. 1992. *Green-eyed Flo. The cat, the fox and the badgers*. Fourth Estate, London. 246 pp. £14.99.

This is the fourth book by Chris Ferris on 'The badgers of Ashcroft woods' which was reviewed in *Mustelid & Viverrid Conservation* No. 4 (p. 19). It provides further important information on rehabilitating injured badgers, and the reintroduction of such casualties and orphan cubs into wild clans without territorial mishap. The book also covers the protracted campaign which finally achieved protection for setts as well as badgers, so that there are some legal constraints on developers and countryside pursuits including field sports.

The family history of the Ashcroft clan is brought up to date, together with a new Ninepenny Wood clan and associated fox families. Shrewd insight into wildlife is described with poetic eulogy, without however anthropomorphism or loss of objectivity. Many unique observations occur, as for example with a boar swimming for mating frog prey, feeding on a hibernating clump of slowworms, mushrooms, slugs up trees, elderberries often confused with blackberries, quite apart from badgers drunk on fermenting apples!

The book also discusses the long running saga on badgers and bovine tuberculosis both in England and in Ireland. Perhaps the most arresting quote of the book is that by Dr. L. Downey, who headed the ERAD programme in Ireland until recently, who admitted 'of course, we have known for years that badger control doesn't work'... and yet the Dept. of Agriculture goes on culling some 3,000 a year in Eire.

(review by M. Hancox)

# The European mink, *Mustela lutreola*, in protected areas in the former Soviet Union

Tiit MARAN

The European mink, *Mustela lutreola*, is the most endangered carnivore in Europe. Since the beginning of this century its range has decreased drastically. At present it can be found as isolated populations in 1/5 of its former range.

In western Europe the European mink only occurs in Spain (Palomares, 1991; Ruiz-Olmo & Palazon, 1991), France (Chanudet & Saint-Girons, 1981), and possibly in Rumania (Youngman, 1982). The last Finnish specimen was caught in 1978 (Henttonen *et al.*, 1991).

In the territory of the former Soviet Union the situation was not clear until Tumanov & Zveryev (1986) reviewed the national distribution and status of the mink, the article being based on questionnaire data<sup>1</sup>.

The political and economic situation have since changed in the territories of the former Soviet Union. Plans for privatisation, and attempts to raise the living standard of the population as quickly as possible through intensified agricultural and industrial activity, will most likely change a major part of the natural landscapes and biotopes into cultural ones. As a result, many rare species, including the European mink, may be badly affected. It is important to know the situation of the European mink in protected areas as these territories are the least likely to be influenced (or if influenced, then hopefully to a lesser extent) by these new economic activities.

In 1990 I sent a questionnaire to all the protected areas in the Soviet Union located within the former range of the European mink, and which either have or had biotopes suitable for the species. The following questions were included:

1. Does the European mink inhabit the protected area? Yes/No.
  - 1.1 What are its numbers? Single specimens/Rare/Common?
2. Did the European mink inhabit the protected area formerly? Yes/No.
  - 2.1 What year were the last confirmed data on the European mink? 19 . .
  - 2.2 What are the reasons for the decline in the European mink?
  - 2.3 What is the tendency of abundance? Increasing/Decreasing?
3. Does the American mink inhabit the territory of the protected area? Yes/No?
  - 3.1 When were the first recorded records of the American mink? 19 . .
  - 3.2 What are its numbers? Single specimens/Rare/Common?
  - 3.3 What is its tendency of abundance? Increasing/Decreasing?
  - 3.4 Which species is more numerous, the American or the European mink?

I got answers to approximately 65% of the postal questionnaires. In addition I had personal contacts with experts of various localities, and I reviewed the recent literature on European mink distribution in the former Soviet Union. On the basis of these data I obtained the following picture of the situation of the European mink in the protected areas (Fig. 1).

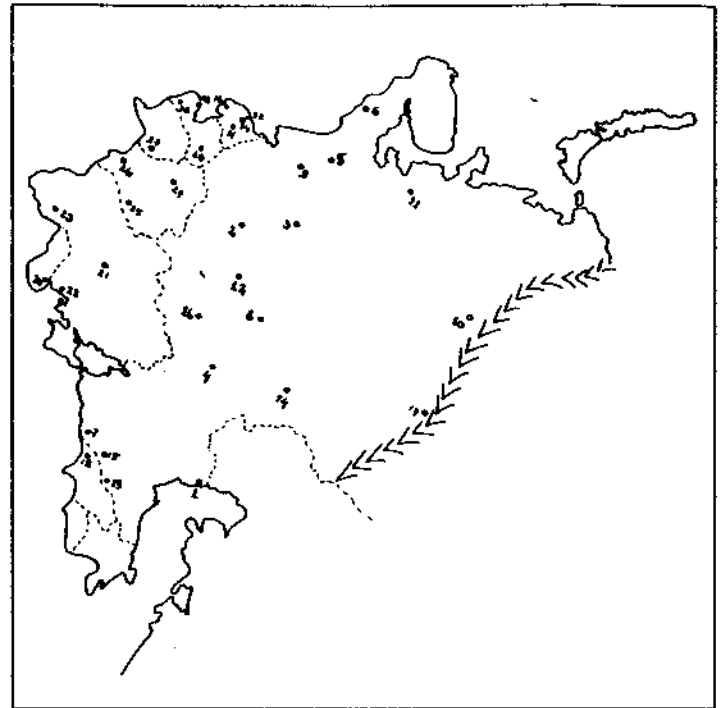


Fig. 1 The protected areas within the former range of the European mink in the former Soviet Union

## Russia

### 1. Astrakhansky Nature Reserve (62,500 ha)

The American mink has inhabited the reserve since 1974, when a single individual was registered on the western part of the Volga Delta. The number of animals is increasing (Zapovedniki...1989a). Information about the European mink is not available. The species appears to be extinct.

### 2. Central Forest Reserve (21,380 ha)

The European mink population is stable. The abundance of animals is high, reaching between 0.5-0.7 specimens/km of river bank. The American mink does not inhabit the territory of the reserve.

### 3. Darvinsky Nature Reserve (112,630 ha)

Formerly the European mink was abundant, but now only single specimens can be found. The last record dates back to 1989. The American mink has never inhabited the reserve. The main reason for the decline (according to the information from the questionnaire) was the construction of a new artificial lake at Rybinsk in 1947. This drastically changed the circulation of water in small rivers and streams, resulting in a decrease in suitable biotopes for the European mink. The decrease in numbers still continues.

### 4. Hopersky Nature Reserve (29,800 ha)

The last confirmed information is from 1940. At present there are no data on whether either American or European mink inhabit the reserve.

