MUSTELID & VIVERRID CONSERVATION

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

Number 1 August 1989

Liberian mongoose *(Liberiictis kuhni)*. First photograph taken of a live animal. Photo by M. E. Taylor.

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

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

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EDITORIAL

This is the first number of what we hope will be a regular Newsletter series. That this Newsletter has surfaced is mainly due to the dedication and enthusiasm of Harry Van Rompaey who has offered to take over the major work in putting the publication together and have it sent out at regular intervals.

The aim of this Newsletter -like of all SSC Specialist Group Newsletters- is, of course, not to publish just another periodical for its own sake, but to intensify our efforts for the conservation of the species we are concerned with. As such the Newsletter wants to reach all who have some sort of interest in the survival of the present diversity of mustelids and viverrids. With animals scientifically so poorly known as many of the world's mustelids and viverrids we would like to see intensified efforts to learn more about the status, ecology, reproduction, diseases, and captive management needs of especially those species and subspecies listed as of conservation concern in the recently published Conservation Action Plan of the IUCN/SSC Mustelid & Viverrid Specialist Group.

As such the Newsletter wants to bring all persons together who want to work towards these aims in one way or another. We would appreciate to hear from anybody who would like to contact somebody to do conservation-related mustelid/viverrid research or who can offer his services and experience in starting one of the many priority actions identified in the Action Plan. We would be more than happy to publish such requests or offers in forthcoming issues of the Newsletter.

A major goal of the Newsletter will also be to give up- dates on recent conservation or research initiatives and to report on new or so far unrecognized conservation problems. If -as we hope-we will receive many short communications for this section, the Newsletter can quickly fulfil its need to help coordinate action for threatened taxa and allow quick response to newly surfacing conservation problems.

While, as mentioned before, the Newsletter has become a reality thanks mainly to the efforts of Harry Van Rompaey, it needs the active cooperation of ALL MVSG members and it should not be too much of a request to ask at least one communication a year from each of you. Obviously anybody else who is not an official member of the Group and who has to say anything related to mustelid or viverrid conservation or the activities of the Specialist Group should also write.

Each member of the Specialist Group will receive a complementary copy of each Newsletter issue, but others interested in receiving it should pay something. In fact, the problem of funding any issues of the Newsletter additional to this present one is completely unsolved. It is your-the reader's-responsibility in helping to obtain a funding basis for the Newsletter. Initially we plan to produce two Newsletters a year, but to make the publication relatively attractive and to have enough surplus copies to be sent free of charge to researchers, students, government officials, etc. in third world countries we would need a minimum of US$ 2,000 a year. I would suggest that any non-member of the Specialist Group who would like to subscribe to the Newsletter pays an annual fee of US$ 15 (larger donations would, of course, be welcome). If each member of the Specialist Group and any other person interested in mustelid & viverrid conservation would find us four or five subscribers, the future of the Newsletter would be financially ensured.

Roland Wirth
Chairman IUCN/SSC
Mustelid & Viverrid Specialist Group

Mustelidae and Viverridae from north-eastern Zaire ethnozoological research and conservation.

Guiseppe M. CARPANETO and Francesco P. GERMI

The faunal richness of north-eastern Zaire is mainly due to the great variety of its vegetation types: lowland- and mountain forests, arid and wet savannahs, marsh and riverine ecosystems, etc. The high diversity of mammal communities is also found in the large number of small carnivore species. As regards the two families Mustelidae and Viverridae (including Herpestinae), they are respectively represented by 6 and 17 species.

In order to realize our own ethnozoological research on the forest- and savannah dwelling people (hunter-gatherers and shifting cultivators), we have carried out faunistic investigations on the mammals of the Kivu and Haut-Zaire regions. In the following checklist we marked (!) the species directly observed by us, at different times between 1984 and 1988; unmarked species were recorded by other authors in previous papers. Owing to taxonomists' disagreement through literature, we neglected the subspecies level. The following abbreviations were used: TM, Tshopo-Maiko Rivers region; IF, Ituri Forest; VI, Virunga National Park (including Mont Hoyo); GA, Garamba National Park.

Up to the present our ethnozoological surveys have been mainly carried out in the Ituri Forest and in the Virunga National Park.

Ituri Forest

All the larger mammals serve as food for the Mbuti pygmies of the Ituri Forest. In this area the Alexander's cusimanse, *Crossarchus alexandri*, is the commonest carnivore species (Fig. 1), and is is usually captured and killed by dogs but also often flushed out by dogs whereupon the Mbuti kill it with a stick blow on the head or shoot it with iron-tipped arrows. If the animal takes refuge in a hole, the Mbuti smoke it out.

During four consecutive bow-hunting days we observed a single Mbuti band catch four cusimanses. This species seems to be very common game for the Mbuti archers in the eastern Ituri Forest. On the other hand the Mbuti net-hunters of the western Ituri Forest do not have many chances of capturing cusimanses.

The above mentioned hunting techniques are used to kill the ratel *(Mellivora capensis)*, the black-legged mongoose *(Bdeogale nigripes)*, who are very aggressive against both dogs and men, *Herpestes* sp., and all the genet species.

The African civet *(Civettictis civetta)* and the two-spotted palm civet *(Nandinia binotata)* are often caught and eaten by the Mbuti. The former is easily captured with nets for antelopes because of its large size and terrestrial

Fig.1. Alexander's cusimanse *(Crossarchus alexandri)*

Photo G.M. Carpaneto

Fig.2. Mbuti girl wearing a hat made from *Genetta* skin. Photo G.M. Carpaneto

behaviour; the latter is killed with every kind of arrow (simple wooden, poisened, and iron-tipped) when resting in trees.

