SMALL CARNIVORE CONSERVATION

The Newsletter and Journal of the IUCN/SSC
Mustelid, Viverrid & Procyonid Specialist Group

Number 15 October 1996

SPECIES SURVIVAL COMMISSION

Fossa (*Cryptoprocta ferox*) - Photo: Dipl.-Biol. F. Ostenrath

The production and distribution of this issue has been sponsored by
"Blijdorp Zoo", Rotterdam, Holland,
"Columbus Zoo", Powell, Ohio, USA
and the "Royal Zoological Society of Antwerp", Antwerp, Belgium.

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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:

Small Carnivore Conservation
c/o Dr. H. Van Rompaey
Jan Verbertlei, 15
2650 Edegem
Belgium

Printed on recycled paper **ISSN 1019-5041**

The European endangered breeding program for the Fossa (*Cryptoprocta ferox*)

Achim WINKLER

The Fossa is the largest native carnivore on the island of Madagascar, with a head and body length of 60-75 cm, plus a tail of 55-70 cm. Adult males can weigh more than 14 kg, while females are considerably smaller, rarely weighing as much as 10 kg. The body of the fossa is long and slender with short reddish-brown fur. Fossas are solitary hunters which inhabit the woodlands remaining throughout Madagascar. They are agile climbers and can jump exceptionally well. Their diet consists primarily of birds and small to medium-sized mammals, including lemurs.

Systematically the fossa forms a link between the true cats and the viverrids, showing a range of morphological traits characteristic of both felines and viverrids. The overall appearance of the animal, its dentition and the retractible claws are reminiscent of felids, whilst the skeleton, brain, feet, and anal glands are more characteristic of viverrids. Formerly in the cat family, the fossa is now classified in a separate subfamily, Cryptoproctinae, within family Viverridae.

The fossa are widespread over the entire island of Madagascar but nowhere are they very common. They are absent from the many deforested regions (particularly in the central mountainous zones) but are still considered to occur in larger numbers in the forests remaining in western and eastern Madagascar. Numbers are declining however, although no exact figures are known. Today the fossa is listed as "vulnerable" in the IUCN Mammal Red Data Book and is listed on CITES Appendix II.

Fossa (*Cryptoprocta ferox*) in Zoo Duisburg

The reason for the population decline of the fossa is to be seen largely in the ongoing destruction of the natural environment of Madagascar. Woodlands are continuously being cleared on a large scale to gain land for the grazing of cattle and to allow the use of valuable timber, so depriving the animals of their prime woodland habitat.

Already more than 80% of Madagascar's original woodlands has been destroyed. Many of the intact forests remaining are incorporated into protected areas such as national parks and nature reserves, which warrant protection for the fossa and other threatened wildlife. However, in a country as poor as is Madagascar, there is immense human pressure to explore any remaining parts of the country's natural heritage.

In addition to the effects of habitat destruction, fossas are hunted in many parts of the country since they are known to prey on domesticated animals, particularly poultry and young pigs.

Fossas have been held in captivity in small numbers at a few zoos since the beginning of this century. The first success in breeding in captivity was recorded at the Parc Tsimbazaza in Antananarivo, Madagascar in 1967. The first birth outside Madagascar was at Montpellier Zoo, France in 1974.

At the end of 1995 a total of 34 fossas was held in zoos worldwide (11 in Europe and 2 in the USA). Twelve of these animals are held at Zoo Duisburg in Germany, and most of the other captive fossas originate from the Duisburg population. In recent years Zoo Duisburg has been the only zoo to record the regular annual breeding of the fossa. Basle Zoo in Switzerland, Montpellier Zoo, San Diego Zoo (USA), and Parc Tsimbazaza thus far have been the only other zoos where fossas have reproduced successfully. Breeding at Basle and Montpellier, however, has not occurred since the early 1980s, whilst the only female held in San Diego no longer reproduces. Parc Tsimbazaza does not keep fossas at present. The future development of the captive

population of the fossa thus depends solely on ongoing reproductive successes at Zoo Duisburg.

The sex ratio of the present captive population of 18:16 is rather well-balanced. The founder population of five animals is small however, although inbreeding has been prevented largely in the past. Two further potential founder animals (at Basle and Montpellier) have not yet reproduced. However, with new partners having been established recently, it is hoped to produce some offspring from these genetically valuable animals.

In the ten years since 1985 a total of 20 fossas have been raised successfully from six different females from the captive population. Surplus animals were transfered to a number of zoos in Europe to establish new potential breeding pairs. Further zoos in Europe and in the USA are also interested in obtaining fossas.

In 1994 a European Endangered Breeding Program (EEP) for the fossa was initiated at Zoo Duisburg. The EEP was started with two aims in mind. Firstly, the breeding program is intended to maintain a genetically viable population in captivity. The program is based on a masterplan for the cooperative management of fossas in captivity, incorporating the distribution, pairing and breeding the animals, evaluation of a target population, and long-term population planning to minimize inbreeding and to maintain high genetic variability. The international studbook for the fossa in coordinated at Duisburg Zoo.

The second aim of the EEP is to support nature conservation in Madagascar. A Fossa-Fund was established at Zoo Duisburg to obtain funding necessary for *in situ* conservation activities. Most of the money generated thusfar originates from the transfers of fossas between zoo. Fossas which are translocated within the EEP-program are offered on a breeding loan basis without changing ownership. Apart from paying transport costs, the recipient zoo is requested to pay a one-off sum of at least US$ 1,000 to the Fossa-Fund for each fossa obtained. (Naturally, each zoo is welcome to donate more money if they so desire). Additional money for the Fossa-Fund is being collected from the public. By the end of 1995 more than US$ 12,000 already had been gathered by the Fossa-Fund.

Some of this money has been invested in a research project to evaluate the behavioural ecology and reproductive biology of the fossa in western Madagascar. This PhD study, conducted by Clare Hawkins (University of Aberdeen), will be the first detailed biological account of the fossa in the wild. Animals are radio-tracked for information on home range sizes, population densities, and habitat preferences. Skin and blood samples are taken for DNA fingerprinting and hormonal analyses, respectively, while faeces are collected for dietary studies. The only previous study of the fossa in the wild, carried out by Bernardin Rasolonandrasana in 1994, focussed on the collection of faecal material only, so gaining our first insights into the diet of the fossa. Almost all that we know of the animal's biology at present derives from observations made on animals in captive environments.

