SMALL CARNIVORE CONSERVATION

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Stripe-necked Mongoose Herpestes vitticollis - *Photo: M. N. Jayakumar, IFS, ARPS, AFIAP*

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Brown-tailed Mongoose *Salanoia concolor* in the Betampona Reserve, eastern Madagascar: Photographs and an ecological comparison with Ring-tailed Mongoose *Galidia elegans*

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Abstract

Photographs of the little known Brown-tailed Mongoose *Salanoia concolor* in the Betampona Reserve, eastern Madagascar are presented. These are probably the first images of this species taken in the wild. Morphological features of *S. concolor* are described. Comparison of the behavioural ecology of this species with the sympatric Ring-tailed Mongoose *Galidia elegans*, indicates that while the two species share the same habitat and activity cycle, they have dietary differences. Evidence suggests that *S. concolor* is mainly insectivorous, while *G. elegans* is more carnivorous. Both species exhibit activity peaks in the early morning and late afternoon and show a preference for relatively intact rain forest. Observations suggest that *G. elegans* is more arboreal than *S. concolor*. Both species often forage solitarily, but live as monogamous pairs with dependent offspring.

Introduction

The Brown-tailed Mongoose *Salanoia concolor* (I. Geoffroy Saint-Hilaire, 1839) of the monotypic genus *Salanoia* (Gray, 1865) is one of the least known Malagasy mongooses (Herpestidae, Galidiinae). Albignac (1984) devotes only two short sentences to this species in his overview of Malagasy carnivores. It is reported as occurring in the eastern coastal zone of Madagascar (Albignac, 1984). The pelage is uniformly dark brown. The species is known to be diurnal and is suspected to have a diet mainly consisting of insect larvae (Albignac, 1984). *S. concolor* was recently classified as Vulnerable by IUCN red list criteria (IUCN/CBSG, 2001).

The Ring-tailed Mongoose *Galidia elegans* (I. Geoffroy Saint-Hilaire, 1837) is common and widespread in the east, north and west of Madagascar. It is represented in the east by the form *G. e. elegans*, with reddish-brown pelage and five or six darker brown rings on the tail (Albignac, 1984). The species is diurnal and eats a varied diet including rodents, small lemurs, reptiles, frogs, fish, snails, insects, worms and eggs (Albignac, 1984).

Both species are morphologically similar and exist sympatrically in the rain forest of the eastern coastal zone (Albignac, 1984; Britt, 1999).

Study Site and methods

The Betampona Reserve was first created in 1927 and became the first of the strict nature reserves (Réserve Naturelle Intégrale) established in 1966 (Andriampianina & Peyrieras, 1972). The reserve is situated between 17°15' - 17°55' S and 49°12' - 49°15' E, about 40 km north-west of the city of Toamasina on the east coast of Madagascar. Betampona covers an area of 2,228 ha with altitudes ranging from 275 - 650 m above sea level (Razokiny, 1985). Current estimates (Britt *et al.*, in press) indicate that only 50% of the reserve area remains as relatively intact forest. The climate is humid tropical. Mean annual temperature is 24°C and annual rainfall is greater than 2,500 mm. The forest at Betampona is dominated by trees of the families Lauraceae, Moraceae, Euphorbiaceae, Clusiaceae, Sapotaceae, Myrtaceae, Arecaceae, Liliaceae and Burseraceae; lianas of the families Dillenidae and Apocyanaceae; and numerous epiphytes of the families Aspleniaceae and Orchidaceae (Andrianarisata, 1995; B. R. Iambana, *pers. comm.*). The canopy height averages 20 - 25 m and is very broken, with occasional large emergents of > 30 m. The terrain is steep with numerous ridges.

Fig.1. Brown-tailed Mongoose Salanoia concolor. *Photo: V. Virkaitis.*

The sympatric occurrence of *Salanoia concolor* and *Galidia elegans* at Betampona was previously reported by Britt (1999). Observations of *S. concolor* and *G. elegans* were collected opportunistically from November 1998 to December 2001. *S. concolor* was first noted at Betampona by Ingrid Porton (St. Louis Zoo, U.S.A.) in 1998. Limited data are presented on the behaviour of both species at Betampona based upon observations by personnel of the Madagascar Fauna Group's (MFG) Project Betampona. MFG personnel were in the forest daily between 07:00 and 16:00 hrs, and on average 3 times a week an hour before dawn and an hour after dusk. Additionally occasional night walks were taken. The following variables were recorded when the species were sighted: location; time; number of individuals; age of individuals (adult or immature); activity; substrate. Locations were recorded making use of fixed markers positioned every 50 m on the trail system.

A total of 75 observations of *Salanoia concolor* were recorded. Times of observations (indicative of activity pattern), variation in group size, and comments on diet and habitat use are presented. These are compared with data from 70 observations of the sympatric *Galidia elegans*.