Otters are widespread and common in the Ituri Forest but are only occasional game for pygmies, who lack hunting techniques for aquatic animals. Out of the water, when found near river banks, the otters may be roused by dogs and killed with iron-tipped arrows.

The skins of genets and civets are used to make hats. The Mbuti wear these hats when then go hunting for monkeys: they think that monkeys come near out of curiosity and so may be easily killed. The same hats are worn by Mbuti girls during their initiation ceremony (Fig. 2). The skin may also be used to make the wrist-protector bracelet which guards the archer's arm against the snap of the bow-string. The ratel's skin, on the other hand, is used to make drums.

Not only pygmies but also Bantu and Sudanic shifting cultivators inhabit the Ituri Forest. These people belong to different tribes (Bira, Bali, Ndaka, Budu, Lese, etc.) and have close barter relations with Mbuti, who provide them with forest products such as meat and honey. These villagers, in fact, are not specialized hunters and view the forest as powerful and alien. They prefer to provide the Mbuti with starch foods and receive meat in exchange. Nevertheless they show an interesting trapping culture to integrate their protein requirements. The African civet and all mongooses are lured with bananas, oil palm fruits, and dead snakes as bait. The villagers appreciate eating all species of small carnivores (excluding their own clan totems) and use the animal skins in a similar fashion as the pygmies.

Several kinds of food restrictions exist in the traditional culture of both pygmies and villagers. For instance, according to the Mbuti of Alipanda (W. Ituri), the giant genet *(Genetta victoriae)* may be eaten only by the elders. Women do not eat this animal because of its strong smell; men cannot eat it otherwise their offspring might have diseases of the respiratory system. The parents of little children cannot eat the spotted-necked otter *(Lutra maculicollis)* because their babies would risk a dangerous case of dysentery. According to the Mbuti Efe (E. Ituri), *Nandinia binotata* and *Civettictis civetta* may not be eaten by pregnant women or by their husbands, otherwise the baby might be born with some anomalies.

All carnivore species may also be totemic animals of single clans for both pygmies and villagers. In that case, they believe these animals are their own ancestors and must never be eaten.

All these food restrictions, together with the good status of forest conservation and low human population density in the Ituri region (3 persons per km^2) lead us to think that the forest species of Mustelidae and Viverridae will still survive unthreatened for many years. In fact, there is no scientific information on the status of their populations but we can suggest it is satisfactory: most of the species are widespread and common, and perhaps they may tolerate the current hunting pressure. The rarest and endemic species, such as the aquatic genet, *Osbornictis piscivora,* are very elusive and represent only exceptional game for both pygmies and villagers. In the near future, however, deforestation associated with increasing human population and fire-arms introduction will reduce the population size of all the larger mammals to risk levels.

Conservation measures should be taken considering villager demography and livestock absence throughout the Ituri Forest. The increasing Bantu populations of the region survive by the exploitation of game and forest clearing. A large protected area of forest reserve (1.383.000 ha) in the Epulu River region was recently accepted by the government as a potential National Park.

Virunga National park

The Virunga National Park covers an area of 780.000 ha, within one of the most populated regions of Zaire. More than 14.000 persons live in the Savannah just around Lake Idi Amin; almost one million people inhabit the area surrounding the southern sector of the park (volcanoes and montane forest). Most of the people belong to the Nande and Bwisha tribes of agriculturalists. All these people need firewood and timber for domestic use. Furthermore, many of them set out traps either in the forest or in the savannah to catch small and medium-sized mammals. In the Mitumba Mountains (west of Lake Amin), forests have almost completely disappeared and most of the mammal species are locally extinct.

All of the Mustelidae and Viverridae species are eaten by the Nande, except for the white-naped weasel *(Poecilogale albinucha)* and the striped polecat *(Ictonyx striata)*, because of their bad smell. The former is used as a medicine against rheumatic pains: its ashes are put into a small incision of the patient's skin. Genet skins are used in the same way, while the excrements of *Civettictis civetta* are considered a remedy against infectious diseases.

Genets are frequently poached in the volcanoes forests and many skins are put on sale every day in the tourist shops of Goma, the regional capital, together with those of servals, dassies, and threatened monkeys (golden monkey and black & white colobus).

The most threatened populations of Mustelidae and Viverridae are surely those of the southern sector of the park (montane forests and volcanoes) and the Mitumba Mountains. Luckily, no endemic species seems to occur in these endangered ecosystems. Further taxonomic studies could reveal the presence of endemic subspecies in these yet unknown carnivore populations.

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SPECIES	DISTRIBUTION			
Mustelidae				
Aonyx capensis (Schinz, 1821)			VI	GA
Aonyx congica (Lonnberg, 1910)	TM	IF(!)		
Lutra maculicollis Lichtenstein, 1835	TM		VI	GA
Mellivora capensis (Schreber, 1776)	TM		VI(!)	GA(!)
Poecilogale albinucha (Gray, 1864)			VI(!)	
Ictonyx striata (Perry, 1810)			VI	
Viverridae				
Nandinia binotata (Gray, 1830)	TM	IF(!)	VI(!)	
Civettictis civetta (Schreber, 1776)	TM	IF(!)	VI(!)	GA(!)
Osbornictis piscivora J. A. Allen, 1919	TM	IF		
Poiana richardsoni (Thompson, 1842)	TM	IF(!)		
Genetta victoriae Thomas, 1901	TM	IF(!)		
Genetta servalina (Pucheran, 1855)	TM	IF(!)	VI	
Genetta rubiginosa Pucheran, 1855	TM		VI	GA
Genetta pardina (I. Geoffroy, 1832)	TM			
Bdeogale nigripes Pucheran, 1855	TM	IF(!)	VI(!)	
Ichneumia albicauda (G. Cuvier, 1829)			VI	GA(!)
Herpestes ichneumon Linnaeus, 1758	TM		VI(!)	GA(!)
Herpestes sanguineus (Rüppel, 1835)			VI	GA(!)
Herpestes naso (De Winton, 1901)	TM			
Atilax paludinosus (G. Cuvier, 1829)	TM		VI	GA
Mungos mungo (Gmelin, 1788)			VI	GA(!)
Crossarchus alexandri Thomas & Wroughton, 1907	TM	IF(!)	VI	
Dologale dybowskii (Pousargues, 1893)				GA