More of the money from the Fossa-Fund is to be allocated to a joint project with Parc Tsimbazaza, Madagascar. The Parc has already developed plans to re-establish fossas at the zoo, while the Fossa-EEP urgently requires new animals from Madagascar to broaden the genetic base of the EEP-population. With support from the Fossa-Fund, the staff at Parc Tsimbazaza will also be looking to assess the overall number of the fossa on Madagascar.

In conclusion it can be said that the initiation of the Fossa-Fund in 1994 has led to marked changes in the conservation activities undertaken for the fossa. The captive situation has been greatly improved with the establishment of various potential breeding pairs at a number of zoos throughout Europe, whilst further institutions in Europe and America are due to receive any surplus fossas. With more zoos joining the Fossa-EEP, a greater number of fossas can be presented to the visiting public. This provides an opportunity for participating zoos to raise public awareness of an unfamiliar animal species such as the fossa, and to inform the zoo-going public about the status of the fossa in its increasingly diminishing natural environment. The conservation of the fossa and other threatened wildlife on Madagascar will be further supported with the finances generated by the Fossa-EEP's Fossa-Fund.

Zoo Duisburg, Mülheimer Strasse 273,
47058 Duisburg, Germany

The Netherlands ban the importation of furs from animals caught in leghold traps

In 1991, the European Commission announced its intention to prohibit the introduction into the Community of pelts and manufactured goods of certain wild animal species originating in countries which catch them by means of leghold traps or trapping methods which do not meet international humane trapping standards. A regulation (EC 3254/91) was to take effect on 1 January 1995. However, implementation of the ban has been delayed twice by the Commission in anticipation of the establishment of international humane trapping standards.

The Commission left the way open for individual members of the EU to impose the ban, however, and the Netherlands is the first country to do so. Fur exporters from the USA, Canada, and Russia fiercely oppose the ban which, they argue, runs counter the World Trade Organization rules.

Dutch Ministerial Decree of 24 December 1995, effective 1 January 1996, bans the import of pelts, skins and furs, and manufactured goods that contain pelts, skins or furs, of the following species:

American badger *Taxidea taxus*; American pine marten *Martes americana*; Beaver *Castor canadensis*; Coyote *Canis latrans*; Ermine *Mustela erminea*; Fisher *Martes pennanti*; Grey wolf *Canis lupus*; Muskrat *Ondatra zibethicus*; Otter *Lutra canadensis*; Raccoon *Procyon lotor*; Sable *Martes zibellina*.

The ban does not apply to imports from other EU Member States.

Netherlands clamps down on leghold pelts. 1966. *Traffic Bull.*, 16(2):38.

Sightings of Nilgiri marten (*Martes gwatkinsi* Horsfield) at Peppara Wildlife Sanctuary and Silent Valley National Park, Kerala, India.

G. CHRISTOPHER and E. A. JAYSON

Western Ghats of the Indian sub-continent is well known for its extensive floral and faunal diversity. The complex topography and wide range of micro climatic and soil conditions results in a mosaic of plant communities and animal associations. In particular, the southern part of the Western Ghats is a refuge to many threatened, endangered and endemic plants and animals, amongst which the large mammals are better known than the smaller mammals. The small carnivore community of this region has remained under-recorded (Yoganand & Kumar, 1995). Scientifically, most viverrids and mustelids, and particularly the tropical forms, are among the least known carnivores (Schreiber *et al.*, 1989).

The Nilgiri marten is a rare mustelid which is endemic to the forested tracts of the Western Ghat mountain range. Sightings of this species have also been very few (Madusudan, 1995). The UICN/SSC Mustelid, Viverrid & Procyonid Specialist Group listed the Nilgiri marten as a threatened species for priority conservation action.

Though the distribution of *Martes gwatkinsi* in the southern Western Ghats has been described by various authors (Pocock, 1941; Hutton, 1949; Finn, 1980; Prater, 1980; Jerdon, 1984), there is a remarkable paucity of information on the distribution and status of this species. Apart from the early descriptions, direct sightings of Nilgiri marten have been reported from the Brahmagiri Wildlife Sanctuary in Karnataka (Karanth, 1984), the Eravikulam National Park in Kerala (Madusudan, 1995) and , more recently, from Upper Bhavani of the Nilgiris (Gokula & Ramachandran, 1996). Indirect evidence (scats) of the animal were identified from the Mukuruthi National Park by Yoganand & Kumar (1995). The species is likely to occur at the Indira Gandhi Wildlife Sanctuary and the Kalakad-Mundanthurai Tiger Reserve of Tamil Nadu, and the Neyyar Wildlife Sanctuary of Kerala (Schreiber *et al.*, 1989). The present observations (Fig. 1) are the first records of the Nilgiri marten from the Peppara Wildlife Sanctuary and the Silent Valley National Park.

Peppara Wildlife Sanctuary

The Peppara Wildlife Sanctuary (08°34'-08°42'N, 77°07'-77°14'E) is situated at the southern end of the Western Ghats. To its east lies the Kalakad-Mundanthurai Tiger Reserve and towards its south is the Neyyar Wildlife Sanctuary. The sanctuary occupies an area of 53 km^2. It is drained by the River Karamana where a reservoir formed by a dam across the river occupies an area of 5.82 km^2. The terrain is rugged, with elevations ranging from 100 m to 1717 m ASL.

The sanctuary is endowed with west coast tropical evergreen and semi-evergreen, southern moist mixed deciduous, southern tropical hill forests, and southern hill top evergreen forests (Champion & Seth, 1968). Reed brakes and *Myristica* swamps can also be seen in this tract. During our three-year study on man-wildlife conflicts in and around the sanctuary area, we made sightings of various small and large mammals interacting with the local Kani-tribals.

Occasionally, a strange animal with dark coat, pale yellow throat, flat otter-like head which it wagged up and down slightly, was found in the moist deciduous and hill top evergreen tracts of the sanctuary. The 'Kani' tribals call this animal 'Koduvalli'; after a direct sighting we confirmed this to be the Nilgiri marten.