Results

Description

The photographs show that *Salanoia concolor* has fairly short, dark brown pelage. This is flecked with longer, light coloured guard hairs along the back and flanks. The back cover illustrates the slightly lighter collar of reddish-brown fur running from just below the ears around the throat. The fur on the ventrum is also reddish brown. The ears are relatively large and more rounded than

in *Galidia elegans*. Fig. 1 illustrates clearly the sharply pointed muzzle of *S. concolor*. The snout protrudes somewhat over the lower jaw. The muzzle is very thinly furred with short whiskers. Fur under the chin and around the mouth is whitish/grey. The tail is uniformly dark brown. The fur on the tail is much longer than on the rest of the body and can be erected when the animal is alarmed. The claws are about 1cm long and relatively straight.

In the field *Salanoia concolor* is noticeably smaller and more gracile than *Galidia elegans*. The tail of the latter is also considerably longer. Individual variation in pelage colour has been noted, such that some individuals of *S. concolor* appear the same shade of reddish-brown as *G. elegans* (although this may result from varying light conditions in the forest).

Salanoia concolor emit a variety of soft, throaty squeaks and growls while foraging, but are generally fairly silent. On sighting humans, individuals often exhibit "head-bobbing" behaviour. If alarmed they produce loud growls and move with a stiff-legged gait, erecting the tail hair. In contrast, *Galidia elegans* is very vocal, with a wide range of calls, and are often first detected by their characteristic high-pitched whistling contact calls.

Prior to this publication the only known photograph of *Salanoia concolor* in existence was of a stuffed specimen at the Field Museum of Natural History in Chicago, published in Garbutt (1999). Photographs presented were taken by Vicki Virkaitis in May 2001 at Betampona.

Activity pattern

All observations were recorded during daylight. Neither species were observed to be active at night during nocturnal fauna surveys undertaken on 20 nights between October 2001 and January 2002 nor during occasional night walks in the Reserve from 1997 to 2002.

Data presented in Fig. 2 suggest that both species exhibit peaks of activity in the early morning and late afternoon, with lower levels of activity throughout the day.

Group size and composition

Salanoia concolor is most frequently observed singly or in pairs (see Fig. 3). Groups of three were also observed - usually one animal was clearly smaller than the other two and was assumed to be an offspring of the pair. In March 1999 three adult-sized and one immature individual were observed travelling together. In November 2001 two adults, one juvenile and one infant were observed together. The same group was observed again in December 2001. On both occasions the infant was concealed in a hollow under tree roots, and not observed until the mother returned to lead it away. In July 2000 five adult sized animals were observed foraging as a group. Infants were observed from November to March. As trios were observed throughout the year it is hypothesised that offspring remain with the parents for at least a year.

Galidia elegans is also most frequently observed singly or in pairs (see Fig. 3). No more than three individuals were ever recorded together, and these were invariably a pair of adults and an offspring. Infants were observed from November to May. As groups of three individuals were noted throughout the year it is proposed that young remain with their parents for at least a year.

Habitat use

Salanoia concolor is observed most frequently in relatively intact rain forest (92.5% of observations), but is also recorded in areas of secondary vegetation and cultivated land (7.5% of observations). On three occasions individuals were observed in trees, once at 2 m foraging in a dead trunk and twice descending vertical trunks between 5 - 10 m above the ground. All other observations were on the ground. This species appears to have a preference for ridge tops, as 88.1% of observations were recorded in this habitat.

Galidia elegans was also observed most frequently in relatively intact rain forest (94.3 % of observations), but were also recorded in areas of secondary vegetation (5.7% of observations). *G. elegans* appears to be markedly more arboreal than *S. concolor*, being noted in trees during 12.8% of observations. Most detections of *G. elegans* off the ground were below 5 m, although one individual was observed moving through the canopy at around 12 m above the ground. *G. elegans* was observed to climb vertical trunks, clamber through dense masses of fine branches and lianas, and to leap between horizontal and vertical supports. This species was recorded on ridge tops during 60% of the observations.

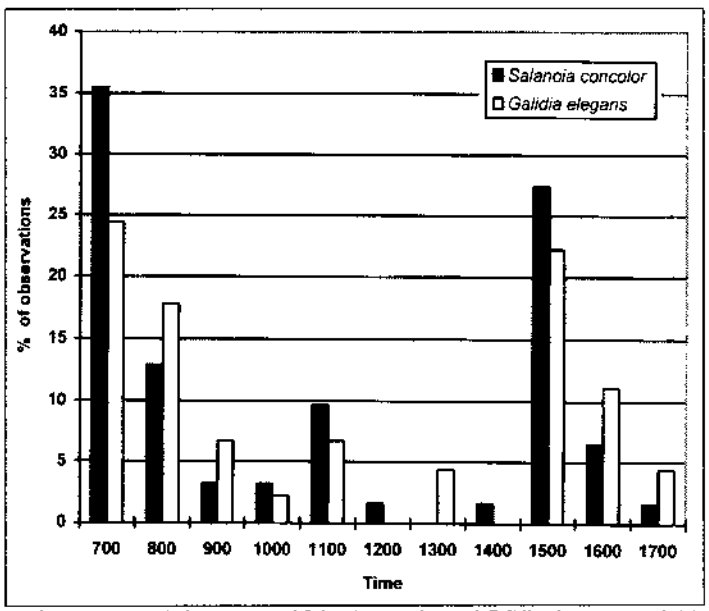

Fig.2. Percentage of observations of Salanoia concolor *and* Galidia elegans *recorded in each hour from 07.00 to 18.00 hours at Betampona.*