TM = Tshopo-Maiko Rivers region IF = Ituri Forest VI = Virunga National Park GA = Garamba National Park

Conservation and economic importance of the mustelids and viverrids in China.

TAN Bangjie

Status of conservation

Of the 19 species of mustelids only two, the wolverine *(Gulo gulo)* and the sable *(Martes zibellina)*, belong nominally to the Chinese Protected Animal List Category I, and five: the stone marten *(Martes foina)*, the yellow-throated marten *(Martes flavigula)*, the European otter *(Lutra lutra)*, the smooth-coated otter *(Lutrogale perspicillata)*, and the oriental small-clawed otter *(Amblonyx cinerea)* belong nominally to category II.
The remaining ones, including all the weasels and badgers, are left "unprotected" for the time being.

Of the 11 species of viverrids only one, the binturong *(Arctictis binturong)* is listed in category I, and three others: the large Indian civet *(Viverra zibetha)*, the small Indian civet *(Viverricula indica)*, and the common palm civet *(Paradoxurus hermaphroditus)* are listed in category II.

The "Chinese Wildlife Conservation Law" adopted by the National People's Congress in November 1988 has become effective from March 1, 1989. According to the law animals of category I are not allowed to be collected without a special permit from the central government authorities, while the collecting of animals of category II needs a permit from the provincial authorities. Various terms of punishment are provided by the law for violators. It is hoped that with the legislation of the law free hunting and poaching may be checked to some extent hereafter.

As for the present status of these animals it seems that none of them is really very endangered. But, speaking as a whole, their present populations are markedly reduced, having been hunted without restriction for so many years.

Economic value

To what extent the protective regulations may be effective, we will have to wait and see. For generations up to the present, almost all the species mentioned above have been hunted or poached by the masses and collected by commercial agents as fur animals. A few of them have additional economic value: thus both the large and the small Indian civet are "civet" producers, and the masked palm civet *(Paguma larvata)* is considered as a delicacy. Besides being freely on sale in Guangdong and Guangxi markets, masked palm civets (known as "guo-zi-li" or "fruit cat") are exported in thousands to Hong Kong annually for the local gourmet's consumption.

On the whole the economic value of all wild animals is exploited to the utmost by the Chinese. For instance the pelts of the large and small Indian civets, the masked palm civet, the crab-eating mongoose *(Herpestes urva)*, and the ferret badgers *(Melogale* sp.) have little value in other countries but are important fur bearers in China. Coats made from such furs are widely on sale on the markets.

The pelts of Eurasian badgers *(Meles meles)* and hog badgers *(Arctonyx collaris)*, being harsh in quality, are well suited for making rugs. In addition their guard hairs are used to make brushes and their fat for medicines.

Most of the Chinese fur animals, regardless of whether their furs are valuable or not, have really little economic significance because the annual harvest is quite negligible. The annual collection of otters, sables, stone martens, and ermines, despite the high cost of their fur, amounts only to some hundreds of each. This is even more the case with the wolverine *(Gulo gulo)*, whose pelt is valuable, but whose wild population is so small in China that its annual catch seldom exceeds ten specimens.

Exceptions are Siberian weasels *(Mustela sibirica)*, ferret badgers *(Melogale moschata)* and alpine weasels *(Mustela altaica)*: although individual pelts are sold much cheaper than those of sables and otters, the collective income is much higher because the annual catches are quantitively much greater. Statistic figures indicate that the annual average catch of Siberian weasels amounts from 2.5 millions (1972-1977) to 3 millions (1978-1980) with a peak of 3.52 millions. The annual catch of ferret badgers varies between 300.000 and 500.000, of alpine weasels between 250.000 and 300.000. These furs and their products are staple exports for China. Moreover these figures are probably incomplete, as specimens caught for private consumption have not been counted.

Formerly fur coats were seldom worn by Chinese women, but, as a result of the economic reforms, such coats are seen more frequently in Chinese cities lately. A coat made of Siberian weasel- or ferret badger pelts is generally sold for 300-500 US$ in Chinese fur stores. Coats made from pelts of large Indian-, small Indian civet, common palm-, or masked palm civet are 15 to 30% cheaper than those made of weasel or ferret badger, and also cheaper than those made of leopard cat or marmot.

On the other hand, prices of fur coats from sable, marten or otter are so high, these products are only for export and seldom if ever seen on the local markets.

The tail-hairs of the Siberian weasel and small Indian civet are also used in the production of fine brushes for Chinese painting and writing.

Distribution

Some species are widely distributed in China. For instance the European otter, the yellow-throated marten, and the two species of badgers, which are found both in the northern and southern provinces. On the other hand most of the martens and weasels are distributed in the north, while the ferret-badgers and the two remaining species of otters live in the south. Most of the mustelids have a fairly extensive range except the wolverine, whose small population is limited to the Greater Xing-an-ling Mountains

in northern Heilongjing Province, and the back-striped weasel *(Mustela strigidorsa)* which is found in Yunnan Province only. The smooth-coated otter *(Lutrogale perspicillata)* is limited to the western part of Yunnan.