### 5. Kivach Nature reserve (10,460 ha)

Formerly the European mink was abundant, although the

<sup>1</sup> Although this article seems to reflect the actual situation in general, in some regions the data obtained by questionnaire are incorrect (e. g. Baltic States, Byelorussia).

last confirmed information is from 1975. The American mink has inhabited the area since 1966. According to the questionnaire, competition with American mink is the main reason for the decline of the European mink. The European mink is now extinct.

**6. Kostomuksky Nature Reserve (47,567 ha)**

The European mink was common in the past, but is now extinct. The reason for its extinction is supposed to be competition with American mink, which is now common (Zapovedniki...1988).

**7. Kavkazsky Nature Reserve (263,300 ha)**

In the past, the European mink was numerous (Novikov, 1938). There is also information on the European mink inhabiting this area in the 1960's. At present the European mink is either very rare or already extinct. There are no American mink (Kudatkin, in lit., 1991).

**8. Mordovsky Nature reserve (32,140 ha)**

The European mink was common in the 1930's, but the last confirmed information dates back to 1955. According the Nature Reserve staff, the reason for the mink's decrease is the degradation of prey animals as a result of rapid changes in the water circulation system in small rivers and streams, coupled with the effects of pollution. American mink do not inhabit this protected area.

**9. Nizhne-Svirsky Nature Reserve (40,972 ha)**

Reliable information is not available. Mink do occur there, but which species has not been determined. Mink pelts collected from the neighbourhood of the reserve (1989-1990) indicated the European mink is probably extinct.

**10. Pechoro-Ilychsky Nature Reserve (721,322 ha)**

A few specimens inhabit the protected area, the last confirmed data being from 1989. Numbers are decreasing rapidly. Personnel at the protected area claim that the reason for the decline is competition with otters and American mink. The latter have inhabited the area since 1982.

**11. Pinegeysky Nature Reserve (41,224 ha)**

The European mink occurs in low numbers, the last confirmed data coming from 1989. Their number appears to be declining. Staff of the protected area claim that the reasons for the decline are severe living conditions and competition with the otter.

**12. Prioksko-Terrasny Nature Reserve (4,945 ha)**

The European mink no longer inhabits the protected area. From time to time it migrates into the nature reserve from neighbouring areas (Zapovedniki...1988).

**13. Severo-Osetinsky Nature Reserve (2,990 ha)**

There is no information on the European mink, although the American mink has been present since 1951.

**14. Zhigulevsky Nature Reserve (23,100 ha)**

Mink have been found in the reserve, but they have not been identified (Zapovedniki...1989).

**15. Teberda Nature Reserve (85,840 ha)**

The European mink is rare and declining. The last confirmed data are from 1977. There are no American mink in the protected area. In the opinion of the staff, the mink is rare because the protected area is at high altitude (1,200-4,000 ASL) and prey species are scarce there.

**16. Voronezhsky Nature Reserve (31,053 ha)**

At present the European mink does not inhabit the reserve. The last confirmed information dates back to 1950. The American mink is common. In 1939, 19 specimens were introduced into the area of the reserve. The extinction of the European mink is the result of competition with American mink.

**17. Visimsky Nature Reserve (3,767 ha)**

The European mink is now extinct. The last confirmed records are from 1958-1968. The American mink was observed in 1983, and is common at present. The reason for the decline of the European is thought to be competition with the American mink.

**18. Kunashir Nature Reserve (65,256)**

European mink were released on the islands Kunashir and Itunup between 1981-1988 (127 specimens). The territory of the islands is 600 km<sup>2</sup>. The number of animals on both islands is estimated to be 500. There are no American mink. (Voronov, 1989; Ternovsky & Ternovskaya, 1988). The Kuril archipelago lies outside the actual range of the mink.

## Georgia

**19. Pskhu-Gumistinsky Nature Reserve (27,333 ha)**

The European mink inhabits the territory of the small subreserve at Skrutsinsky (85 ha)(Zapovedniki...1990).

## Moldova

**20. Dunaikiye Plavni Nature Reserve (14,815 ha)**

The European mink occurs in low numbers. There is no information on the American mink (Zapovedniki...1987).

## The Ukraine

**21. Kanevsky Nature Reserve (1,035 ha)**

The European mink is very rare. The number is declining. The main reason is supposed to be competition with the American mink (Zapovedniki...1987).

**22. Tshernomorsky Biosphere Nature Reserve (87,348 ha)**

The European mink only occasionally migrates to the reserve. The last confirmed record is from 1983 (Selyunina, 1986).

**23. Karpatsky Nature Reserve (12,706 ha)**

The European mink is extinct. Earlier it was common. The reason for the decline is competition with the American mink and the reduction of suitable biotopes.

## Byelorussia

**24. Berezinsky Nature Reserve (35,000 ha)**

The last confirmed information on the European mink dates from 1963. It is now extinct. The first data on the American mink go back to 1953. The reason for extinction is thought to be competition with the American mink.

**25. Pripjatsky Nature Reserve (63,120 ha)**

Information in the literature is controversial. Both species of mink seem to occur here (Zapovedniki...1989:299). This information contradicts data from Sidorovic (1991). He shows that the European mink has been extinct in the southern part of Byelorussia since 1970. It is clear that if the European mink does exist in the protected territory, it is very rare and declining rapidly.

**26. Bielovezhskaya Pushcha Reserve (87,600 ha)**

The European mink is extinct. In former times it was common. The reason for extinction is thought to be the reduction of suitable biotopes. The American mink was recorded in 1984.

## Lithuania

**27. Zhuvintas Nature Reserve (5,443 ha)**

The American mink inhabits the territory. The European

mink is extinct (Zapovedniki...1989b). The European mink is extinct in the whole territory of Lithuania (Lietuvos...1991). There are some claims that the European mink inhabits some localities in southern Lithuania (Mickevicius & Baranauskas, 1992). Even at the beginning of this century the European mink was rare. The last confirmed data are from 1978 and 1979 (southern Lithuania). The introduction of the American mink started in 1950. At present it is common everywhere (Bluzma, 1990).

## Latvia

### 28. Slitere Nature Reserve (15,440 ha)

The information is contradictory. In the literature there is information that the European mink is common in this area (Zapovedniki...1989b). At the same time, researchers at the protected area are sure it is extinct (A. Zoss, pers. comm.).

### 29. Krustkalny Nature Reserve (2,902 ha)

Both species inhabit the area. The European mink is decreasing rapidly due to competition with the American mink (Zapovedniki...1989b).

### 30. Grini Nature Reserve (1,076 ha)

In the literature there is information on the European mink inhabiting the area (Zapovedniki...1989b). Although in the book on the protected areas in the Baltic and Byelorussia (Zapovedniki...1989b) there are notes about the European mink inhabiting Latvia, one should treat these data with caution as many zoologists in Latvia doubt the existence of European mink in their country nowadays (A. Zoss, 1991; V. Pilats, 1992, pers. comms).