In May 1995, at Vazhukkampara (450 m ASL), near the Bonaccord Hills, we noticed an animal feeding on honey by inserting the front half of its body into a tree hole (*Dillenia pentagyna*) about five metres above the ground. It was around 11.00 hours, and the animal actively fed for 10 minutes without bothering about its surroundings. Immediately after withdrawing from the tree hollow it noticed the observers, raised its fore body slightly, and made a harsh chuckling noise. Soon, it climbed down from the tree and swiftly moved off into the grassy undergrowth. With its head raised, the pale yellow throat was clearly visible, with a total body length (head to tail) of about 1.3 m. The area of the sighting was rocky with mixed deciduous forest.

In February 1996, again we observed a Nilgiri marten in a cultivated area near the Chathankode Kani tribal settlement (120 m ASL). In the clear sunlight, we were able to observe the yellow

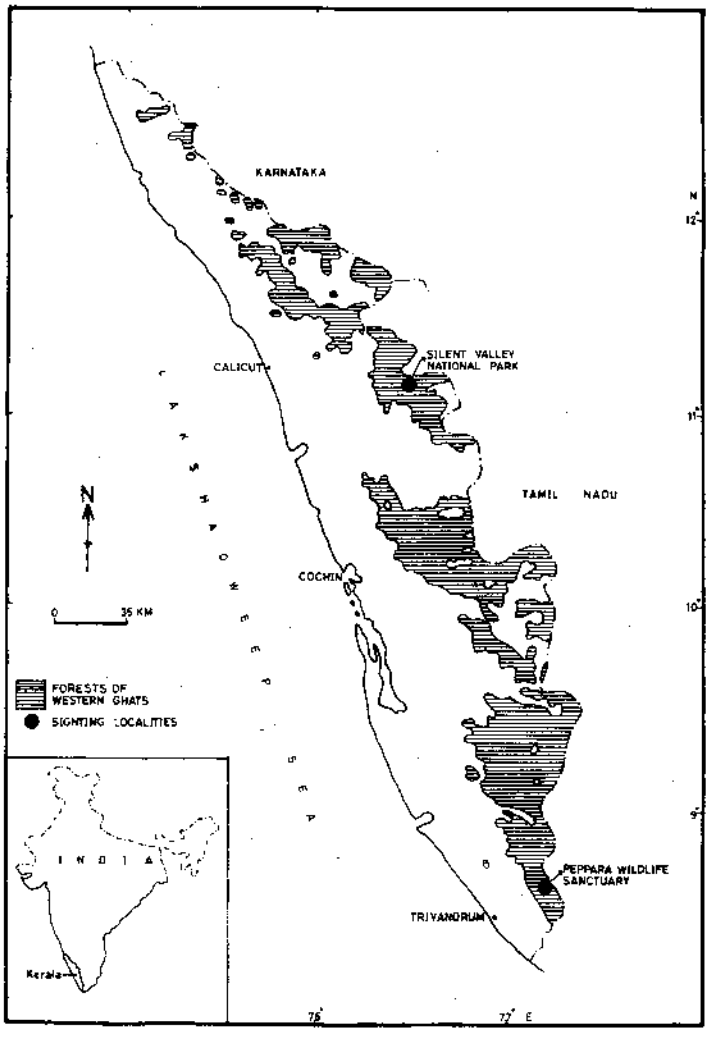

Fig. 1 Sighting localities of Nilgiri marten

throat and the dorsally flattened head. When disturbed the animal ran along the ground with small leaps before disappearing into the adjoining moist deciduous vegetation. During its movement, though there were many trees and shrubs on the way, the animal moved only on the ground until it disappeared from sight.

The Nilgiri marten is well known to the Kani tribals of the region. They believe that a disturbed marten (Koduvalli) in the forest will call other members of its kind and will attack an unarmed person. Being hunter-gatherers, the Kanis will consume any type of wild animal (herbivores, omnivores, and carnivores), but they avoid eating the Nilgiri marten because they believe its meat to be poisonous. The unpleasant body odour of the marten may be the reason for this belief.

Silent Valley National Park

The Silent Valley National Park (11°04'-11°13'N, 76°24'-76°29'E) is unique for its high biological diversity and endemism; it forms the core-zone of the Nilgiri Biosphere Reserve. The elevation ranges from 900 m to 2,383 m ASL. The park is covered mostly by west coast tropical wet evergreen forests and grassland-shola eco-system in the higher reaches.

On 29 May 1996, during the wildlife census, a Nilgiri was spotted by us near Anginda peak (2,383 m ASL). At 10.20 hours, we saw an animal with a black coat and orange-yellow throat, moving on the grassland which came out from the nearby shola. We were watching the animal at a distance of about 5 m and, when it realized our presence, it raised its fore body to stand on its hind legs for a moment. Then it moved swiftly off into the shola it had come from. The animal had a darker colour than those sighted earlier at Peppara (which had a dark brown coat with a pale yellow throat). From the earlier reports from Anamalai and Coorg (Riley, 1913; Gouldsbury, 1949. Finn, 1980; Jerdon, 1984), it appears to have been either a male, or a female in summer coat.

Clear visibility and good sun light, combined with the background of green grass, made that sighting of Nilgiri marten at the Anginda Peak spectacular. The animal is known as 'Karumverugu' to the 'Muduga' tribes of this region.

Our present observations also reveal that *Martes gwatkinsi* is adaptable to a wide range of habitats, from high altitude shola grassland to tropical deciduous forest at low elevation. This adaptability resembles that of the closely related Himalayan species *Martes flavigula*, (Prater, 1971; Roberts, 1977). Apart from our direct sightings, Nilgiri marten were reported by the local tribals from the Kaviar, Cherukad, Chemmunji, and Athirumalai areas of the Peppara Wildlife Sanctuary, and also from the contiguous Kiamalai Reserved Forests and Neyyar Wildlife Sanctuary.

In the Mundanthurai-Kalakad Tiger Reserve, a marten attacking a mouse deer (*Tragulus meminna*) was observed by a group of students (1991) from the School of Ecology, Pondicherry University, near the diversion bund on Pachaiar River. In 1992, an animal again was observed along the Sengaltheri-Kakkachi trek-king path (M. Vinayak, pers. comm.).