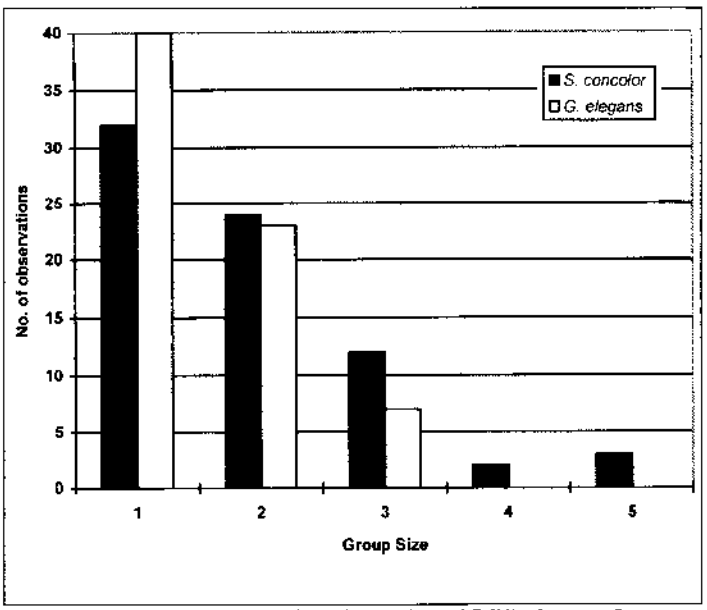

Fig.3. Observations of group sizes in Salanoia concolor *and* Galidia elegans *at Betampona.*

Diet

Salanoia concolor at Betampona have been observed feeding only on coleopteran larvae extracted from rotting wood (n = 8). Foraging in leaf litter has also been observed (n = 6), thus it seems likely that other insects are also taken.

Galidia elegans at Betampona have been observed consuming or hunting a wide variety of prey, including Woolly Lemur (*Avahi laniger*) (n = 1), a native forest rodent (*Nesomys rufus*) (n = 2), *Mantidactylus* frogs (n = 2), crabs (n = 1), and coleopteran larvae (n = 5). It is unclear whether *G. elegans* actually captured and killed the *Avahi*. A Henst's Goshawk (*Accipiter henstii*) was observed in the area, and it is suspected that the *G. elegans* stole its meal. This carnivore has also been observed attempting to capture the following bird species: *Canirallus kioloides*, *Coua caerulea*, *C. reynaudii*, and *Brachypteracias squamiger*. Arboreal activity suggests that *G. elegans* will raid birds nests for eggs or nestlings. As with *S. concolor* individuals of *G. elegans* have been observed foraging in leaf litter (n = 3), suggesting that other insects are also consumed. Both of these carnivores are reported by local villagers to take domestic poultry.

Discussion

The limited data presented suggest that while both *Salanoia concolor* and *Galidia elegans* share the same habitat and activity cycle they have dietary differences. It seems likely that *S. concolor* is mainly insectivorous, specialising in extracting insect larvae from decaying wood, while *G. elegans* is far more carnivorous and omnivorous. Certain external morphological features of *S. concolor* suggest that it is adapted for the extraction of insect larvae: the relatively long, straight claws for breaking up decaying wood and the long, narrow, protruding snout for locating larvae by scent. The evidence supports the assertion by Albignac (1984) that *S. concolor* has a similar diet to the Narrow-striped Mongoose *Mungotictis decemlineata* (A. Grandidier,1867), from the dry forests of south-west Madagascar.

The two species do also appear to differ in use of the rain forest habitat, with *Galidia elegans* being more active in the canopy, while *Salanoia concolor* is more terrestrial in its activities. *S. concolor* was predominantly observed along ridge tops, while *G. elegans*, although most commonly sighted along ridge tops, was also often sighted on mid-slopes and in valley bottoms.

Both species appear to prefer to forage alone, but likely live in pairs with dependent offspring. Albignac (1984) reports *Galidia elegans* living in family groups of 3, 4 or more. At Betampona no more than 3 individuals were observed together, although on three occasions larger groups of *Salanoia concolor* was recorded. *S. concolor* infants are born between November and January, as has been recorded for *G. elegans* (Albignac, 1984). If *S. concolor* shares a similar gestation period with *G. elegans* (74 - 90 days, Albignac, 1984), mating would be expected to occur from August to October.

Both species are estimated to exist in reasonable numbers at Betampona, and it is likely that populations can be self-sustaining. Subjectively it appears that *Salanoia concolor* is the commoner of the two species at Betampona. Certainly both species are adapted to live in largely intact rain forest. Betampona, as the last sizeable remnant of lowland forest in the area, thus provides an important refuge for both these species.

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Current and historical distribution of European Mink *Mustela lutreola* in Biscay. Evolution and comments on the results

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Abstract

First records of European Mink in Biscay date back to 1963, since then its distribution had no important changes. Recently, a European Mink survey has been carried out in the Basque Country using line-triggered camera systems. Results suggest a reduction of the distribution in Biscay; however, this seems to be an artefact due to different performances of European Mink detection techniques. We give a more accurate distribution for the species and we stress the need for a systematised methodology for European mink surveys.