Almost all the civets and mongooses are animals of the subtropical regions of south, southwest, and southeast China. The large Indian civet, the small Indian civet, the masked palm civet, and the crab-eating mongoose *(Herpestes urva)* are wide-ranged species with large populations. On the other hand, the binturong *(Arctictis binturong)* is strictly limited to the Xishuangbanna region of Yunnan. Whether or not Lowe's otter civet occurs in China is not yet known. It is worth getting deeper into the distribution of the masked palm civet. It seems that it is the only viverrid whose range of distribution extends from the southern subtropical provinces into the northern temperate provinces. Surveys made in recent years have proved that it is not only found in the southern part of Henan and Shaanxi provinces south of the Yellow River, but also in central Hebei and Shanxi far north of the Yellow River bank, and even in the mountains to the north and west of Beijing up to latitude 40°N. The Beijing Zoo in the fifties received quite a number of specimens snared in the western Hills in the suburbs of Beijing, but no more since the seventies. These specimens were obviously larger, longer haired, and greyer coloured than specimens from the south, so that they may form a different race. As for its population, past records indicated that the annual catch of this species was 80.000 to 100.000 in the 1960's. The present figure is not known. As an unprotected animal it is still freely hunted both for its fur (known as "qing-zong" or blue-haired in the fur tra[illegible] its meat. The reduction of its population is quite anticip[illegible]

Farming

Since natural resources are getting more and more scarce and the animals more difficult to collect, people are inclined to raise some of the species with economic value in farms. Experiments in the past dozen years have shown that some are more or less successful while others are not. For instance, a number of farms or experimental stations in northeast China trying to raise sable and Siberian weasel for a profit all ended in failure for one reason or an other. Experiments with ferret badgers and marbled polecats *(Vormela peregusna)* are still being continued on a very small scale. As far as mustelids are concerned, the only successful project in China is mink farming. Numerous large and small mink farms are scattered almost all over China. But the animal is not Chinese, the breeding stock being imported from abroad, and its products are for export to foreign countries. The furs and fur coats are too costly to be sold locally.

At the same time, fur farming with canids (foxes and racoon dogs) is also very popular in China.

Meanwhile civet farming has begun to thrive in China. "Civet musk" is accepted as a good supplement to "deer musk", which is very costly and difficult to get. Among the limited civet farms in China, the Hangzhou Zoo is a forerunner. Hundreds of civets of both species are presently being kept by the zoo for musk collection.

List of the 19 species of mustelids and 11 species of viverrids known to occur in China.

A. MUSTELIDS

1. *Gulo gulo* (Linnaeus, 1758) - wolverine
2. *Martes zibellina* (Linnaeus, 1758) - sable
3. *Martes foina* (Erxleben, 1777) - stone marten
4. *Martes flavigula* (Boddaert, 1758) - yellow-throated marten
5. *Mustela erminea* Linnaeus, 1758 - ermine
6. *Mustela sibirica* Pallas, 1773 - Siberian weasel
7. *Mustela altaica* Pallas, 1811 - alpine weasel
8. *Mustela kathiah* Hodgson, 1835 - yellow-bellied weasel
9. *Mustela strigidorsa* Gray, 1853 - back-striped weasel
10. *Mustela putorius* Linnaeus, 1758 - polecat
11. *Mustela nivalis* Linnaeus, 1766 - weasel
12. *Vormela peregusna* (Güldenstaedt, 1770) - marbled polecat
13. *Melogale moschata* (Gray, 1831) - Chinese ferret badger
14. *Melogale personata* Geoffroy, 1831 - Burmese ferret badger
15. *Meles meles* (Linnaeus, 1758) - Eurasian badger
16. *Arctonyx collaris* F. Cuvier, 1825 - hog badger
17. *Lutra lutra* (Linnaeus, 1758) - European otter
18. *Lutrogale perspicillata* (Geoffroy, 1826) - smooth-coated otter
19. *Amblonyx cinerea* (Illiger, 1815) - oriental small-clawed otter

B. VIVERRIDS

1. *Viverra zibetha* Linnaeus, 1758 - large Indian civet
2. *Viverra megaspila* Blyth, 1862 - large-spotted civet
3. *Viverricula indica* (Desmarest, 1817) - small Indian civet
4. *Prionodon pardicolor* Hodgson, 1842 - spotted linsang
5. *Paguma larvata* (Hamilton-Smith, 1827) - masked palm civet
6. *Paradoxurus hermaphroditus* (Pallas, 1777) - common palm civet
7. *Arctogalidia trivirgata* (Gray, 1832)- small-toothed palm civet
8. *Arctictis binturong* (Raffles, 1821) - binturong
9. *Chrotogale owstoni* Thomas, 1912 - Owston's palm civet
10. *Herpestes auropunctatus* (Hodgson, 1836)- small Indian mongoose
11. Herpestes urva (Hodgson, 1836) - crab-eating mongoose

Chinese Association of Zoological Gardens, 137 Xi Zhi Men Wai Street, Beijing, China.

Conservation of the Liberian mongoose.

Mark E. Taylor

The Liberian mongoose *(Liberiictis kuhni)* was first described in 1958 on the basis of a number of skulls, while the external characteristics of the species were not described until 1974 from two freshly killed animals obtained by Schlitter in 1971.

Although other specimens have been obtained subsequently and used for anatomical research, little ecological information is available for the species. Until 1989 there were no known published photographs of a live animal.