## Estonia

### 31. Endla Nature Reserve (81,162 ha)

The European mink was numerous in the 1940's & 1950's. At present both species inhabit the protected area. The American mink is more numerous. The reasons for the decline of the European mink are most likely the alteration of suitable biotopes and the influence of the American mink (Personal observations).

### 32. Lahemaa National Park (64,911 ha)

The European mink was previously common in the whole territory. It was numerous and the population stable until the end of the 1980's (personal observations). In 1988 one American mink (Maran, 1991) and in 1992 five American mink were recorded in the park. The status of the European mink is not clear at present. It seems that during the last two-three years its status has changed very quickly. Lots of habitats known to be inhabited by European mink are now occupied by American mink.

### 33. Matsalu Nature Reserve (48,640 ha)

The European mink was known to be numerous up to 1950 (Paakspuu & Meriste, 1981). The first American mink records date back to the beginning of the 1960's. The number of American mink started to increase very rapidly (Paakspuu & Meriste, 1982). At present the European mink is extinct and the American mink is numerous and its population stable (personal observations).

### 34. North Kõrvemaa Nature Reserve (11,283 ha)

The European mink is common. There is no information about the American mink.

## Discussion

As the data from different nature reserves show, the status of the European mink is very critical. In one fourth of the whole protected territory the European mink is extinct; in 68% of the

territory the population is decreasing or is otherwise in a critical state, and in less than 2% of the protected territories does the population seem to be stable. There are also a lot of unprotected areas where the European mink occurs but in these areas there are no guarantees of protection, e. g. the species is not even protected by the state in Russia; the furbearers' price list for hunters does not distinguish between the two species; they are referred to as wild mink (Preiskurant, 1983). These data show that the status of the European mink is critical not only in western Europe but also in the former Soviet Union. Although in some places the European mink is in comparatively good shape, these places are isolated and will not be enough to guarantee the survival of the species.

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# Bird predation on badgers, foxes, and wildcats

M. HANCOX

The conventional ecological view of a pyramid of numbers, with a sparse predator population exploiting abundant herbivore populations tends to obscure understanding of the widespread interconnected food chain web with hunters themselves becoming the hunted. Thus golden eagle may kill buzzard, goshawk, hen harrier, kestrel, merlin, peregrine, raven and tawny owl; goshawk prey includes buzzard, kestrel, sparrowhawk, as well as long-eared, short-eared, and tawny owls; while eagle owl prey items include at least 18 diurnal raptors and 12 species of owls (Mead, 1987; Tomkies, 1987).

Although adult badgers (*Meles meles*) weighing 10-11 kg are above the normal prey size of most European raptors, cubs when first above ground at eight weeks of age weigh just under 2 kg and have been recorded as prey of both eagle owl (Marz, 1953) and golden eagle. Being largely nocturnal and thinly distributed in mountain areas partly accounts for the paucity of golden eagle prey records, but badger has been noted widely albeit infrequently in for example: -Britain, one eyewitness case during the early afternoon in the Lake District; -France, 5 in 112 prey items in the Alps; -Italy, 1 in 169 prey items in the Appenines; -Russia (Davies, 1985; Gordon, 1955; Kapitonov, 1979) as well as in North America (*Taxidea taxus*, Long & Killingley, 1983).

The red fox (*Vulpes vulpes*) is more vulnerable to raptor predation, being both more diurnal in habits, and lighter in weight (5.5-6.5 kg for adult English vixen-dog foxes). Although adults are taken occasionally, cubs are more usual prey, some seven cubs were recorded at Scottish golden eagle eyries by Tomkies (1987), and fox is also taken by imperial and white-tailed eagles, goshawk and eagle owl. A tame buzzard has been seen attacking both a fox and a domestic cat, and fox at least as carrion occurs in the diet of buzzard, Egyptian vulture, and red kite (Hancox, 1979). Common and rough-legged buzzards may also prey on arctic fox (*Alopex lagopus*); additional records include white-tailed eagle, Snowy owl, and skuas, but not so far apparently either golden eagle or the big sympatric great grey and Ural owls. Interestingly, the Kazakh and Kirghiz tribes of central Asia where falconry is a centuries old tradition, use golden and imperial eagles to hunt badger, red fox and wolf particularly for their pelts (Brusewitz, 1969); whilst other canids taken by raptors include domestic dog by golden and white-tailed eagle, golden jackal by white-tailed eagle and grey fox (*Urocyon cinereoargenteus*) by holarctic golden eagle.

Wildcat has been noted as prey of the goshawk, but although one golden eagle attempt to steal a hare carcass from a wildcat resulted in the death of the latter, the eagle was severely wounded in the encounter (Bannerman, 1956), and although adult wildcats may be lighter than red foxes at 3.9-5.1 kg, their sharper retractile claws make them at least as dangerous as potential prey. Golden eagle may however occasionally prey on lynx, while domestic cat has been noted as prey of both golden eagle and eagle owl; there is one extraordinary record of a barn owl taking newborn kittens; and a cat has been noted in the diet of the great black-backed gull.

Amongst the other small carnivores of the region, there are apparently no instances of raptor predation on otters, although

white-tailed eagle scavenge off otter kills; but pine marten has been recorded as prey of golden eagle and buzzard, polecat by golden eagle, and stoat or weasel by: -common/long-legged/rough-legged buzzards, booted and golden eagles, goshawk, kestrel, red kite, saker falcon, sparrowhawk; amongst owls, the eagle/hawk/tawny owls; as well as raven and herring gull. Clearly these records suggest that most avian predators are opportunistic, taking any prey within their size capability which is commonly available within their geographical range. Golden eagles may weigh some 6 kg or even up to 10 kg as regards both the Russian subspecies and the imperial eagle, while the eagle owl can attain over 2 kg in weight. Golden eagles can lift prey of up to 4 kg, and so it is hardly surprising that marmot, young chamois, and roe, red and reindeer calves are within their prey size range (neonate roe 1.3 kg and red deer 6.5 kg). Adult rabbits and leverets at some 2 kg in weight are preyed upon by most of the big raptors of the region, which may accordingly be potential predators of badger, fox or wildcat. Of the 47 accipitrid/falconid diurnal raptors and 18 owls of the western Palearctic, 24 and 10 respectively are British. Some of these large species over 45 cm in length are unlikely to be important as predators due either to preferred food specialization or restricted overlap in range, such as: -osprey which take fish up to 2 kg in weight and other frequent piscivores like black kite, white-tailed eagle and brown fish owl; reptile eating booted and short-toed eagles; the wasp/bee specialist honey buzzard; and the carrion feeding often soaring species including all six vultures, and black and red kites. More likely predators of the occasional badger, fox or wildcat include mammal orientated species such as the other three buzzards, such eagles as Bonelli's, spotted and tawny/steppe goshawk, gyrfalcon, saker falcon used by falconers against dorcas gazelle, and the snowy and Ural owls.