Introduction

The European Mink *Mustela lutreola* is a riparian mustelid native to the continent. Its distribution experienced a severe regression during the second half of the 20th century and disappeared from most countries (Youngman, 1982; Maran & Henttonen, 1985; Maran *et al.*, 1998a). As a result of this decline, nowadays there are two major populational nuclei: one in the East, (Maran & Henttonen, 1985; Tumanov, 1992), and another in the West. The eastern population is still in regression (Maran & Henttonen, 1985; Maran *et al.*, 1998b); mink has disappeared from some countries in recent decades, and it continues declining in areas where it is still present (Maran & Henttonen, 1985; Maran *et al.* 1998b; Romanowski, 1990).

With the western population, the situation is different. In the north, the French population has disappeared from Brittany and Pays de Loire in 20 years, between 1977 and 1997 (Lodé *et al.*, 2001). On the other hand, in the Iberian Peninsula the situation is intriguing since the species seems to be expanding southwards (Maran & Henttonen, 1985; Palazón & Ruiz-Olmo, 1992; Torres & Zuberogoitia, 1997). Recently, a survey was carried out in the whole Iberian area occupied by the European Mink, including Biscay. In this paper we discuss the results of this survey for Biscay, we add some other locations, present past data on the distribution of European Mink in the area and we discuss the current distribution and its historical evolution.

Study area

Biscay, in the north of the Iberian Peninsula (Fig.1), has an area of 2,236 km^2 and a population of near 1,200,000 people. Altitudes range from 0 (by the sea shore) to 1,475 m (Gorbea peak). The climate is oceanic, annual rainfall ranges between 1,200 and 2,200 mm, and annual average temperatures range from 13.8ºC to 22ºC. (Flores, 1989). Winters are mild and there is no summer drought. Streams are short, small and fast flowing, running into the Bay of Biscay. All the major rivers, with the sole exception of the Butroe River (Fig 1), are polluted, specially the Nerbioi and Ibaizabal Rivers (Department of Environment and Land Ordination, 2001). Springs, tributaries and small coastal streams show in general acceptable water conditions, however some of them are also polluted, especially those of Nerbioi and Ibaizabal Rivers near the main population nuclei (Department of Environment and Land Ordination, 2001). Best water conditions are in small Rivers in the Artibai-Oka area and westwards of the Kadagua river (Department of Environment and Land Ordination, 2001).

Results

European Mink was first reported in Biscay in 1963 (Rodiguez de Ondarra, 1963), a few years after the first record of the species in the Iberian Peninsula (Rodriguez de Ondarra, 1955). Afterwards, persistence of mink in the Biscay area has been confirmed in several works (Castién & Mendiola, 1985; Palazón & Ruiz-Olmo, 1997; Aihartza *et al.*, 1999; Zuberogoitia *et al.*, 2001) including the last survey carried out from February 1999 to December 2000 (Gonzalez-Esteban *et al.*, 2001; Palazón *et al.*, 2002). The species reached Biscay from Gipuzkoa in the East, and by the time of its first report it had arrived in the northwest of the region, east of the Nerbioi river (Rodiguez de Ondarra, 1963). Castién & Mendiola (1985) reported European Mink to be present in five 10 x 10 km UTM squares, including the two already reported by Rodriguez de Ondarra (1963). In 1997 after an extensive study, Palazón & Ruiz-Olmo (1997) cited European Mink in 13 10 x 10 km UTM squares, two of them based on bibliographic data before 1980 and another one reported before 1980 and confirmed afterwards (Palazón & Ruiz-Olmo, 1997). Locations recorded spread over