The species is rare and has only ever been seen or collected in Liberia. It is hunted for food by rural Liberians in Nimba and Grand Gedeh Counties, and its ecological requirements are more or less unknown. In preparing the IUCN/SSC Action Plan for Global Mustelid and Viverrid Conservation, the committee recommended that a study of the distribution of the Liberian mongoose should be started together with a captive breeding programme. I undertook to try and accomplish this and in 1988 led my first expedition from the Royal Ontario Museum and Metro Toronto Zoo to Liberia. I found one Liberian mongoose which had been shot by a hunter in the Gbi National Forest near Tappita, Nimba County. Attempts to trap this species in Sapo National Park (Sinoe County) which is some 60 km south of where Schlitter collected his specimens were unsuccessful, though marsh mongooses and a palm civet were caught and kusimanses were seen.

The purpose of the Metro Toronto Zoo 1989 expedition to Liberia was to survey the distribution, abundance and ecological requirements of the Liberian mongoose in Nimba and Grand Gedeh Counties and to obtain if possible two pairs to start a captive breeding program. A large number of Tomahawk live traps of various sizes were used and were set along animal trails, by paths and roads and near watering places in forested and secondary growth areas. They were baited with a variety of foods including fresh meat, fish, crabs and fruits. The trapping rate of viverrids was less than 0.5%, though other vertebrates caught included dwarf crocodile, pigmy rail and giant rats. Local hunters also used our traps but their success rate was no better.

During the 1989 expedition I distributed several hundred coloured brochures to forestry staff, villagers and hunters. These brochures illustrated the Liberian mongoose, Gambian mongoose, slender mongoose, kusimanse, forest genet and African linsang. Discussions with villagers were aimed at determining the relative abundance of the commoner species and to what extent they were aware of the rare species. Many villagers claimed they knew all six species which is highly unlikely, while others knew some of the species and were able to describe their habits and where they lived. The general information I gathered was that the Liberian mongoose is uncommon, not present in some of the areas visited, is fierce and is found most commonly by water courses, at least during the dry season. It also digs worms out of rotten palm tree stumps.

A single live Liberian mongoose was obtained from a villager, John Weyu, on February 6th, 1989 in the Gbi National Forest. He had received one of our coloured brochures during a previous visit to his village and caught this animal, a young adult male, in a snare. This resulted in damage to the foot and as soon as we obtained the mongoose we started medical treatment with injections of penicillin and surface cleansing with a dilute Betadine solution. The foot responded well to this treatment, and the animal gained weight, and was soon able to walk and trot. He was flown to Canada on March 19, 1989, and is now at the Metro Toronto Zoo.

I hired John Weyu to try and catch another Liberian mongoose, and gave him a number of my Tomahawk traps. In spite of two weeks trapping he was not successful, although he did catch a single kusimanse. The use of these live traps has generally been unsuccessful in Liberia.

I used a remote infra-red beam activated camera which was very useful in surveying animals in the forest. With this equipment I obtained phtographs of leopard, civet and genet, and with more time and equipment I am sure that it would be an effective way of censusing an area for terrestrial species. Baiting an area with either meat or fruit assists in attracting species which avoided the live traps.

During the expedition many Liberians were interviewed and the goals of the expedition discussed. The value of animals as an integral and important part of Liberia's heritage was stressed and the uniqueness of the Liberian mongoose was emphasised.

Although I was unsuccessful in obtaining more than a single live animal, I am now familiar with the habitat requirements of this species and have recommended to Wildlife officials of the Liberian Forestry Development Authority that hunting restrictions be enforced in the Gbi National Forest.

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Diversity and conservation status of mustelids in Mexico

GERARDO CEBALLOS

The diversity of native mustelid species in Mexico is relatively high. The following 15 species are distributed in the country: tayra *(Eira barbara)*, grison *(Galictis vittata)*, striped skunk *(Mephitis mephitis)*, hooded skunk *(Mephitis macroura)*, three hog-nosed skunks *(Conepatus mesoleucus, C. leuconotus,* and *C. semistriatus)*, three spotted skunks *(Spilogale gracilis, S. putorius,* and *S. pygmaea)*, northern river otter *(Lutra canadensis)*, southern river otter *(Lutra longicaudis)*, sea otter *(Enhydra lutris)*, American badger *(Taxidea taxus)*, and long-tailed weasel *(Mustela frenata)*. The largest species is the tayra (5 kg) and the smallest one the pygmy skunk (0.3 kg) (Leopold, 1959; Hall, 1981; Ceballos & Navarro, in press).

Practically all these mustelid species, but the northern river otter and the sea otter, were widely distributed in Mexico in historic times. Human activities such as indiscriminate hunting and habitat destruction have caused population declines in all the species in recent decades. Most species however, are considered out of danger because they have been able to cope with the transformation of their habitats. Unfortunately, several species are in danger of extinction. Overexploitation of both the sea otter and the northern river otter caused their extirpation from the country. The pygmy skunk, the southern river otter and the grey-headed tayra *(E. b. senex)* are considered threatened or endangered throughout their geographic ranges. The problems faced by the grey-headed tayra and the pygmy spotted skunk are discussed in detail in the Action Plan for the Conservation of Mustelids and Viverrids (Schreiber et al., 1989).

Two species, the American badger and the grison, although not globally endangered, face severe conservation problems in Mexico (Ceballos & Navarro, in press). The badger populations, who are considered predators of small domestic animals, have been decimated by hunting and poisoning. Predator control campaigns using non-specific pesticides, such as compound 1080 (Sodium fluoracetate), were carried out until recent years. Presently, the use of 1080 is illegal but there are enormous problems to enforce the law. Badgers are protected in La Michilia and Mapimi biosphere reserves in the state of Durango. Badgers are quite abundant in the USA states bordering Mexico.