Amongst large non-raptor species, ravens have been recorded attacking American badger cubs (Long & Killingley, 1983); whilst a variety of young or even large helpless animals may be attacked by carrion/hoodie crows, great black-backed, glaucous and herring gulls, and all four skua species. Rather more within the realms of folklore however is the 1555 claim by Olaus Magnus of Sweden that the harmless plant and insect eating capercaillie, and despite its hooked beak, is given to driving the eagle away from carrion, kill hares and foxes and carry them off in its powerful claws (Brusewitz, 1969)!

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# Badgers and bovine tuberculosis in perspective

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The Richards Report in 1972 on the persistence of TB in cattle herds in Cornwall identified a number of factors contributing to the problem, including poor farm husbandry such as inadequate fencing and disposal of slurry, and most importantly the defects of the diagnostic skin test. Twenty TB cattle cases were documented in being non-reactors or false negative, three of which were open infectious cases that caused 18 herd breakdowns. It is a nice irony that the first wild TB badger was found as the Report was published, thereby launching the alleged involvement of badgers as causing cattle TB saga, since the latest studies from Ireland have reaffirmed the importance of farm practices and inadequate cattle tests as a source of recurrent herd breakdown cycles (Downey, 1991).

The ERAD study in Ireland noted that roughly half the 65,000 TB cattle each year are being missed, so that even intensive testing of up to 40,000 reactors a year cannot eradicate TB, merely contain the situation with existing technology i.e. the inadequate skin test and not yet fully computerised movement records. This puts the British situation into perspective, since GB is 'Officially TB free', only some 800 reactor cattle a year, and yet the TB 'eradication' programme is necessary to comply with EC Directives 64/432 & 77/391, at a cost of some £ 9 million annually, even though there is no risk to public health since the milk is pasteurised, abattoirs rigorously inspected, efficient drug therapy available, and human TB of the bovine type is under 1% (Hancox, 1992a; Yates & Grange, 1988). Furthermore, based on the Irish data of some 5,000 TB carrier false negative cattle missed, this would suggest some 1,500 a year in the problem southwest of England, hence more than accounting for the 100 or so breakdowns annually, ignoring badgers entirely.

The badger culling strategy is based on a number of assumptions which were not unreasonable 20 years ago. However, the pivotal belief, that cattle are no longer a source of infection to other cattle or badgers is simply wrong (Dunnet *et al.*, 1986; Zuckerman, 1980). Given this number of missed TB carriers, together with an average of four reactors per herd breakdown, there is still a considerable ongoing reservoir of TB in cattle. Clearly there is some spread within herds, and half of herd breakdowns contain visibly lesioned cattle which should all be regarded as potentially infectious (Neill, 1988, 1992). Transmission from a point source cow pat to badgers foraging for worms and dor beetles is probably far more efficient than the alleged but improbable respiratory infection of cattle from badgers (Hancox, 1991, 1992b). The preoccupation with badgers as a scapegoat has diverted attention for 20 years from the real problem in cattle, and hence contiguous spread via passive transport by rats which do not show lesions, as well as via slurry which can be infectious for up to a year and far longer than generally admitted (Haehsy, 1991; Hancox, 1991; O'Connor, 1986; Zuckerman, 1980).

Culling badgers is unjustifiable on scientific grounds, since the risk of cattle getting TB from badgers is very slight (Hancox, 1992b). It is also totally unjustified on economic grounds, since spending some £ 11 million has not reduced the level of herd breakdowns from some 100 a year in the southwest since culling

started in 1976. A cost of £ 1 million a year is not cost-effective, and the alleged saving of 60 herd breakdowns a year may have been due to drought, it has not been maintained, and a saving of 200 to 300 breakdowns a year would be needed to break even financially (Dunnet *et al.*, 1986). Each infectious badger is currently costing up to £ 16,000 to cull, or roughly the farmer compensation for three to four breakdowns.

The proposed new selective preemptive cull of only infected badgers using the ELISA Brocktest would miss threequarters of TB cases, and merely waste £ 5 million over the 5-year trial. This money would be far better spent on bringing in the already available improved blood tests for cattle (gamma interferon, ELISA or DNA probe). There are at least eight advantages potentially in such tests: one herd roundup instead of two, so less cost in labour, less stress to herd and risk of activating latent TB, no desensitisation of test through too frequent testing and blunting the skin test inflammatory response, use for other diseases such as brucellosis and perhaps eventually BSE, picking up false negative TB carriers, and finally picking up cattle which react to skin test but do not have TB (false positive) and so fewer culled needlessly, and most importantly from the farmers' point of view shorter herd restriction time which is a major hardship.

Ending pointless badger culling is largely a political decision, and will need some recognition that the original assumptions were flawed. Cattle TB will not be eradicated until better cattle testing and computerised tracing of stock is in place.

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# Ferret-badger in Manipur, India

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Two species of ferret-badger, the Small-toothed (*Melogale moschata*) and the Large-toothed (*M. personata*), occur in Assam and range eastwards into southern and eastern Asia.

Both a male and female ferret-badger were captured in the sub-tropical pine forests (1,200-1,500 m ASL) of the Chandel district in Manipur, India. The *Pinus kesiya* in these forests are associated with *Schima wallichii*, *Quercus serrata*, *Quercus griffithii*, and *Castanopsis* spp. The animal is known to frequent the Jhum areas and is reported from Barak Valley forests, tropical wet evergreen forests as well as tropical moist deciduous forests. The author suggests that this may be the first specific report and description of the ferret-badger of the Manipur Hills. It is not known if this form represents a new species or a new subspecies.

It is a small animal with a flattened, almost snake-like head with a long snout that projects beyond, concealing the lower lip and chin. The naked tip of the snout along with the external and internal wings of the nostrils are pink and the upper lips have an array of rigid white whiskers. The colour of the coat varies from black to silvery grey with bleached tips of hair. The tail is sandy-yellow throughout the year. The forked white stripes above and below the eyes extend down the throat to the belly as dirty white. The narrow whitish stripe on the crown of the head neither ends just beyond the shoulders as in *M. moschata* nor reaches up to the rump as in *M. personata*. Unlike most ferret-badgers, the Manipur specimens have a streamlined squirrel-like body.

The female ferret-badger was kept in captivity and under observation for 27 days. The animal showed a chiefly nocturnal behaviour, although even in bright daylight it was not ill at ease. It relied heavily on its highly developed sense of smell in reaching for food. The animal was found to have an aptitude for climbing although it was only seen twice resting at 1.2 m above the ground on a dry tree trunk in its cage. The ferret-badger was fed *ad libitum* but refused to eat tubers, fruits, grains, sugar cane or honey; it ate frogs, toads, lizards, and chopped meat but was partial to earth-worms. Eggs were also appreciated but could not be broken despite repeated efforts.