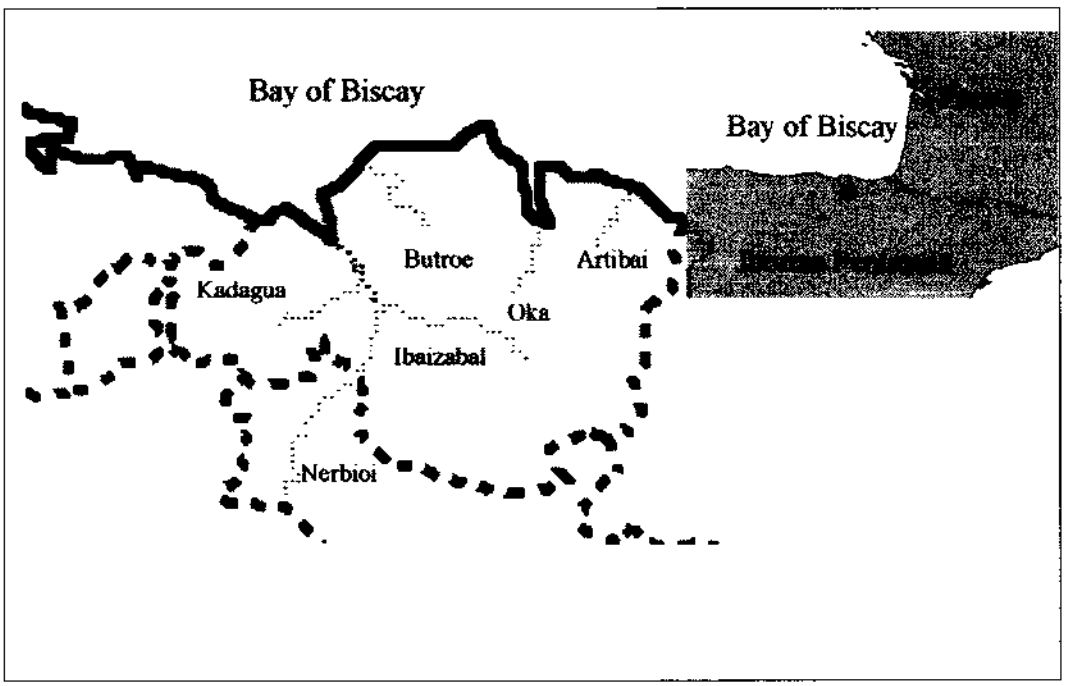

Fig. 1. Map of the study area. Biscay and major rivers in the region.

the catchments of the Rivers Ibaizabal, Oka, Artibai and Butroe, and also some other minor rivers (Palazón & Ruiz-Olmo, 1997). In addition, they reported two bibliographical (before 1980) locations in a tributary of the Nerbioi and another one in the Nerbioi (after 1980), but none westwards of this river. Aihartza *et al.* (1999), as the result of field surveys carried out between 1990 and 1996, reported European Mink in ten 10 x 10 km squares, including two new squares and the first location westwards of the Nerbioi River. Zuberogoitia *et al.* (2001) cited the species as present in most of the region, but more common in the oriental area. They also include new data westwards of the Nerbioi near the western edge of the region. Finally in the last survey carried out from February 1999 to December 2000, Gonzalez-Esteban *et al.* (2001) located a total of eight European Mink in five different 10 x 10 km UTM squares. Four of these locations are in the Artibai catchment, one in the Lea (a smaller river between Artibai and Oka), two in the Oka catchment and the last one in the Ibaizabal catchment (Gonzalez-Esteban *et al.*, 2001; Palazón *et al.*, 2002). The authors concluded that the European Mink maintains populations in the area of the Artibai and Oka rivers, and they also remarked the fact that European Mink is absent from western Biscay, where the rivers are best preserved (Gonzalez-Esteban *et al.*, 2001).

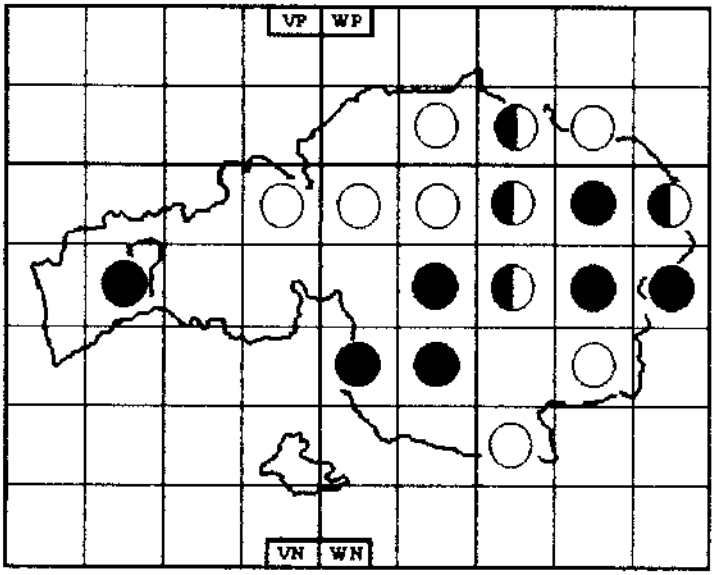

Fig. 2. Distribution of European Mink in Biscay. Empty circles indicate bibliographic data, full circles indicate presence detected in the last three years, and divided circles indicate both bibliographic data and presence detected in the last three years.

Discussion

At first sight, it seems that the European Mink spread rapidly over eastern and central Biscay after its arrival and maintained this distribution for a long period of time, without colonising the area westwards of the Nerbioi River. By the late 1990s there are two records of European Mink westwards of the Nerbioi (Aihartza *et al.*, 1999; Zuberogoitia *et al.*, 2001), but permanent colonisation of the area has not been confirmed. The last survey, carried out by Gonzalez-Esteban *et al.* (2001), suggests a reduction of the distribution of European Mink, with the species confined to the north-east area. However, as stated by Gonzalez-Esteban *et al.* (2001), there are some methodological differences that prevent unconditional comparison among works.

Firstly, works of Castién & Mendiola (1985) and Palazón & Ruíz-Olmo (1997) are partially based on bibliographic data, dating back as far as 1963 (22 and 34 years respectively). By including information from many years, they risk artificially enlarging the actual distribution of the species.

Secondly, data for Biscay given by Palazón & Ruíz-Olmo (1997) and Aihartza *et al.* (1999) are not the result of a survey for European Mink with a specific methodology, but based on different sources such as: live-trapping data, track searches, torching, enquiries and road casualties and casual observations. Thus, they are liable to fail to detect mink in remote areas and areas of low human density.