In the Peppara Wildlife Sanctuary, apart from the Nilgiri marten, we have made direct sightings of Common mongoose (*Herpestes edwardsii*), Ruddy mongoose (*H. smithii*), Small Indian civet (*Viverricula indica*), Common palm civet (*Paradoxurus hermaphroditus*), Leopard cat (*Felis bengalensis*), Jungle cat (*F. chaus*), and the Common otter (*Lutra lutra*).

Therefore, in addition to the Nilgiri Biosphere region, the Ashambu Hills of the southern Western Ghats may be another potential area for studying small carnivore communities. Though the tribal myths and taboos help in the conservation of this endagered mustelid to some extent, none of the locals are aware of its status and importance.

Acknowledgements

We acknowledge Dr. K. K. Ramachandran and Dr. P. Vijayakumaran Nair, Kerala Forest Research Institute, Peechi; and Dr. Ajith Kumar, Salim Ali Center for Ornithology & Natural History, Coimbatore, for their comments and encouragement. We also extend our thanks to Mr. Gigi K. Joseph, Kerala Forest Research Institute and Kerala Forest Department for inviting us to the wildlife census of 1996.

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Division of Wildlife Biology, Kerala Forest Research Institute, Peechi -680 653, Kerala, India

Comments on the behaviour of a Grison (*Galictis vittata*) hunting an Agouti (*Dasyprocta punctata*)

Roland W. KAYS

The grison (*Galictis vittata*) is a little-known neotropical mustelid. Reports on captive individuals (Dalquest & Roberts, 1951; Kaufmann & Kaufmann, 1965), carnivore communities (Sunquist *et al.*, 1989), and the neotropical fauna in general (Emmons, 1990) describe the grison as a terrestrial hunter of small mammals and other small vertebrates.

Given such scant information on the grison, I report here observations of an incidental encounter. On the morning of 17 December 1995, myself and three other biologists were hiking the Plantation Loop trail in Soberania National Park in Central Panama. The park contains 22,000 ha of lowland moist forest including both old and new growth. The Plantation Loop trail runs through young forest (30-50 years) that has grown up in an abandoned cacao plantation.

At approximately 08.15 we were standing in the middle of a 2 m wide trail when we heard something running towards us. An agouti (*Dasyprocta punctata*) rounded the corner of the trail 10 m ahead and proceeded to run directly at us without slowing; the animal ran right through the four of us and continued on the trail behind. Immediately following, we heard another animal running towards us on the trail: a grison rounded the corner, stopped about 8 m from us, and ran off into the forest.

When the grison momentarily stopped for about two seconds on the trail, it provided us with direct, clear views of its facial markings; we also observed partial side-views of the animal as it ran off into the forest. The animal could be clearly distinguished from a striped hog-nosed skunk (*Conepatus semistriatus*) because its tail was not bushy and its body was not black and white striped. The comparatively small size and distinctive facial markings permitted exclusion of other carnivores such as the tayra (*Eira barbara*) and the bush dog (*Speothos venaticus*). The grison we observed resembled the darker, more stout depiction in Eisenberg's (1989) book more than the painting in Emmon's (1990) field guide.

Several additional observations about the encounter are worthy of note here since they lead to speculation about the hunting methods of the species. The grison was obviously in pursuit of the agouti, yet there were approximately 15 m separating the two animals. Furthermore, all four observers have seen countless agoutis in the forest and we were all struck by three unique features of this individual. First, it was not running at top speed; we have all seen agoutis sprint away in the forest and this animal was not running that fast. Second, it looked to be in bad condition, as some fur was missing from the middle of its back, and it appeared to be close to exhaustion. Third, its fur looked wet, as if it recently swam or ran through a river.

These observations permit speculation that grison may hunt by scent, following a prey's trail and continuing pursuit across rivers and in and out of holes and other possible refuges until it can finally catch the exhausted prey. This is consistent with comments on grison behaviour reported by other authors. Sunquist *et al.* (1989) noted the keen sense of smell and apparently poor eyesight of free-ranging grison, and Kaufmann & Kaufmann (1965) reported that their captive grison frequently explored agouti burrows. I have found no reports of agoutis as prey of grison in published literature. However, one unpublished account of the mammals of San Blas, Panama, includes a report of a grison attacking an agouti in a river at mid-day (Charnley, 1985). Additional information is needed to verify the hunting methods of grison and the importance of agoutis in their diets.

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Department of Ecology & Evolutionary Biology, University of Tennessee, Knoxville, TN 37996, USA

ABSTRACT

Agonistic behaviour of male striped weasels

Agonistic behaviour of captive adult male Striped weasels *Poecilogale albinucha* was investigated by arranging encounters between separately housed individuals. Three distinct phases of intensity were recognised going from immediate submission by one individual to ritualised fighting with no or only minor injury. It is speculated that adult weasel in the wild are solitary. Recommendations are made for keeping and breeding weasels in captivity.

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THERIOLOGICAL CONGRESS

The 'Seventh International Congress' will be held from 6 to 12 September 1997 in Acapulco, Guerrero, Mexico. Contact: Dr. Rodrigo A. Medellin, Communications Coordinator e-mail: ogaona@miranda.ecologia.unam.mx.

Seasonal changes in energetics of nutrition in males of small mustelid species (Mustelidae)

Igor L. TUMANOV and Elena A. SORINA

The rapid developments in the biological sciences make it important to apply different research methods that promote a more comprehensive understanding of the features of a species that determine its ecology. Information about seasonal changes in the levels of food consumption and physiological parameters allow us to judge the adaptability of an organism to one or another environmental factor. This is a necessary consideration in the development of a strategy for the management for an animal population, or breeding it in captivity.

In this paper the authors try to trace seasonal changes in body weight, levels of food consumption and also some physiological parameters in males of small species of mustelids that have been kept in captivity for four years. The data obtained significantly supplement the presently fragmentary and heterogeneous information available on the seasonal changes in energy balance and nutrition of the species under consideration in captivity (Slonim, 1952; Heidt *et al.*, 1968, Tumanov & Levin, 1974; Segal, 1975; Danilov & Tumanov, 1976; Chappel, 1980; King, 1980; Korhonen *et al.*, 1990; Tumanov, 1993b).