The faeces were always deposited in the same corner. Close approach by strangers elicited repeated hissings and baring of the teeth. However, even under great stress or excitement it did not discharge through the anal glands.



Fig. 1 Ferret-badger. Photo by V. Ramakantha

The female was pregnant when brought from the wild and gave birth to two cubs, which were blind and hairless. Probably due to repeated disturbance caused by feeding and observation, the mother had the tendency to forsake the cubs. Even when columns of ants had attacked the cubs she left the box and settled elsewhere. Only on this occasion were the cubs handled because of the possible risk that the mother will abandon or kill her litter if it is handled. One cub died on the fifth day, entangled in the threads of a gunny bag placed inside the nest box. The second cub opened its eyes on the 16th day but was killed and partly eaten by its mother later on, possibly as a result of the human handling.

## Literature

Ramakantha, V. Ferret badger (*Melogale* spp.) in Manipur and a report on the birth of badger cubs in captivity. *Zoo's Print* Feb. 1992:16-17.

Deputy Conservator of Forests/Wildlife  
Santhenjong, Imphal, Manipur, India

## More on badgers and bovine tuberculosis

A motion now has been tabled in Parliament, calling for an immediate moratorium to badger culling, since after sixteen years this has had no demonstrable impact on the levels of tuberculosis in cattle herds in southwest England.

The motion also calls for the £ 0.5 million saved annually to be spent on better farmer compensation, and a review of the

overall strategy. The real solution to cattle TB lies either with new diagnostic tests such as blood ELISA or gamma interferon tests or a DNA sample; or in a cattle vaccine.

M. Hancox  
72 Bisley Old Rd., Stroud, Glos. GL5 1NB, UK.

# New information on the introduction into Europe of the Small Indian mongoose, *Herpestes auropunctatus*

Boris KRYSTUFEK and Nikola TVRTKOVIC

In 1910 twelve mongooses were purchased in India by the Austro-Hungarian authorities and introduced onto the Dalmatian island of Mljet (Fig. 1) to exterminate the venomous Horned viper (*Vipera ammodytes*). The introduction being successful, the animals were released also on the Peninsula of Peljesac (from 1921 to 1927) and the following Central Dalmatian islands: Korcula (from 1921 to 1927), Brac (1926), and Hvar (1970). The introduction to Brac failed to give proper results. Details can be found in Tvrtkovic & Krystufek (1990).

The identity of the introduced mongooses has only recently been studied in detail. Before, they were usually reported as *Herpestes ichneumon* or *H. edwardsi*. Recent examination of seven specimens originating from three Adriatic islands revealed that the animal in question is really the Small Indian mongoose, *Herpestes auropunctatus* (Hodgson, 1836) (Tvrtkovic & Krystufek, 1990). This population is the only one of its kind in Europe.

We have recently obtained additional information on the distribution of the small Indian mongoose in Dalmatia and Herzegovina. In 1991 it was reported to be common on the small island of Ciovo which is very close to the coast. The history of this population remains unknown.

We reported a presumably unsuccessful introduction to the karstic region of Herzegovina near Mostar (Tvrtkovic & Krystufek, 1990). In November 1990 Dr. Sasa Marinkovic (Institute for Biological Research, Belgrade) informed us that the small Indian mongoose is still present in this region. He found it on the Ortijes Hill above the spring of the Buna River near Mostar. Although this area is far inside the mainland, its climate is mediterranean with only slightly more severe winters than those on the islands.

Thus, for example the mean January temperature is around 2°C (between 4 and 8°C on the islands and the Peljesac Peninsula), the annual temperature amplitude averages 19°C (16 to 18°C on the islands and on Peljesac), and the number of days with the highest daily temperature below 0°C is the same in both regions (zero to 5 per year; data according to the Climatic Atlas of the Socialist Federative Republic of Yugoslavia; undated).

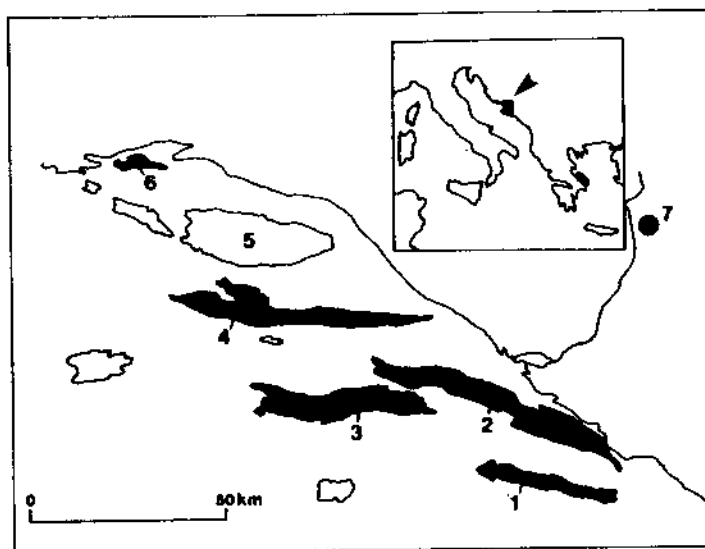


Fig. 1 Present distribution (black areas and dot) of *Herpestes auropunctatus* in Dalmatia and Herzegovina. Arrow indicates position of the study area in south-eastern Europe. 1: Mljet, 2: Peljesac Peninsula, 3: Korcula, 4: Brac, 5: Hvar, 6: Ciovo, 7: Ortijes Hill.

On the islands the small Indian mongoose is harmful to wild fowl, causing damages to vegetables, grapes, figs, and poultry. Hunting organisations endeavour, with rather poor results, to exterminate it. Consequently, there is no interest nor need to protect the only population of the small Indian mongoose in Europe.

## Reference

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

**Boris Krystufek, Slovene Museum of Natural History, Presernova, 20, P. O. Box 290, 61001 Ljubljana, Slovenia**  
**Nikola Tvrtkovic, Croatian Natural History Museum, Demetrova 1, 41000 Zagreb, Croatia**

## Abstract

### A new locality for the Steppe polecat in Yugoslavia

The Steppe polecat (*Mustela eversmanni* Lesson, 1827) is a Eurasian species with a chiefly Asian and partly European distribution. Its habitat includes steppes, wooded steppes, and semi-deserts. In Europe its most southern known distribution is part of northeastern Bulgaria and a small part of northern former Yugoslavia.