Thirdly, the last survey carried out by Gonzalez-Esteban *et al.* (2001), was conducted using photographic bait stations, more concretely the Line-Triggered Camera System described by Zielinski & Kucera (1995). There are some remarks that one should bear in mind about this method: Firstly, that some studies found that this method has a lower performance than other methods when detecting carnivores (Zielinski & Kucera, 1995). Indeed, Gonzalez-Esteban *et al.* (2001) failed to detect European Mink in areas where there were data of road kills, the species had been sighted and in a stream where European Mink was being studied at that time (Zuberogoitia *et al.*, 2001; Garin *et al.*, 2002a,b). Moreover, Gonzalez-Esteban *et al.*, (2001) used the same method in order to detect European Mink in Araba, a region adjacent to Biscay where simultaneously a live-trapping study was being carried out. They failed to detect the species in 14 squares where the live trapping method did (Gonzalez-Esteban *et al.*, 2001; Palazón *et al.*, 2002). On the other hand, they detected mink in a square where live trapping did not (Gonzalez-Esteban *et al.*, 2001; Palazón *et al.*, 2002). However, despite its lower performance, the method used by Gonzalez-Esteban *et al.* (2001) has several advantages like being cheaper and non-intrusive with the species. Moreover, it lacks some deleterious effects that live-trapping may have (Zabala *et al.*, 2001)

Finally, most studies have been conducted over long periods of time (a whole year or more), whilst small carnivores, including mink, have different degrees of activity and displacements throughout the year. They are likely to be more attracted to bait in some seasons and their trappability also changes markedly throughout the year (Brzezinski *et al.*, 1992; Zielinski & Kucera, 1995; Zabala *et al.*, 2001). Moreover, overall trapping success is related to trapping effort (McDonald & Harris, 1999); therefore, some distributional studies, specially those based on trapping that do not include data from other sources, and/or have low trapping efforts are not reliable and probably only will reliably detect target species in areas with high densities.

In our opinion, the results of the last European Mink survey in Biscay underrepresented the distribution of the species. Based on the results of the recent surveys, scientific research publications, road kills and sightings of the species, we give a more accurate distribution for the species in Biscay (Fig. 2).

As observed in Fig. 2, European Mink in Biscay occupies almost the entire province, including several areas were it was not detected in the surveys. The current distribution is quite close to that reported in older works (Castién & Mendiola, 1985; Palazón & Ruiz-Olmo, 1997; Aihartza *et al.*, 1999). A possible difference might be the colonisation of the area westwards of the Nerbioi River, where mink has been absent for many years. Indeed, besides data on two road kills (Zuberogoitia *et al.*, 2001), there are data on mink in streams south of the area (Palazón *et al.*, 2002). Small distributional changes observed in previous works are more likely to be due to different sampling efforts than to a changing distribution pattern with continuous colonisation and extinctions in some areas.

The main conclusion is the need of a reliable and common (for all the regions) methodology to detect European Mink. Indeed, using different methods results in incomparable data and inefficient effort. In our opinion, a deep study is needed in order to develop a standardized technique, which should fulfil some basic requirements. An easy, cheap and, most important, harmless and reliable technique is needed.

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REQUEST FOR INFORMATION ON MUSTELIDS: FOLKLORE, MYTHOLOGY AND BELIEFS.

For a work on ethnobiology, I would greatly appreciate any information on local beliefs and uses related to mustelids, such as the use of badger fat as medicine or the belief that weasels can kill people as a revenge if disturbed.

Any type of reference from all around the world is welcome, but published data and especially from Europe are preferred. Please send data to:

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Thank you very much.

Do European Mink use only rivers or do they also use other habitats?

Iñigo ZUBEROGOITIA and Javier ZABALA

European Mink *Mustela lutreola* has been defined as a semi-aquatic mustelid linked to aquatic ecosystems (Youngman, 1982). Afterwards, several works on its ecology involving radio-telemetric studies bore out this statement (Palazón & Ruiz-Olmo, 1997; Maizeret *et al.*, 1998; Sidorovich *et al.*, 2000; Garin *et al.*, 2002a,b; Zabala & Zuberogoitia, 2003; Zabala *et al.*, 2003). Indeed, radio-tracking studies have shown a very close relation between European Mink and aquatic habitats (Palazón & Ruiz-Olmo, 1998; Garin *et al.*, 2002a; Zabala & Zuberogoitia, 2003; Zabala *et al.*, 2003).

However, it is possible to find indirect data about the use of non-aquatic habitats. Road kills are claimed to be the main mortality factor in the Spanish Mediterranean area (Palazon & Ruiz-Olmo, 1997) as well as it is in the neighbouring French area (Maizeret *et al.*, 1998). In this way, Palazón *et al.* (1997) report dead minks on roads far away from rivers. Moreover, during a study on distribution of carnivores in Biscay Aihartza *et al.* (1999) found three out of fourteen European Mink records (21,1%) to be a long way away from the nearest river (more than 1 km). Both arguments suggest that European Mink may leave river basins but do not show how often this event occurs. Similar behaviour has been already reported for other semi-aquatic species, which do so in order to increase their hunting territories, to establish their dens or to seek new areas (i.e. otter *Lutra* see Kruuk, 1995; American Mink *Mustela vison* see Dunstone, 1993; Lodé, 1993; Niemimaa, 1995; Ferreras & MacDonald, 1999). The high number of road kills and casual sightings of European Mink far from rivers suggest that this takes place very often, whilst radio-tracking data contradict this hypothesis.