The conservation status of the grison throughout its geographic range is unknown. There are few records of grison in Mexico, most from tropical rain forests. Such forests are disappearing really fast in the country threatening the long-term survival of this species (Ceballos & Navarro, in press). A few populations are protected in reserves such as Sian Ka'an (Quintana Roo), Los Tuxtlas (Veracruz), and Montes Azules (Chiapas). However, a long-term study of its distribution and ecology is required.

References

Ceballos, G. & Navarro, D. In press. Diversity and conservation of Mexican mammals. *In*: Latin American mammalogy: Ecology, evolution and conservation (M. A. Mares & D. J. Schmidly, eds.). Oklahoma University Press.

Hall, E. R. 1981. The mammals of North America. Wiley-Interscience, New York.

Leopold, A. S. 1959. Fauna silvestre de Mexico. IMRNAR, Mexico, D. F.

Schreiber, A., Wirth, R., Riffel, M. & Van Rompaey, H. 1989. Weasels, civets, mongooses, and their relatives. An Action Plan for the conservation of mustelids and viverrids. IUCN, Gland.

News from CITES

The Government of India has submitted to the CITES Secretariat the following list of mustelid and viverrid species for inclusion in Appendix III:

Martes flavigula (including *Martes gwatkinsi*, the Nilgiri marten)	Yellow-throate marten
Martes foina intermedia	Central Asian stone marten
Mustela altaica	Mountain weasel
Mustela erminea	Stoat
Mustela kathiah	Yellow-bellied weasel
Mustela sibirica	Siberian weasel
Arctictis binturong	Binturong
Paguma larvata	Masked palm civet
Paradoxurus hermaphroditus	Common palm civet
Paradoxurus jerdoni	Brown palm civet
Viverra megaspila	Large-spotted civet
Viverra zibetha	Large Indian civet
Viverricula indica	Small Indian civet
Herpestes auropunctatus	Small Indian mongoose
Herpestes edwardsi	Indian grey mongoose
Herpestes fuscus	Indian brown mongoose
Herpestes smithii	Ruddy mongoose
Herpestes urva	Crab-eating mongoose
Herpestes vitticollis	Stripe-necked mongoose

The listing of these species became effective on 16 March 1989.

Traffic Bulletin 10(3/4):29.

Mustelid and viverrid genetics: A call for cooperative action!

ARND SCHREIBER

Imagine that the seafarers who roasted the last dodo had spared a sample of its tissue! We now could extract genomic DNA from it, and carry out a great number of scientific investigations, yielding data on various genetical and physiological details of this peculiar creature, its taxonomy, and its evolutionary relationships. Most of this must remain mysterious because no one cared to conserve some tissue. Still, similar opportunities are lost frequently, in each case when a rarely kept mustelid and viverrid dies, and the keeper does not care to preserve its genome (although this is fairly easy). DNA is a stable molecule contained in any organ and tissue, and it is easily secured if the sample is removed soon, and stored frozen until the nucleic acid is extracted in the laboratory. Once the DNA is solved in an appropriate buffer solution, or lyophilized, it can be stored for many years.

Therefore I ask every interested zoo curator, or private keeper, to cooperate in an effort to collect tissue samples of fresh carcasses of rare mustelids and viverrids for a DNA bank. Inadvertently trapped animals are another possible source (but scientific enthusiasm should not lead trappers to persecute rare species). Collected over a number of years, enough species could be available for comparative purposes, and hopefully, also several individuals from single species for population genetical analysis. There are numerous additional biological fields which could profit from certain molecular analyses, such as conservation genetics, immunology, systematics, evolutionary biology and ecology.

Background

Hardly any mustelid or viverrid species considered as threatened (or likely to be so) by the Mustelid and Viverrid Specialist Group has been the object of intensive molecular genetical studies, and DNA investigations appear to be totally lacking. The very few genetic studies published about wild mustelids focused on starch gel electrophoresis of selected proteins. I am not aware of a comprehensive genetic study of viverrids using molecular biological methods. On the other hand, carnivore genetics revealed major surprises, including a remarkably low degree of genetic variation in some species. Likewise, little variation was found in two of three recent studies in mustelids.

Hardly anything is known about the immunogenetics of rare mustelids and viverrids. Endemic diseases, such as distemper and rabies, are common in a number of rare mustelid/viverrids populations. The last known population of the black-footed ferret was almost exterminated by canine distemper. While some molecular investigations based on the only few specimens necessarily available in rare species must remain fragmentary for a long time to come, even single data can give hints to understand more effectively the biology of a species. Wouldn't it be a sad waste if the tissues of the only otter civet presently in captivity were not preserved?

Action

While many keepers will not like this idea while their pet is still living, a small tissue sample will -if treated correctly- yield enough DNA to keep numerous researchers busy. I hope that many keepers will wish to cooperate by preserving at least a whale-nut-sized piece of muscle, and possibly the heart, kidneys, and liver (or anything else needed). Only three aspects must be kept in mind: first, freeze the material as soon as possible after death; second, store it as cold as possible, preferably at -80 C° (after shock-freezing in liquid nitrogen, or in a mixture of dry ice and alcohol), although storage in an ordinary kitchen freezer reaching -20 C° is preferable to losing the valuable material; third, make sure that it does not thaw again. Many collections will send their carcasses to veterinary institutes for autopsy, or will wish to mount the specimens for exhibition in a museum. However, samples of soft tissues can usually be taken without interfering with other post-mortem uses. It might be wise to save reasonably sized samples, in view of unforeseen future needs, including those of your own institution. If you agree to cooperate with me, I am certainly willing to store any remaining DNA, and protein fractions, for future uses by you, or interested colleagues. In lyophilized condition, DNA can reach you at each corner of the globe, by air mail, landrover, or on horseback.