In the collection of the 'Institute for Biological Research' in Belgrade a skull originating from Valandovo was identified as

*Mustela eversmanni*. Valandovo is about 400 km south of the steppe polecat's known distribution in former Yugoslavia and about as far south of its Bulgarian distribution. The skull of the Valandovo specimen is shorter and wider than that of other European specimens and as central and southern Macedonia have steppe elements (both flora and fauna) there may exist a geographically isolated population of *Mustela eversmanni*.

Milenkovic, M. 1990. A new finding of the Steppe polecat, *Mustela eversmanni* Lesson, 1827, in Yugoslavia. *Arh. Biol. Nauka Beograd* 42(3/4):251-257.

## Reintroduction of the Black-footed ferret

The Black-footed ferret (*Mustela nigripes*) is an obligate dependent on prairie dogs for both food and shelter, and the destruction of the prairie dog ecosystem contributed greatly to elimination of ferrets in the wild. The last known wild colony of ferrets, located west of Meeteetse Wyoming, was decimated by canine distemper in 1985. Subsequently, the few remaining ferrets were brought into captivity in an effort to save the species from extinction. Captive breeding has been successful and some blocks of prairie dog habitat are now protected, so ferrets are entering the reintroduction phase of recovery.

Reintroduction is the only known hope for re-establishment of black-footed ferrets in their natural habitat. Yet, the effects of captivity are not well understood and can vary widely between and within species. Because of this variability, coupled with the expense of reintroduction, careful release design is critical. To maximize chances of success, release methods should employ the scientific process, social aspects should be adequately addressed to the local populace, and policy processes and implementation should not be ambiguous (the latter alone can produce a great deal of internal turmoil on the project).

Agency, zoo, and university researchers have been uncovering ways to aid the black-footed ferret reintroduction for several years. Some of the work was done directly with black-footed ferrets, while other research utilized the surrogate Siberian ferret (*Mustela eversmanni*). The work investigated developmental processes of critical behaviors, compared those behaviors under different captive environments, tested differential release techniques with neutered Siberian ferrets, and refined the telemetric monitoring system that would be used on black-footed ferrets. That research established a transition to the first experimental black-footed ferret releases.

Because reintroduction of captive-raised animals is a relatively new tactic, the Black-footed ferret Recovery Plan recommended that the first three black-footed ferret releases continue to

use the experimental process. The results of the early experiments could then illuminate an optimum operational technique for the later large scale releases. By employing the comparative scientific process, biologists could rapidly attain knowledge necessary for recovery.

During September and October 1991 black-footed ferrets were released near Shirley Basin, Wyoming. On this first attempt, all 49 juvenile black-footed ferrets (37 radio-tagged through September and October) were released from on-site elevated holding cages. Supplemental feeding was offered in those cages post-release. The majority of ferrets, however, were disassociated from their release cages within 24 hours. Seventeen ferrets dispersed from the release area. Nine mortalities were documented due to coyotes (5), a badger (1), starvation (1), and injury (2). By 14 November, a spotlight census revealed a minimum of nine black-footed ferrets remaining on the core release area. As of 10-11 March 1992, snow-tracking uncovered a minimum of 3 ferrets still present on the core area. A spotlight census next July will verify any reproduction, and more black-footed ferrets will be released into the same area during September and October 1992.

Although only one release technique was used in the 1991 Wyoming reintroduction, future reintroductions will compare two widely different techniques that are within the realm of biological knowledge. By testing reasonable, but widely different ideas, the fastest road to recovery will not be overlooked. The most promising technique can then be refined. Nearly all reintroductions have been a learning process with methods changing as knowledge accumulates. By employing the comparative process in early attempts, biologists can avoid testing a single unsuccessful technique for several years, or even settling on a partially successful method without ever knowing whether there is a more efficient technique.

**Brian Miller, Dean Biggins and Lou Hanebury**

## New data on *Mustela lutreola* from western France

The European mink *Mustela lutreola* is one of the most endangered mammal species in Europe (Saint-Girons, 1973). In France, the distribution of this mustelid seems to be restricted to the Atlantic coast (Camby, 1990), but still remains poorly known.

A few recent data could be obtained from the Pays de Loire region in western France. Three animals identified as European mink by J. L. Carrere have been accidentally trapped in central Vendée in 1989. Another was sighted by F. Ibanez in the marches of the Lake of Grand-Lieu in 1990. A record near Le Pellerin on the Loire River was more problematic because the animal had escaped before my arrival. A dead mink was found at Sévérac near the marshes of the Vilaine River in February 1992 (Lodé, 1992). The body was partly decomposed but the skull was intact. The presence of *Mustela lutreola* in these marshes is remarkable because we trapped two feral American mink (and kept them in captivity) in the same watercourses in September 1990.

The polecat *Mustela putorius* also frequents these watercourses (Lodé, 1992). A longer survey of this site would appear to be very interesting in order to obtain a more accurate picture of the interspecific relations between the three species.

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- Saint-Girons, M. C. 1973. *Mammifères de France et du Benelux*. Doin, Paris.

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### from N. V. Ashraf Kunhunu...

The Malabar civet study (see Newsletter No. 5, p. 16), conducted by Mr. Nitin Rai under the supervision of Dr. Ajith Kumar, is nearing completion. There was one "possible" sighting of the species in a Cashew plantation which Nitin believes was more likely to be a Small Indian civet (*Viverricula indica*). I was there with him for a week in April. We decided to move around for a survey rather than concentrating on one place (Chattangottupuram). Our brief survey to Wynand further strengthened our doubts of the Malabar civet's existence in the elevated Ghats. But in many localities of Wynad district, in Chooralmala for instance, local hunters readily recognized the Nilgiri marten (*M. gwatkinsii*).

The most successful part of this tour was my visit to the Kannavam Forest Range (Kannur district of Kerala) which is located in the foot hills of the Western Ghats. There I saw a beautiful stretch of lowland semi-evergreen forest with some *Ailanthus malabaricum* plantations. Looking at the vegetation type, the amount of thickets underneath, and the presence of small streams, I thought what a pleasant surprise it would be if the species should prove to occur here. For the first time in my "viverrid career" I met forest tribals who recognized the species and I have started at least to believe that there is some scope for conserving the species in its natural habitat!

These Kuruchiyar tribals call the Small Indian civet 'Chaandu' and the Malabar civet 'Kannan Chaandu'. Unlike the name 'Jawad' which is very popular among 'civilized' countryside people, this particular name seems to be restricted to these tribals. I met the same tribals living in Ambayathode and Palchuram in the higher ranges of the adjoining Manantoddy (or Periya) forest range; they knew 'Chaandu' but not 'Kannan Chaandu'. It is very sad to know that the Malabar civet is not found in the elevated parts where our protected areas lie. Nevertheless, all these forest tribals readily distinguished the Nilgiri marten by its yellow throat, and call it by name "Then Nayi" (Honey-dog). Some of them even knew the Brown palm civet (*Paradoxurus jerdoni*), but their knowledge about this animal was generally poor. I have written to Nitin, who is at present in Karnataka, to visit this Kannavam Forest range to try and obtain further details on the Malabar civet. It is also to be hoped that he may find similar areas of lowland forest in Karnataka.

