SMALL CARNIVORE CONSERVATION

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

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

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

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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 Guatamala), 'Marta Gris' (Guatamala), 'Mico Leon' (also for *Potos*; Chiapas and Guatamala), 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 fuits and/or tree hollows), and altitudes above 2,800 m. Local seasonal migration occurs at the "Reserva El Triúnfo", 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 Biologia "Los Tuxtlas" of the National University. Located near Catemaco, the property covers 700 ha of fine, tall rain forest, which extends onto Volcán San Martin, 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 disjunked 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 *(Oreophasis 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 periferal 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* ssp. 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 exagerated, 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
Annona ssp.	Annonaceae	Anona, Chincuya
*Brosimium alicastrum**	Moraceae	Mujú
Capparis sp.*	Capparaceae	Amolillo, Cashimbo
Carica sp.	Cecaceae	Papaya silvestre
*Cecropia obtusifolia**	Moraceae	Gerumbo
*Diospyros digyna**	Erbenaceae	Zapote negro
Dipholis minutiflora	Sapotaceae	Zapotillo
Eugenia sp.*	Mirtaceae	Chasa
*Ficus glabrata**	Moraceae	Amate, Mato palo
Ficus ssp.*	Moraceae	Igo
*Manilkara zapota**	Sapotaceae	Chicle, Chicozapote
Morisonia americana	Capparidaceae	Zapote blanco
Poulsenia armata	Moraceae	Chirimoya
*Pouteria sapota**	Sapotaceae	Mamey,Zapote colorado
Psidium quajava	Rubiaceae	Guyaba
*Quararibea cordata**	Bombacaceae	?
*Sideroxylon tempisque**	Sapotaceae	Tempisque
Spondias mombin	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 likelyhood 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 Triúnfo") alternate with periods of intense calling (main reproductive season). Estimates of population densities by means of trapping/marking 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 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 postorbital 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.

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

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/km².

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;

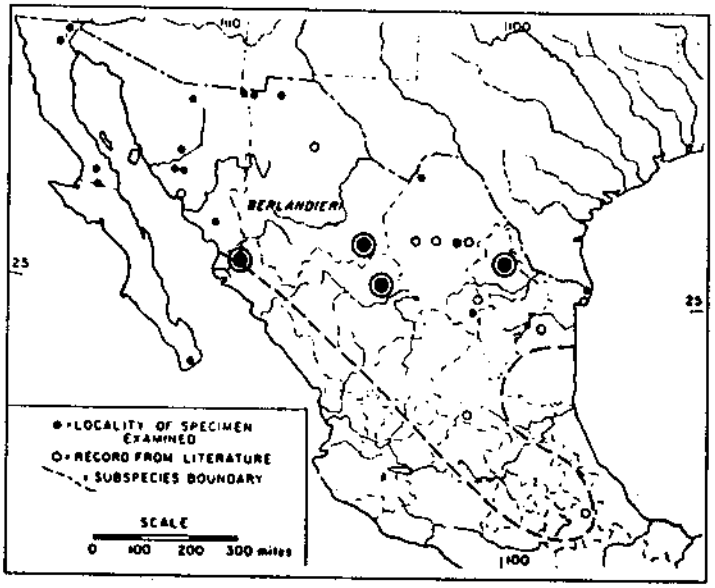

Fig. 2 Geographic range of the North American badger in Mexico. Modified from Long (1972). Bull's-eyes represent new records mentioned in text.

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 km².

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 concomittant 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

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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. Alkhatili (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 *Histrix 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'ammar 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.

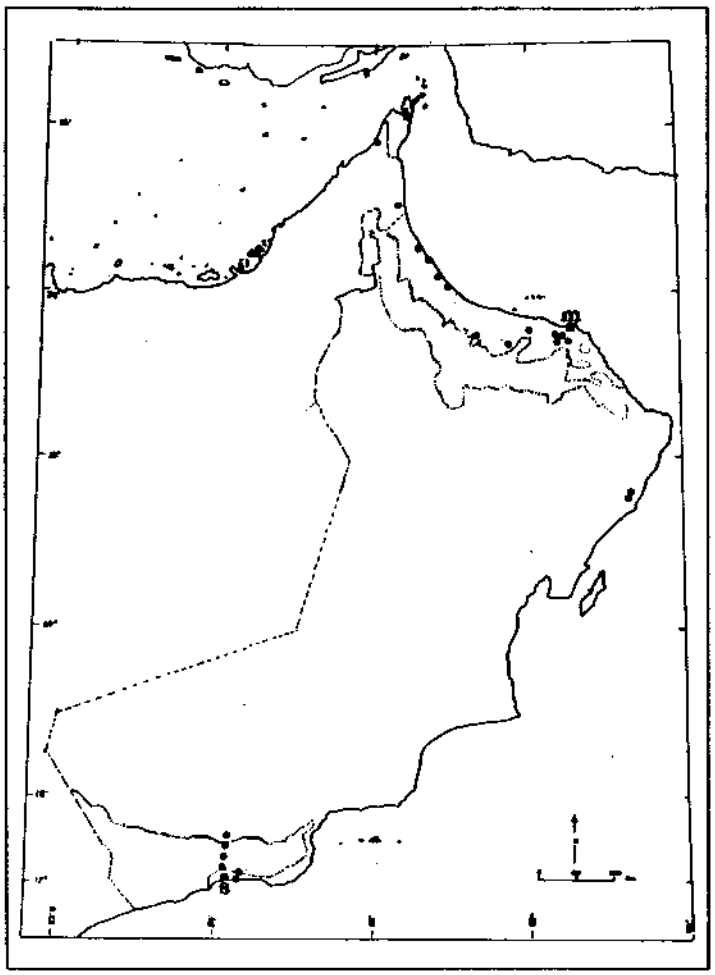

Fig. 1. The Sultanate of Oman, showing the known distribution of the White-tailed mongoose *Ichneumia albicauda*.. M = Muscat, S = Salalah.

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