During a radio-tracking study of eight European Mink we gathered 1,092 locations, 406 of them belonging to active points and 686 to inactive points (nocturnal and diurnal resting sites). Five mink were never found out of streams or marshes. The other three (all of them males), were located at least once out of aquatic habitats, but always within 100 metres of the river. Altogether, minks were found out of aquatic habitats 10 times (2.46%) during activity and five times resting (0.84%). Out of the 10 times that minks were found out of streams, once is supposed to have been a short cut from a stream to the main river; and the other nine times, the mink presumably went out to forage (two locations were found in a chicken farm 30 m from a river). The conclusion that can be drawn from these results is that territorial minks use almost exclusively aquatic habitats, according with data reported by Palazón & Ruiz-Olmo (1997). However, the high number of road kills remains surprising. Therefore, either mink use non-aquatic habitats more often than reported, or studied mink are not representative of the whole population.

In our study area mink home ranges were almost exclusive with low overlap, and though intensively trapped (see Zabala *et al.*, 2001) no other mink but tracked individuals were found inside the home ranges (Garin *et al.*, 2002a). Besides, after the disappearance of a male, it was replaced by another one (a mature male) that came to occupy almost the same home range (Garin *et al.*, 2002a). This rapid substitution suggests the existence of a floating population somewhere. Moreover, several studies have, hitherto, reported exclusivity of home ranges within sexes (Sidorovich, 2000; Garin *et al.*, 2002a) and in some cases there are clues of territoriality (Garin *et al.*, 2002a, Zabala & Zuberogoitia, 2003). On the other hand, Sidorovich *et al.* (2000) reported that when European Mink was attacked by American Mink, the former usually left the stream area and sheltered for up to 22 hours in habitats unusual for this species, such as forest or fields. In addition, behavioural experiments conducted in captivity showed that while the most common interaction between European Minks was an approach (40 % of the cases), there were also aggressive behaviours, defensive threats, escapes and chases between them (in total 60 % of the cases) (Maran *et al.*, 1998; Macdonald *et al.*, 2002). In the same way, it is very likely that outcast minks (young, weak or old individuals) are pushed by dominant European Minks out of main streams, to marginal streams or springs, and probably even out of aquatic habitats. Probably outcast minks move continuously seeking for new territories, waiting for a chance to occupy a vacant one, or to escape from territorial conflicts with conspecifics or American Minks. This would explain the rapid substitution of an adult male by another one after the disappearance of the former, our fail to detect more mink inside the home ranges (territories) of studied mink (Garin *et al.*, 2002a) and also the high number of road kills and observations of European Mink far from aquatic habitats. This would also imply the existence of a floating population of European Mink, that has not yet been studied. Further study on this topic is needed.

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Is the European Mink *Mustela lutreola* a longstanding member of the Iberian fauna or a mid-twentieth-century arrival?

Jabi ZABALA[1] and Iñigo ZUBEROGOITIA[2]

Since the first report, in 1951 (Rodríguez de Ondarra, 1955), of European mink *Mustela lutreola* in the Iberian Peninsula there have been two hypotheses in order to explain the lack of data before 1951. The first suggested that European Mink had just recently reached Iberia, whilst the second proposed that it is an ancient, but overlooked, member of the Iberian fauna. Most authors supported the first hypothesis (Rodríguez de Ondarra, 1955; Youngman, 1982; Senosiain & Donazar, 1983; Illana, 1994: Aihartza *et al*,.1999). However, recently, in relation with a paper dealing with the distribution of European mink in the Iberian Peninsula, both referees observed that there is still no answer for the question in the title of this paper. Therefore, we would like to make here some comments on this point, and try to clarify it.

As is widely known, the first data of European Mink in the peninsula date back to Rodríguez de Ondarra (1955), who describes mink (*Putorius lutreola* in his work) captured in 1951 (one animal) and 1952 (two) in Gipuzkoa. Two were caught in Tolosa, and the third in Villabona (Rodríguez de Ondarra, 1955). Both villages lie in eastern Gipuzkoa. Before this there are no data on the species in the Iberian Peninsula: no data in (the scarce) scientific literature; no animals in taxidermists' collections; no knowledge among trappers; no road kills; and no observations of river-dwelling mustelids (Rodríguez de Ondarra, 1955; Castién & Mendiola, 1985; Aihartza *et al*., 1999). Since then, there have been numerous records of European Mink in Iberia: one in 1951, three in 1952, three in 1954, two in 1956, one in 1958, one in 1959, one in 1962, and three more mink captured at an unknown date (Rodríguez de Ondarra, 1963), and so on. Most of these mink were captured (presumably by farmers) and several of them stuffed. Afterwards, road kills and sightings have both become important data sources (Arambarri *et al*., 1997), especially in densely populated areas (like Biscay or Gipuzkoa) where these methods have detected the species in areas where photographic devices and live trapping failed to do so (Zabala & Zuberogoitia, 2003). Finally, our personal field experience showed us that in areas where European Mink is present locals (at least some of them) notice them; we also met some European mink watchers, especially in medium populated villages.