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### from Alastair A. Macdonald...

The expedition documented in this report commenced in the last week of July and finished in mid September 1990. One of its aims was the capture and study of the Seram Long-nosed bandicoot (*Rhynchomeles prattorum*) on the island of Seram, off the coast of Irian Jaya (New Guinea). The bandicoot was not found but two Malayan civets (*Viverra tangalunga*), a male and a pregnant female, were caught, incidentally in traps set for the bandicoot. These animals, well known to the local people as "Musang", have never before been documented on Seram. Also, the civets were trapped at an altitude almost twice that of previous records for this species. Biochemical and cytological analyses were carried out on the few blood samples obtained. The studies

generated data to add to the very few observations which have been made on this species to date. The Malayan civet is an introduced species on the island and is known to predate small mammals such as the bandicoot. Thus the presence of the viverrids in an area believed to support bandicoot is thought to go some way towards explaining the apparent lack of the latter.

During August 1991 a joint team from the University of Edinburgh's Royal (Dick) School of Veterinary Studies and the Natural History Department of the National Museums of Scotland again carried out several studies on the mammals and birds of Seram. Again no bandicoot were caught but the presence of the Malayan civet was confirmed. An adult female was found at the 2,200 m study site and a juvenile male was shot by police at the coastal town of Wahai, thereby suggesting its presence throughout the island. An analysis of gut contents revealed a diet of invertebrates, fruit and some other vegetable matter.

Thompson, N. M. J. 1990. Report summary of the Royal (Dick) School of Veterinary Studies Expedition to Seram Island, Indonesia: Information concerning Seram long-nosed bandicoot (*Rhynchomeles prattorum*), Malay civet cat (*Viverra tangalunga*) and the Common phalanger (*Phalanger orientalis*). *Roy. Zool. Soc. Scotland 78th Ann. Rep.*  
Anon. 1991. Seram Bandicoot Project 1991. *Roy. Zool. Soc. Scotland 79th Ann. Rep.*

**Dept. Preclinical Vet. Sciences,  
Royal (Dick) School of Veterinary Studies,  
Univ. of Edinburgh, Summerhall, Edinburgh EH9 1QH, UK**

### from Robert Berghaier...

During October 1989 I was undertaking lemur observations for Duke University in Ranomafana National Park in southern Madagascar. On October 22nd, on B trail in the park at 1605 hours, my guides Loret Rasabo and William Rakotonivina showed me and my colleague, Doug Quinn, a collection of half a dozen scats comprised of matted hair and small bits of bone. They identified the faeces as belonging to a Fossa (*Cryptoprocta ferox*). After examining the faeces further they determined that the hair and bone were the remains of a Grey gentle lemur (*Hapalemur griseus*). Loret and William believed that the lemur had been killed and eaten by the fossa. I took representative samples of the faeces back to camp and Doug made sketches of them.

I have found few references to actual lemur kills by fossas even though many researchers consider them as being important lemur predators. Even the Ranomafana NP brochure states that fossas are "rumored to stalk lemurs". The University of Southampton Expedition to Ankarana in northern Madagascar in 1986 found fossa faeces which comprised the remains of what appeared to be a Crowned lemur (*Lemur coronatus*) (Wilson *et al.*, 1989). The faeces were eventually sent to the British Museum's (Natural History) Mammal Section. Comparison of sketches of both fossa faeces showed that the Ranomafana NP faeces were those of a fossa that had eaten a grey gentle lemur.

#### Reference:

Wilson, J.M. *et al.* 1989. Ecology and conservation of the Crowned lemur (*Lemur coronatus*), at Ankarana, North Madagascar. *Folia Primatol.*, 52:1-26.

**Zoological Society of Philadelphia, 3400 Girard Avenue,  
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## Research project wanted

For the last four years I have been studying the behavioral ecology of the Eurasian badger at Sussex University under the supervision of Dr. Tim Roper. I am now in the final stages of writing my PhD thesis and I am looking for a subject for my next research which combines my academic interests in small carnivores with a commitment to conservation. I am particularly interested in Madagascar but my interests are not restricted to Madagascan carnivores and I would be pleased to work wherever there is a need for urgent research on an endangered carnivore, to establish its status and environmental requirements.

For a copy of my *curriculum vitae* and all other information please contact:

Mr. Sean Francis Christian, 34 Clyde Road, Brighton BN1 4NP, East Sussex, United Kingdom

## Black-footed ferret Workshop

July 22-24 1992, Washington, D.C., USA

The workshop was convened by the IUCN/SSC Captive Breeding Specialist Group at the request of the U.S. Fish & Wildlife Service (USFWS) to review the current status of the recovery program for the Black-footed ferret and to make recommendations for updating the Recovery Program for the species.

We are grateful to U.S. Seal, who combined the reports into a 'draft report', for allowing us to publish some interesting data. The "Black-footed Ferret Recovery Plan" (1988), the official guide for rescuing the species, emphasized species preservation through natural breeding, but also recognized the potential of assisted reproductive technology. Specifically, it was determined that artificial insemination (AI) with fresh or frozen sperm could be useful for retaining all existing genetic diversity by ensuring that all founders eventually were represented in subsequent generations. The common ferret (*Mustela putorius furo*) and Siberian polecat (*Mustela eversmanni*) were used as animal models for developing a laparoscopic AI technique. Most recently, 4 of 9 hormonally-treated black-footed ferrets laparoscopically inseminated with either fresh or thawed sperm became pregnant and delivered live kits.

Population objectives formulated in 1987 were to establish a captive population of 200 breeding animals to retain 90% of the original genetic diversity for 50 years. This was based on the assumptions of genetic input from nine or ten founders, early reintroduction, and establishment of ten separate free-ranging populations totalling 1,500 breeding animals within the 50 year time frame. Only five founders have contributed to the population and in November 1991 the SSP recommended to increase the breeding population to 240 black-footed ferrets by 1993. Furthermore, the SSP decided to only consider females under three years-of-age at the start of the breeding season as breeding animals, because fertility, litter size and kit survival markedly decline after a female's third year. Older, genetically important females will be bred, but will not be considered as part of the 240 breeding animals.

The current estimated black-footed ferret carrying capacity remains at 310-340 cage spaces distributed among the seven participating institutions; Wyoming Game & Fish Department's Sybille Wildlife Research Unit, Omaha's Henry Doorly Zoo, the National Zoological Park's Conservation and Research Center, the Louisville Zoological Park, Colorado Springs' Cheyenne Mountain Zoo, the Phoenix Zoo, and the Metropolitan Toronto Zoo. The U.S. Fish & Wildlife Service serves in a coordinating and permitting role. An agreement reached between the Wyoming Game & Fish Depart-

ment and U.S. Fish & Wildlife Service will result in expansion of the role of the Service in the captive breeding program and SSP.