Ten mammals were used in the experiments: three European mink (*Mustela lutreola* L.), three polecats (*M. putorius* L.), two American mink (*M. vison* Schreb.), and two weasels (*M. nivalis* L.). During the research period the animals were weighed monthly and received control feeding following generally accepted methods (Danilov & Tumanov, 1976). The physiological status of the animals (all male) was determined by visual inspections of their genitalia, the dimensions and colour which changed markedly during the rutting period. Rectal temperature was measured with a medical TEMP-60 electrothermometer. The ambient temperature during experiments was 18-20°C in summer and 12-15°C in other seasons.

Body weight

Changes in the live weight of mammals during the seasons are highly significant as a sign of periodic changes in the level of their energy metabolism. Our observations on captive mustelids revealed the following changes in the body weight of males during the seasons (Fig. 1). At the end of summer (i.e. in autumn) this index noticeably increased in all animals observed, this corresponding with intens food consumption during this period and the accumulation of the fat reserves required for survival in winter. For example, during the period from September to December, the increase in weight with respect to June-July was on the average 8.1% in the weasel, 6.3% in the American mink, 7.0% in the European mink, and 20.9% in the polecat. Thus, the most intensive fat accumulation was observed in polecats in autumn, which should be considered a specific adaptation related to the reduction of heat irradiation and energy expenses in winter. In the cold season in all mustelid fat reserves gradually decreased and their weights reduced, but in spring (before the beginning of the moulting and reproductive period) the value of these indices rose again. At the end of spring the animals had their lowest body weights and fat reserves. These changes were observed in each year of research (Figs. 2 & 3).

Daily food consumption

Collected data show that the seasonal body weight dynamics are closely connected with the changes in the food consumptions of the carnivores under observation (Fig. 4). In summer when it was hot, mammals ate comparatively little. A decrease in daily food consumption became visible in polecats and weasels in June, and in mink in July. Since the middle of August (approximately) the amount of daily food eaten began to increase sharply and in September the food consumptions of the animals were maximised. Thus, in September-December, in comparison with the summer season (June-July), this index increased on average by 9.3% in weasels, by 13.8% in American mink, and by 19.9% in European mink. The greatest increase in autumn food consumption observed was in the polecat; the daily food consumption of which increased by 59.0%. A notable feature of animals of this species is the clear agreement with the increase in their body weight in autumn, due to the accumulation of considerable fat reserves. In the cold season the need for high-caloric food markedly decreased in all mustelids, which should be considered as a stable adaptive response aimed at the more 'economical' expenditure of accumulated energy reserves. In carnivores, when metabolic processes decrease in winter, the need for high quantities of food and high energy expenditure is reduced, which determines the successful outcome of over-wintering (Slonim, 1952; Tumanov, 1993b). In spring, before moulting and rutting the daily food consumption of males increased again in the time determined for that species. Furthermore, in different years these changes were stable in character (Figs. 5 & 6).

Rectal temperature

The rectal temperature of animals is an index of the intensity of their metabolism. Its seasonal changes in the carnivores observed were easily monitored. The highest rectal temperature levels were noted in spring and summer, and the lowest in winter. In warm seasons the body temperature of mammals was higher than in December by an average of 0.8-1.8°C, which clearly correlates with the changes in their energy metabolism levels during these periods (Tumanov & Levin, 1974; Tumanov, 1993a).

Among the species investigated, the average annual body temperature was highest in the American mink and the polecat. It was lower in weasels and European mink (Figs. 7 & 8). It is interesting that in the last of these, rectal temperatures in all seasons were lower than in the American mink, which had a higher level of energy metabolism (Segal, 1975; Tumanov, 1993b). The average annual disparity in this test was 1.9°C, although in separate months it reached 2.5°C. Thus, in different years in June-July the body temperature fluctuated within the limits of 36.4-38.2°C in the American mink, and 34.4-37.1°C in the European mink (Figs. 9 & 10). The maximum increase in this index in the species investigated was seen at different times of the year. In the American mink the maximal rectal temperature was in April and July, in the European mink it was in April and June, in March and May in the polecat, and in June and October in the

weasel. At the end of autumn and in winter, the animals' body temperatures were at their lowest. For instance, if in July the body temperature of an American mink was on the average 37.9°C, and that of a weasel 36.3°C, then in December it decreased correspondingly to 36.7°C and 35.1°C. Its respective decrease in winter should be considered as a form of thermo-regulation, since a decrease of temperature amplitude between an animal's body and the environment promotes a decrease in the intensity of heat irradiation (Shilov, 1962).

Reproductive features of the species

The mustelid species observed have a high level of energy metabolism, and experience strong influences from unfavourable environmental factors. Apparently this determines their tendency to high fecundity, early sexual maturation, short pregnancies, and the ability of males to engage in productive matings over a comparatively long period (Table 1).

The results of our observations on captive carnivores show a remarkable increase in reproductive status and readiness to mate in male American mink in February and March, and in other species in the period from March to July, inclusive. The most intensive rut in captivity was in the American mink (from the middle of February to the 20th of March). In the European mink it lasted from March to May, in polecats from March to the beginning of June, and in the weasel from April to the middle of July.

It is necessary also to note that in males of all the species under consideration, the beginning of rut coincided with high levels of food requirement, body temperature and body weight (the dimensions of which decreased by the end of the reproductive period).