It can be argued that the lack of data before 1951 does not prove the absence of mink, as, indeed, negative or absence data can never be considered sure. However, as stated by Youngman (1982), commercially valuable furbearers are among the first species to be recognised by local hunters, trappers and naturalists. In Iberia, both naturalists and taxidermists were surprised with the first European Mink individual,because they had not seen the animal before. They did not know what species it was, even though they knew all the other mustelids of the region (Rodríguez de Ondarra, 1955; Elosegi, *pers. comm.*). Twenty years latter, Senosiain & Donazar (1983) reported that trappers from Navarra also claimed not to know the species when they first captured European Mink. Because trapping (without scientific purpose) was more common in the past, we should expect European Mink to be known, if they were present. The prior lack of road kills also suggests an earlier absence, although this could be due to the lower degree of road traffic in the past. In the same way the lack of stuffed animals, or cranial samples in museums and particular collections (well documented now) strongly bears out the hypothesis of mink absent from the area before 1951 (Rodríguez de Ondarra, 1955; Belamendia, 2001). There is little old material from the area available for study nowadays, and some collections date only back to the 1990s (Belamendia, 2001). However, the distribution of data in both time and space is really suggestive, because the first Iberian data are from near the French border, just after a period of high mink population density in France judging from the large amount of specimens from France deposited in museums during the 1940s

(Youngman, 1982). In the next year, 1952, mink is found in an area near Araba, and by 1958 in the border area between Gipuzkoa and Biscay. Unfortunately, Rodríguez de Ondarra (1963) gave no date for the mink found little more westwards in Biscay. However, overall this pattern suggests colonisation from the border south and westwards.

Rodríguez de Ondarra (1963) described as "captured" every mink found until 1963. But for the first three he gave more detail in Rodríguez de Ondarra (1955): two were killed (one by a hunter and another one by children when they saw it swimming), and the third one was captured, probably because it was causing damage to household poultry. Therefore, these first records, obtained almost simultaneously, were not a result of scientific investigation. Indeed, the same is probably true of all data obtained until the late 1980s. Therefore, even if heightened scientific interest has yielded a considerable amount of data in the area during the last decade, it cannot have been the reason underlying records of European Mink between 1951 and the late 1980s.

In conclusion, the hypothesis that the European Mink has always been part of the Iberian fauna, but was only discovered last century through increased research, is not supported by any data. Indeed, every circumstantial line of reasoning suggests colonisation of the Peninsula shortly before 1951, as stated by most authors (Rodríguez de Ondarra, 1955; Youngman, 1982; Senosiain & Donazar, 1983; Illana, 1994; Aihartza *et al.*, 1999).

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Records of small carnivores from Mount Kinabalu, Sabah, Borneo

Vladimir DINETS

In October 2002, during 36 hours of spotlighting in the vicinity of Gunung Kinabalu National Park headquarters, two species of carnivores were observed.

On October 15, at approximately 03:00, a Hose's Civet *Diplogale hosei* was sighted along Mempening Trail at about 1,700 m elevation, in hilltop montane broadleaf forest, during a dark rainy night. It was first located by its eye-shine with a small flashlight, and then was seen better with a larger one. The animal was apparently curious about the light and approached the observer closely (to as little as 5 m). It walked parallel to the trail but did not use it. Its movements and reaction to light closely resembled Banded Civet *Hemigalus derbyanus*, a related lowland species, which the author had a chance to observe a few days later in a riparian forest along Kinabatangan River, Sabah. Unfortunately, although Banded Civet could be videotaped at night at the same distance, the dark overall coloration of Hose's Civet made it impossible to obtain any video footage of useable quality. Both species have mostly white eye-shine, brighter than all other non-aquatic civet species of Borneo, except for Banded Linsang *Prionodon linsang*.

On October 16, the author discovered that a small roadside garbage dump along the Power Station Road (just below the power station, located at 1,950 m elevation in montane broadleaf forest) was attracting various species of squirrels, treeshrews, and birds. The dump was revisited at approximately 01:00 on October 17. The weather that night was mostly clear with bright moonshine, but the dump was in the shadow. It was attended by nocturnal Pen-tailed Treeshrews *Ptilocercus lowii* and one Kinabalu Ferret Badger *Melogale everetti*. The ferret badger was very shy; it was not seen during the initial approach, and appeared only half an hour later. It was briefly seen through the video camera from across the road, at a distance of about 15 m, and ran away as soon as the small flashlight was turned on to make videotaping possible. The animal had weak reddish eye-shine; it resembled a very large short-tailed treeshrew in overall shape, movements and agility, but could be easily identified by its facial markings.

Elevations provided as in Wheatley, N. 1996. *Where to watch birds in Asia*. Princeton University Press, Princeton, USA.

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