Because of the small number of founders, inbreeding is unavoidable, and the addition of new founders seems unlikely. Selection of kits for release was based upon their mean kinship, inbreeding coefficient, and gene representation of an over-represented male founder and was intended to not jeopardize the genetic goals of the program. Once founder representation is better balanced in the captive population, future releases will be more representative of the genetic variation of the captive population. Genetic analysis of the captive population revealed 4.16 founder genome equivalents, a mean inbreeding coefficient of .052, and 88 percent retention of wild gene diversity.

Founder representation of only five animals is the greatest concern, but nothing can be done unless a currently unknown population of black-footed ferrets is discovered. Because of the age of a living unrepresented founder and an under-represented single offspring of a founder, it is unlikely additional genetic contribution will be obtained. An exception is one aged female that has a single living daughter; priority will be placed upon reproduction by that daughter in 1992. The single wild-caught male offspring of a dead founder female died this year; several poor quality semen samples have been cryopreserved from this male and will eventually be used for an artificial insemination attempt.

The SSP provided 49 eighteen week old black-footed ferrets for reintroduction in September and October 1991. The reintroduction site was the Shirley Basin-Medicine Bow area of southeastern Wyoming. The reintroduced animals were designated as an experimental, nonessential population under provisions of the Endangered Species Act. The reintroduction was a cooperative effort among the Wyoming Game & Fish Department, U.S. Fish & Wildlife Service, Bureau of Land Management, the SSP, and, of most importance, private landowners. Because high mortality is known to occur among wild juvenile black-footed ferrets, a short-term objective of 20 percent survival of reintroduced black-footed ferrets for one month was established, and a long term objective was survival of 50 percent of those alive at one month post release until summer 1992. These goals appear to have been exceeded; at least 24 percent survived through the first month and at least seven animals are believed to have survived through the winter (March 1992). Much was learned about reintroduction techniques and with the birth of at least one litter in the first season of the reintroduction program, the release is considered a success.

# The European Mink, *Mustela lutreola*, Conservation & Breeding Committee (EMCC) founded

Tiit MARAN

The European mink is the most endangered small carnivore in Europe. Historically it inhabited the area from the Ural mountains to eastern Spain, and from Finland to the Black sea. European mink are a fundamental part of the European natural heritage. Since the beginning of this century their range has decreased drastically. At present it can be found in isolated populations in 1/5 of the former range. The main reasons for its decline are habitat loss, prey shortages, and competition with the American mink, *Mustela vison*. If the speed of decline does not slow down, the species may be extinct within 15-20 years.

Facing this fact, the species is included in Appendix II of the Convention on the Conservation of the European Wildlife and Habitats, as a species which needs strict protection. The IUCN Mustelid, Viverrid & Procyonid Specialist Group consider it to have one of the highest conservational priorities (Schreiber *et al.*, 1989).

There is an urgent need to undertake measures to avoid the extinction of this species. One step in this direction is to establish a breeding programme for the species, focusing on the few remaining wild populations and raising funds in order to investigate the species. In the beginning of this year a breeding and conservation committee for the species was established for these purposes.

The committee consists of the following members:

- Tiit Maran, Chairman (*Tallinn Zoo, Estonia*)
- Mati Kaal, Co-chairman (*Tallinn Zoo, Estonia*)
- Jukka Salo (*Helsinki Zoo, Finland*)
- Jukka Lahtinen (*Ahtari Zoo, Finland*)
- Heikki Henttonen (*Finnish Forest Research Institute, Finland*)
- Leif Blomqvist (*The Nordic Ark, Sweden*)
- Pekka Pamilo (*Uppsala University, Sweden*)
- Roland Wirth (*IUCN/SSC, Germany*)
- James Dolan (*San Diego Wild Animal Park, USA*)

The aims of the EMCC are to:

- build up a long-term, self-sustaining captive population
- establish an international studbook guaranteed by IUCN/IUDZG
- integrate the species into the EEP breeding programme
- assist and initiate field work on the species
- present the European mink's conservation problems to the public
- negotiate funds from participating zoos and institutions

To secure better results in captive breeding, as well as financial possibilities for the committee, Tallinn Zoo gave it a stock of 17 European mink. On behalf of the committee, every year some of these animals will be given on a breeding loan basis to participating zoos/breeding stations. All the offspring will remain in the possession of the committee. The committee will act in co-operation with the zoo to decide to which breeding institutions the offspring should be given. The breeding institution must also pay a price agreed by the committee, as well as the importing and exporting zoos respectively. All the funds will be used to undertake necessary field work and research concerning the European mink, as well as other conservation matters relevant to the species. The first animals have been given to Ahtari Zoo (1.1; in November 1991) and Helsinki Zoo (1.2; in April 1992). For further information please contact:

EMCC - Tallinn Zoo

Paldiski Road, 145, Tallinn 200035, Estonia  
Tel. 0142 599855 - Fax 0142 539881

## Reference

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**Tallinn Zoo, Paldiski Road, 145,  
Tallinn 200035, Estonia**

## Brown palm civet in captivity

While attending a seminar in Pune, near Bombay, last December a researcher of the Wildlife Institute of India, Mr. Sathyakumar happened to remark an unusual civet in the local zoo. This was reported to me and I asked Mr. Sanjeeva Pande to obtain a photograph which allowed us to identify the animal as a Brown palm civet (*Paradoxurus jerdoni*). Mr. B. C. Choudhury, realizing that this is "the only known living captive specimen of a brown palm civet in the world", obtained the following particulars from Mr. N. Khaire, director of the Poona Snake Park (Katraj) in Pune:

"The animal was caught in a Gulmohar tree on the Bombay-Bangalore highway near Swargate. There was a fairly large crowd on the ground waiting for the animal to come down, so as to kill it. In Maharashtra, civets are killed because of a superstitious belief that they kill small children and eat their brains. The nearest protected area is Pachgaon Parvati Van Vihar, about 3 km from the

place of capture. We tried to keep the male brown palm civet together with a female Small Indian civet (*Viverricula indica*) of about the same size, but the latter was regularly attacked and only ate after the brown palm civet had fed. The animal is fed nine white mice (ca 25 g) a day and has, by the time of writing this (April 1992), been in captivity for one year and a half".

Pune is on the northern fringe of the Western Ghats. If the animal was not passively transported this far up north, this would mean that the species could be distributed throughout the Western Ghats and that its distribution may not be limited by the occurrence of tropical wet evergreen forests.

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## Recent Literature

### Mustelidae

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