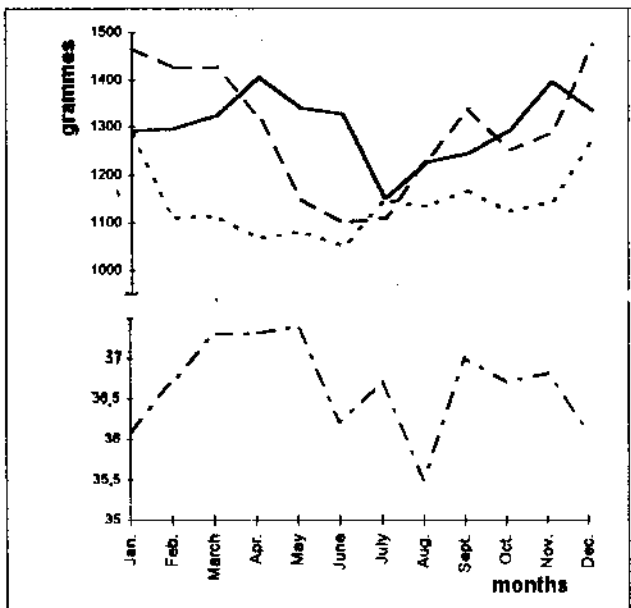

Fig. 1. Dynamics of body weight in males of small mustelid species in the course of a year

Conventional signs for fig.1 & 4:

1- American mink
2 - European mink
3 - polecat
4 - weasel

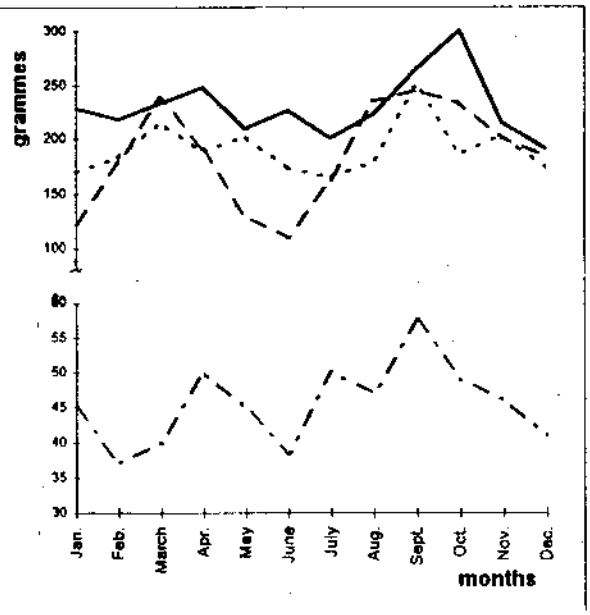

Fig. 4. Daily food consumption in males of mustelids in different months

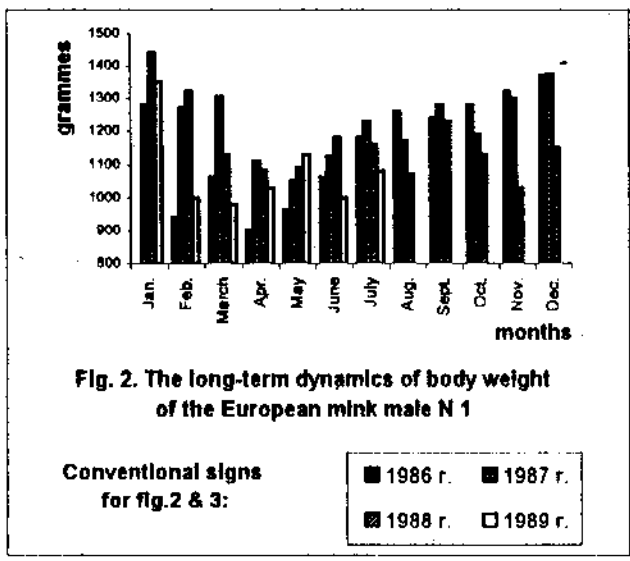

Fig. 2. The long-term dynamics of body weight of the European mink male N 1

Conventional signs for fig.2 & 3:

1986 r. 1987 r.
1988 r. 1989 r.

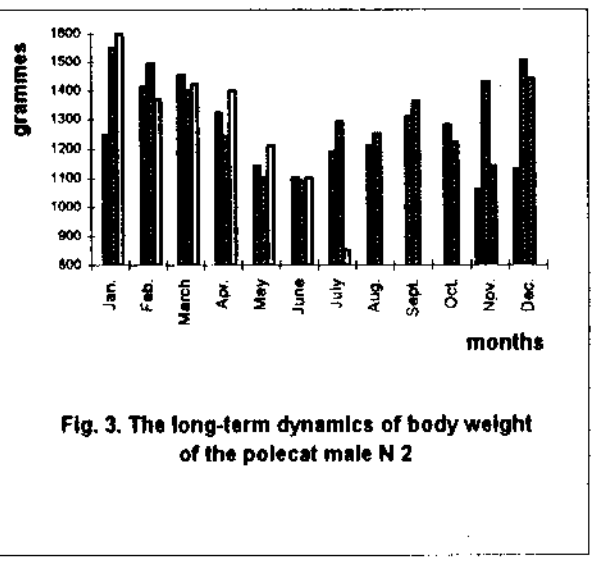

Fig. 3. The long-term dynamics of body weight of the polecat male N 2

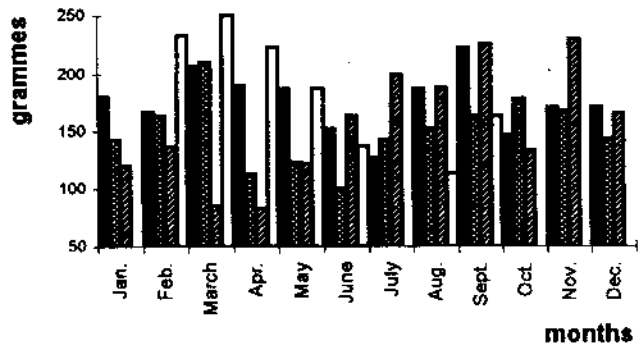

Fig. 5. Changes in daily food consumption in the European mink male N 2 in different years

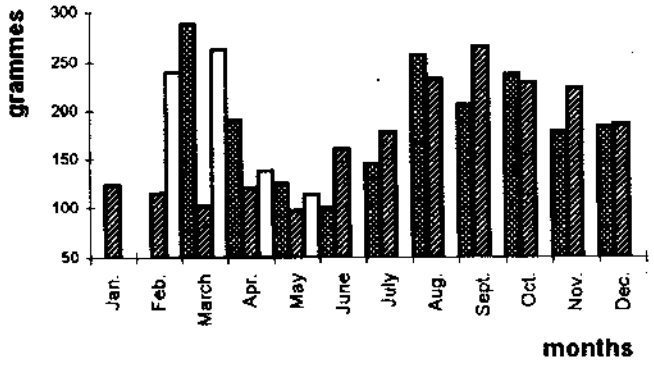

Fig. 6. Changes in daily food consamption in the polecat male N 1 in different years

Conventional signs for fig. 5, 6, 9 & 10:

1986 r. 1987 r.
1988 r. 1989 r.