The only major effort is to send frozen material to a laboratory, e. g. to the address given below. Certainly, the last Chinese purple-spotted flying mongoose would merit any such effort, and in such urgent cases I could probably arrange the transport. However, my research funds are definitely not sufficient to air-ship two dozen frozen European badgers from an Australian zoo to Heidelberg.

Request for cooperation

If you agree that our Specialist Group should initiate such a programme, if you are even preparing similar studies and are interested in scientific cooperation, or if you just feel that the genes of your specimens should be preserved, please contact me. My personal scientific interest is the degree of intraspecific genetic variation of some immunologically relevant DNA sequences, and molecular evolution. Carcass samples are one approach to such research, but much additional work could be done if blood, or living tissues can be taken. Further technical details had better be discussed by direct correspondence between those interested.

Arnd Schreiber, c/o Prof. G. Sauer,
Institute of Virus Research, German Cancer Research Centre, Im Neuenheimer Feld 280, D-6900 Heidelberg, Federal Republic of Germany.

Mustelid and viverrid wealth in Sikkim

Locked in by snow-capped Himalayan peaks, Sikkim is bordered by Tibet (China), India, Bhutan, and Nepal (see map). The climate is tropical up to 1,050 m, temperate from 1,050 to 3,650 m, and alpine from 3,650 m up to the perpetual snow line at 4,850 m. While much of it is barren, mountainous, and under perpetual snow, Sikkim, smaller than Yellowstone National Park, is also botanically one of Asia's richest areas. About 4,000 flowering plants and ferns -including 400 orchid varieties- flourish here. Although the small carnivore fauna may not be abundant it is certainly varied with three species of mustelids and four of viverrids still present.

Mrs Usha Ganguli-Lachungpa (Project Officer, Fisheries & Wildlife Circle, Govt. of Sikkim) has kindly reported on the two field trips of the Zoological Survey of India made in Sikkim Dec. 1981-Jan. 1982 to the northern and southern part, and Apr. 1982 to the western and again to the southern part. We are happy to learn that following species are still part of Sikkim's amazing fauna:

1. *Martes flavigula*, yellow-throated marten

A pair was sighted on 10 Jan. 1982 in Phodong (N. Sikkim) at ca 1,500 m ASL.

According to Mrs Ganguli-Lachungpa it is still quite common in northern Sikkim beyond ca 2,000 m.

2. *Mustela sibirica*, Siberian weasel

One individual was sighted on 6 Jan. 1982 in Lachen (N. Sikkim) at ca 2,850 m.

Mrs Ganguli-Lachungpa reports the sighting of a young Siberian weasel at the hot spring at Yumthang (ca 3,700 m), also in northern Sikkim.

3. *Lutra lutra*, European otter

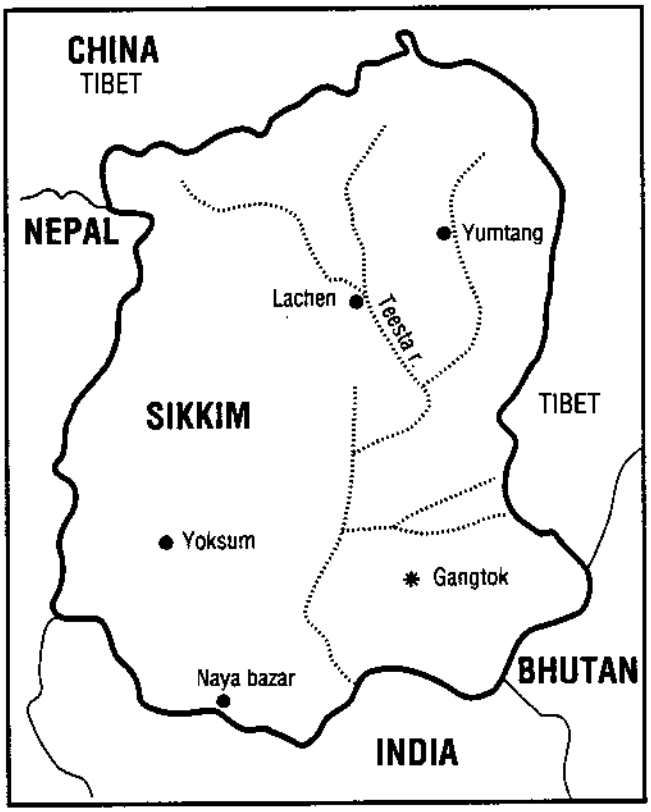
Although the otters are the chief concern of a separate Specialist Group we cannot resist reporting the good news that the European otter was commonly seen in large streams near Hee Gyathang (north) and Melli (south) resp. at ca 1,850 and ca 450 m in Jan. 1982.

4. *Viverra zibetha*, large Indian civet

One individual was observed in each of the following localities: 25-27 Dec. 1981, Singhik (ca 1,400 m, N.); 21-26 Apr. 1982, Naya Bazar (ca 400 m, S.); 23-24 Apr. 1982, Yoksum (ca 1,800 m, W.); 25-26 Apr. 1982, Pelling (ca 2,000 m, W.).

5. *Prionodon pardicolor*, spotted linsang

The report on the spotted linsang is based on the sighting of one individual by Dr. R. K. Ghose in Lema (ca 2,300 m) in Dec. 1981.