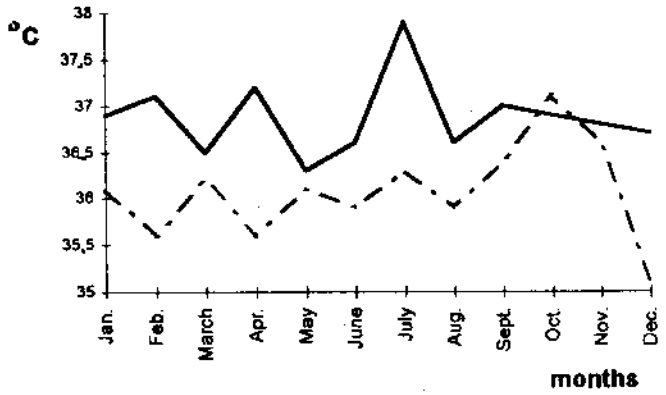

Fig. 7. Seasonal dynamics of rectal temperature in American mink (1) and weasel (2) males

Conventional signs:

1
2

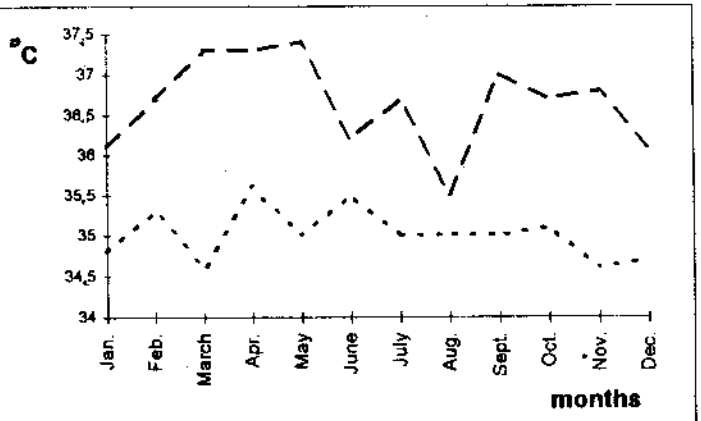

Fig. 8. Seasonal dynamics of rectal temperature in European mink (1) and polecat (2) males

Conventional signs:

1
2

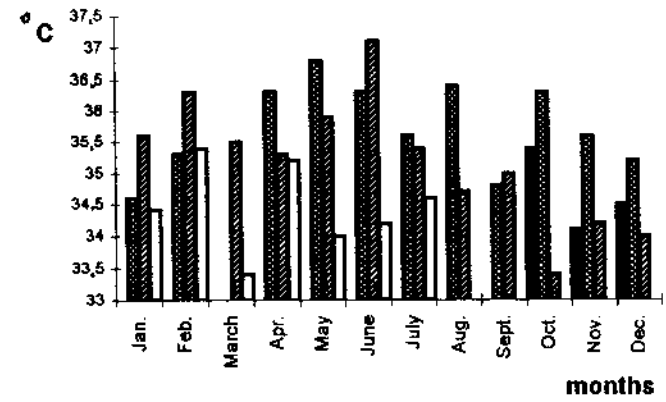

Fig. 9. The long-term dynamics of rectal temperature in the male N 1 of the European mink

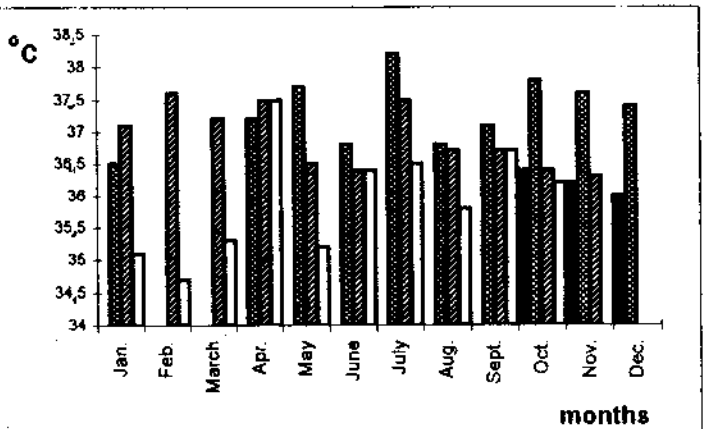

Fig. 10. The long-term dynamics of rectal temperature in the male N 1 of the American mink

Species	Years	Readiness to mating (+) by months											
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
American mink	1986	-	+	+	-	-	-	-	-	-	-	-	-
	1987	-	+	-	-	-	-	-	-	-	-	-	-
	1988	-	-	+	-	-	-	-	-	-	-	-	-
	1989	-	+	+	-	-	-	-	-	-	-	-	-
European mink	1986	-	-	-	-	+	+	+	-	-	-	-	-
	1987	-	-	+	+	+	-	-	-	-	-	-	-
	1988	-	-	+	+	+	-	-	-	-	-	-	-
	1989	-	-	+	+	+	+	-	-	-	-	-	-
Polecat	1986	-	-	-	+	+	-	-	-	-	-	-	-
	1987	-	-	-	+	+	+	-	-	-	-	-	-
	1988	-	-	+	+	+	+	+	-	-	-	-	-
	1989	-	-	+	+	+	-	-	-	-	-	-	-
Weasel	1986	-	-	+	+	+	+	+	+	-	-	-	-
	1987	-	-	+	+	+	+	+	-	-	-	-	-
	1988	-	-	-	-	-	+	+	-	-	-	-	-
	1989	-	-	-	+	+	-	-	-	-	-	-	-

Table 1. Reproductive period duration in males of small carnivores kept in captivity.

Conclusion

Specificity of feeding, seasonal dynamics of weight and food requirements in many cases determine the physiological status, readiness to rut, reproductive potential, and, in the end, the number of mustelids in nature. Seasonal changes in the energy balace of the diets of small carnivores are revealed sufficiently clearly to present a stable adaptive response aimed at the economical expenditure of accumulated energy reserves. When metabolic processes decrease in winter, the food requirement of mustelids decrease sharply, which determines whether there is a satisfactory outcome to over-wintering. In this period these species are usually not very active and consume little food, only gradually expending their internal reserves. Before the reproductive season and spring moult the intensities of feeding and body weight increase noticeably again. In April-May, when males moult intensely, are in rut, or before a rut state, they eat comparatively little. In this period the reserves of nutrients in their bodies are again spent rapidly and the body weights of the animals decrease.

In the summer when it is hot, males consume little food. A decrease in daily food consumption becomes noticeable in June, and lasts on average until the middle or end of August. After that, the level of this index begins to increase. In summer males are usually less fat and their weight is appreciably less than in spring and autumn.

The seasonal dynamics of body temperatures are one of the indices of the level of basic metabolism, and can be observed in mustelids quite readily. Temperature is closely connected with changes in body weight, and is characterized by a sharp increase of rectal temperatures in the summer and in early spring in comparison with winter.

In September-October the food requirement of males noticeably increases. By the middle of autumn the animals reach maximum fatness, after which their food needs decrease. Autumn fattening is important in the lives of all mustelids, because acquiring fat reserves promotes survival of the mammals in the unfavourable seasons. In November both the indices of metabolic processes and the food requirements of males decrease. They become less active, their weights decrease, and the cycle is repeated.

Thus, the autumn period, when the intensity of metabolic processes decreases and fat reserves or energy potential increases, is very important in the life of small predators. Apparently their survival in winter is in many respects determined by the availability and acceptability of high-calory foods in autumn, when food requirements are especially high.

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Research Institute for Nature Conservation of the Arctic and the North, 13 Cheliyeva, 193224 St. Petersburg, Russia

Project: The feeding habits and habitat use of the Long-tailed weasel (*Mustela frenata*) in El Tambo, Cauca, Colombia

Elizabeth Mesa GONZALEZ

Introduction

The Western Cordillera (mountain chain) and the Pacific Basin of Cauca is considered to be one of the regions of greatest biological diversity in Colombia. It forms part of the Choco biogeographic region and contains a variety of endemic species such as the recently discovered Colombian weasel (*Mustela felipei*).

Other species, mostly ecological generalists, have benefited from human influences on the area. These include the Long-tailed weasel (*Mustela frenata*), which has adapted to a variety of habitats. In spite of its being a widely distributed species, knowledge of its biology is only partial, being based on descriptive, anecdotal, and a small number of formal studies carried out in North America over the last few decades. In her study of northern hemisphere weasels, King (1989) comments: "...it is not that tropical weasels are less important, just that they are less known and probably very different from the three northern species".

All these factors combine to motivate the present work, the objectives of which include the determination of home range, nutritional habits, and an evaluation of weasel capture methods.

Although *M. frenata* appears to be little threatened, it is worthwhile to study its nutritional habits and movement patterns, as these must have partly contributed to the success of its expansion in 'high pressure' zones. The comparison of results obtained from sampling localities with different degrees of alteration/disturbance should reveal the current status of the species and its response to human pressure.

1. Considerations

Mustela frenata is a highly adaptive species (Emmons, 1990) and its diet is considered to be generalist and opportunistic (Simms, 1979; King, 1989). It may thus be hypothesised that: "there is no preference for or rejection of the different types of habitat with different degrees of alteration or disturbance". It follows that:

1. the type of habitat (altered or not altered) does not affect the individual home range sizes,
2. feeding habits vary from one locality to another,
3. the proportions of each food type found in the diet are similar,
4. the animals can be captured using any type of bait.

2. Objectives

- To determine the home range sizes in *Mustela frenata*
- To evaluate the composition of its diet during the rainy period (August to February)
- To establish if the activities and diet of *M. frenata* are affected by alteration of the habitat
- To determine the optimum type of trap to use to study the species

The above objectives are set out to answer the following questions:

- Is the size of the home range of individuals determined by the type of habitat (i.e. natural/disturbed)?
- Are there size differences between male and female home ranges ?
- Is there overlap in the spatial niche occupied by individuals?
- Does the degree of alteration of the natural habitat determine the composition of the diet?
- Which is the most appropriate bait for weasel capture?

3. Justification

In Colombia there is no knowledge of the biology of many mammal species and, in the case of *M. frenata*, data derive only from studies at other latitudes, where many of its habits and behaviours are determined by marked seasonal changes in climate, that are absent in the tropics. It is therefore important to develop studies that contribute to the knowledge of the species in Colombia. Studies of species intervened zones and their interactions with human occupants can help in the development of new alternatives for appropriate resource use.

Field study methods such as radiotelemetry, live trapping using appropriate baits, and recognition of the unique colouration patterns of specific individuals, allow close study of animals with minimal effect upon the natural behaviour. This permits a better approximation of the species' biology.

4. Bibliographical review

The family Mustelidae is the most diverse group of the carnivores, being distributed over all continents except Australia and Antarctica. There are species adapted to arboreal, fossorial, aquatic, and terrestrial life, and they assume various biological roles: carnivory, frugivory, insectivory, and earthworm-feeding (Schreiber *et al.*, 1989).

The family is made up of 67 species (King, 1989), and in Colombia is represented by the following species: *Eira barbara* (tayra or ulama), *Conepatus semistriatus* (Amazonian hog-nosed skunk), *Pteromura brasilensis* (giant otter or river wolf), *Lutra longicaudis* (southern river otter), *Galictis vittata* (greater grison or huron), *Mustela frenata* (long-tailed weasel), and *M. felipei* (Colombian weasel)(Emmons, 1990).

The genus *Mustela* was described by Linnaeus in 1758 and includes between 13 and 16 species. The species *M. frenata*, described by Lichtenstein in 1831, is distributed throughout the Americas from southern Canada to Venezuela and Bolivia, but excluding the south-western deserts of the United States (Wozencraft, 1993). It made its appearance, perhaps abruptly, in North America more than two million years ago, before the first glaciation and, like other carnivores, reached South America during the Pleistocene faunal exchanges, quickly occupying the small carnivore niche (King, 1989).