6. *Paguma larvata*, masked palm civet

Masked palm civets were sighted several times: one each in Singhik (ca 1,400 m) and Hee Gyathang (ca 1,800 m) -both in the north-, Yoksum (ca 1,800 m) in the west, and a pair in Naya Bazar (ca 400 m) in the south.

Mrs Ganguli-Lachungpa found that *Paguma larvata*, together with *Viverra zibetha*, and *Lutra lutra*, are still common in east, south, and west Sikkim.

7. *Arctictis binturong*, binturong

A pair of binturongs was observed on 4 Jan. 1982 in Menshithang (ca 3,150 m, N.), and one individual 8-9 Jan. 1982 in Hee Gyathang (ca 1,800 m, N.).

The distribution on the left bank of the Teesta River in northern Sikkim is confirmed by Mrs Ganguli-Lachungpa who found binturongs "not common" there.

Binturong Studbook announcement

Last May the "Regional Studbook of the Binturong (*Arctictis binturong*) in the British Isles" was published. It was compiled by Paul Robinson of Southport Zoo, Southport, UK. Besides some preliminary chapters on taxonomy and distribution, status in the wild, status and history in captivity, reproduction, and diseases, it contains data on the 63 binturongs kept in nine zoos and one private collection in the UK. The genealogy is current through December 1987.

This is to our knowledge the first and only viverrid studbook in existence at present. We hope this useful and much needed work may serve as a model.

RESEARCH

...from R. A. Mead: The reproductive cycle of the wolverine.

Greg Starypan of Northwest Trek Park, Tacoma, Washington invited me to assist them in studying the reproductive cycle of 15 captive wolverines *(Gulo gulo)* owned by Dale Peterson. Others participating in this study are Marc Rector, graduate student at the University of Washington, and Dr. Mike Jones, DVM. We have now pretty well delineated the testis cycle in the male and have monitored testosterone levels. Testicular recrudescence begins in late January and the testes reach maximal size in May. Two out of two males produced good ejaculates in June. Testicular regression begins in late July and appears to be complete by September. The females exhibited increased vaginal cornification from June to early August; however, few of them exceeded 90% cornified epithelial cells in the vaginal lavages for more than a few days and none of the females bred when exposed to males. Plasma progesterone levels remained basal throughout the study suggesting that the wolverine does not ovulate and form corpora lutea unless bred. This study is now about to enter its second year and we hope to obtain breeding this year.

Dr. Rodney A. Mead, Dept. of Biological Sciences, University of Idaho, Moscow, Idaho 83843, USA.

...from Gerardo Ceballos:

1. The "Asociacion Mexicana de Mastozoologia" (Mexican Association of Mammalogists), a scientific society devoted to the study and conservation of the mammals of Mexico, welcomes international members. For more information please send letter to:

Dr. Gerardo Ceballo President AMMAC
Apartado Postal 70-419
Mexico, D. F. 04510 MEXICO

2. I am beginning a study about the ecology of the pygmy skunk *(Spilogale pygmaea)* at the Biological Station of Chamela, located in western Mexico. Anybody interested please get in touch.

Dr. Gerardo Ceballos,
Apartado Postal 23-D, Toluca,
Mex. 50120, Mexico

...from U. S. Seal: Request for population viability data.

We have prepared POPULATION VIABILITY ANALYSIS (PVA) Data Forms to begin the process of collecting the information necessary to construct population models as a part of the process of evaluating the status and needs for long term conservation of species and populations in the wild and in captivity. We are preparing an action plan for captive carnivore populations and wish to work closely with the specialist groups. We welcome your comment, interest, and participation.

POPULATION VIABILITY ANALYSIS DATA FORM - MAMMALS
Species:
Species distribution:
Study taxon (subspecies):
Study population location:
Metapopulation -are there other separate populations? Are maps available? Separation by distance, geographic barriers?:
Specialized requirements (trophic, ecological):
Age of first reproduction for each sex (proportion breeding):
a) Earliest:
b) Mean:
Gestation period (days or weeks):
Litter size (N, mean, SD, range) (at birth?, weaning?):
Birth season:
Birth frequency (interbirth interval):
Reproductive life-span (male & female, range):
Life time reproduction (mean, male & female):
Adult sex ratio:
Adult body weight of males and females:
Social structure in terms of breeding (random, pair-bonded, polygyny, polyandry, etc.; breeding male and female turnover each year?):
Proportion of adult males and females breeding each year:
Dispersal distance (mean, sexes):
Migrations (months):
Territoriality (home range, season):
Birth sex ratio:
Birth weights (male & female):
Ovulation -induced or spontaneous:
Implantation -immediate or delayed (duration):
Estrous cycles (seasonal, multiple or single, post partum):
Duration of lactation:
Post-lactational estrus:
Age of dispersal:
Maximum longevity:
Population census -most recent. Date of last census. Reliability estimate:
Projected population (5, 10, 50 years):
Past population census (5, 10, 20 years -dates, reliability estimates):
Population sex and age structure (young, juvenile, and adults) -time of year:
Fecundity rates (by sex and age class):
Mortality rates and distribution (by sex and age) (neonatal, juvenile, adult):
Population density estimate. Area of population. Attach marked map:
Sources of mortality -% (natural, poaching, harvest, accidental, seasonal?):
Habitat capacity estimate (has capacity changed in past 20, 50 years?):
Present habitat protection status:
Projected habitat projection status (5, 10, 50 years):
Environmental variance affecting reproduction and mortality (rainfall, prey, predators, disease,snow cover?):
Is pedigree information available?:
Attach life table if available.
Data form completed:
Correspondent/Investigator: