

SMALL CARNIVORE CONSERVATION

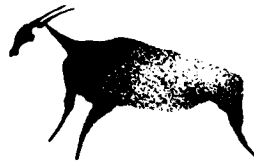


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Adult female Libyan striped weasel (*Poecilictis lybica*) - Photo: Marian Batkiewicz



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Conservation implications of hybridisation between mustelids and their domesticated counterparts: The example of Polecats and feral Ferrets in Britain.

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Animal taxa frequently display natural hybridisation that yields fertile and viable hybrids (Templeton, 1989). The parent taxa are often recognised as separate species on the basis of their distinct morphologies and independence of their paths of genetic evolution. Thus, many animal species are members of syngameons, just as many plants are (Grant, 1981). Templeton (1989) defines a syngameon as 'the most inclusive unit of interbreeding in a hybridising species group' a category similar to the *Rassenkreis* of Rensch (1959). Within these syngameons, demographic and ecological processes become increasingly important in defining 'species', more so than the usual morphological and genetic parameters utilised in conventional taxonomy. Gene flow between the 'species' may be slight or extensive, and their continued existence depends on ecological vicariance, occupying stable and distinct local habitats. If such a patchy environment is destroyed and replaced by a different ecosystem, the separate 'species' usually fuse through hybridisation. In spite of this potential for hybridisation, many of the taxonomic units within these groups represent real biological units in a morphological, ecological, genetic and evolutionary sense.

As researchers (e. g. Templeton, 1989; Harrison, 1990; Groombridge, 1992) note, the presence of syngameons presents difficulties for the traditional biological species concept (Mayr, 1942). The difficulties presented by this phenomenon are not, however, restricted to the realm of biological theory. Hybridisation can present particularly acute problems for conservation biologists. In particular, the release (whether accidental or intentional) of captive animals allows contact between members of a syngameon which may have been separated by geographical distance. This is particularly evident where wild carnivores come into contact with feral members of their domesticated congeners. Such hybridisation also leads to problems for legislators attempting to implement endangered species programs. For example, there has been a great deal of discussion surrounding the specific status of the Red wolf (*Canis rufus*). This has led to discussion as to the status of hybrid populations in general under the U. S. Endangered Species Act, with authors supporting and denying such populations protection under the Act, or indeed arguing about the methods for detection of hybrid animals (Fergus, 1991; O'Brien & Mayr, 1991; Wayne & Jenks, 1991; Dowling *et al.*, 1992a, b; Nowak, 1992; Phillips & Henry, 1992; Wayne, 1992; Ranker & Arft, 1994; Jones *et al.*, 1995).

Hybridisation also occurs between mustelid species, for example members of the Polecat (*M. putorius*) group. There are three wild polecat species -the European polecat, the Steppe polecat (*M. eversmanni*) and the Black-footed ferret (*M. nigripes*). While the latter form is confined to the mainland United States, the specific status of the first two (Eurasian) forms has long been debated and the question as to which of them is the ancestor of the domesticated ferret has been the subject of a number of studies. The two Eurasian forms have been considered conspecific (e. g. Ellerman & Morrison-Scott, 1951), but current opinion in eastern Europe and Russia (where the two species are sympatric) is that they are separate species, which is backed up by karyological evidence (Blandford, 1987).

There is, however, evidence for hybridisation between both species where they are sympatric (Novikov, 1962; Grafodatskii *et al.*, 1978). The ferret (*M. p. furo*) is a domesticated form of uncertain origin, derived from either *M. putorius* or *M. eversmanni* or possibly both (Rempe, 1962). Recent studies of cranial variation between polecats, ferrets, steppe polecats and known polecat x ferret hybrids have shown that hybrids, *M. p. furo* and *M. eversmanni* specimens cluster together, perhaps indicating a mixed origin for the ferret (Fig. 1; see in addition, Lynch, 1993). This idea may be supported by the mosaic of characters that the ferret appears to have, being craniologically similar to *M. eversmanni*, yet karyologically identical to *M. putorius* (Ashton & Thompson, 1955). As Clutton-Brock (1992) notes, domestication is both a cultural and biological process, and it is not inconceivable that breeders utilised different wild stocks to obtain a 'better' ferret.

Domestication can be defined as the adaptation of animals to environmental circumstances defined by humans (Kohane & Parsons, 1989). In general, new characters are rarely produced, but existing ones are selected for (Berry, 1969). The skull of the ferret is a version of that of the polecat in which the palatal (and facial) region is foreshortened and the post-orbital constriction, zygoma, and mastoid region narrowed (Lynch, 1993). Similar differences occur between feral and farmed American mink (*M. vison*) (Lynch & Hayden, 1995). It may thus be possible that, upon escape from captivity, ferrets may return to a 'wild-type' skull as exemplified by that of the polecat, an idea originally proposed by Pocock (1932). This would lead to the conclusion that, if like mink (Lynch & Hayden, 1995), feral ferrets return to wild-type colouration after a number of generations in the wild (as found by McCann, 1956; Lavers & Clapperton, 1990), it would be practically impossible to phenotypically distinguish feral ferrets, polecats and their hybrids using coat and cranial characters.

The early history of the polecat in Britain is poorly documented, although historical evidence points to the species being widely distributed and abundant (Langley & Yalden 1977). Despite various pressures, populations maintained themselves until the middle of the 19th century, when numbers fell and their range contracted. This decline was correlated with an increase in the development of sporting estates rather than the decline in woodland (Langley & Yalden, 1977). The last record for Scotland was in Sutherland in 1912 (Ritchie, 1920). A few isolated populations may have survived in England until the 1930s, with the species flourishing in central Wales and the Marches. The First World war relieved persecution by gamekeepers and marked beginning of the recovery of the polecat (and indeed the wildcat *Felis silvestris* and Pine marten *Martes martes*). The future of the species seems assured, with a dramatic population expansion from Wales resulting in 'polecat-like' animals appearing in the West Midlands (A. C. Kitchener, pers. comm.). However, these animals may turn out to be feral ferrets or introgressive hybrids between polecats and ferrets. Initial morphological studies (Pratt, 1995) indicate that these may indeed be 'pure' polecats, and further investigations are currently underway (Lynch, Kitchener & Pratt, unpubl.).

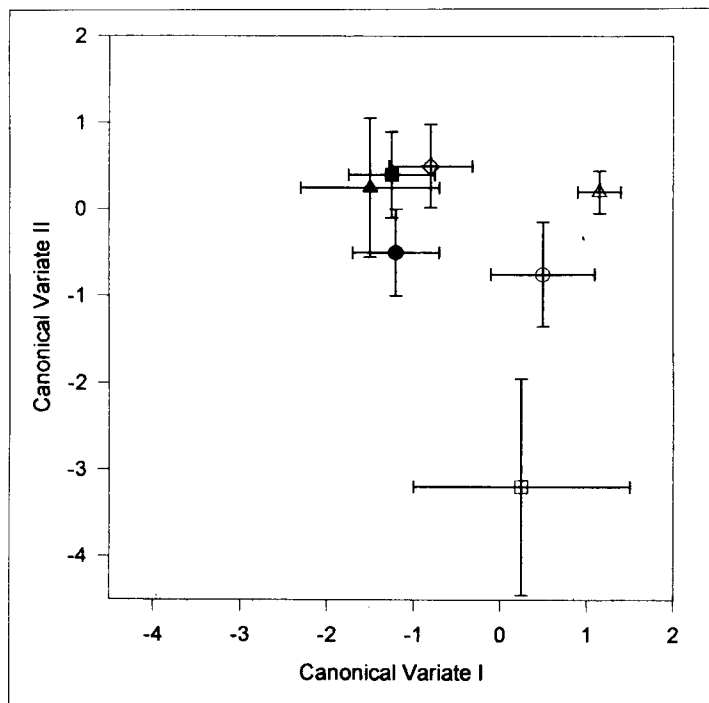


Fig. 1. Separation of *Mustela putorius* group specimens, on the basis of two canonical variates derived from six cranial measurements. The separation is highly significant (Wilks' $\Lambda=0.174$; $F_{36,8570}=7.07$; $P<0.0001$). Key: open triangle, Welsh polecats (n=55); open circle, European polecats (n=13); open square, Scottish polecats (n=3); open diamond, polecat x ferret F1 hybrids (n=7); closed circle, English ferrets (n=23); closed square, Scottish ferrets (n=22); closed triangle, steppe polecats (n=7). All points represent group means with 95% error bars. Further details can be found in Lynch (1993).

The systematic status of the now-extinct Scottish polecat *M. p. caledoniae* remains uncertain. Tetley (1939) described the subspecies on the basis of one female and three male specimens, collected in Sutherland over a two year period in the early 1900s. These specimens are believed by some to be escaped ferrets or hybrids (Dadd, 1970; Blandford, 1987). Recent craniometric studies indicate the specimens to be morphologically unique, showing little affinity to ferrets, having relatively large bulky skulls with a disproportionately broad interorbital area (Lynch, 1993). It may be that the specimens represent the remains of the last surviving polecat population in the area, and may have undergone extensive cranial modification due to hybridisation or inbreeding. An examination of the genetic status of the *M. p. caledoniae* specimens using DNA fingerprinting of genetic material in bone may prove enlightening, and further morphological studies are currently underway (Lynch, Kitchener & Pratt, unpubl.).

The degree to which polecats, ferrets, and steppe polecats resemble each other morphologically and genetically may be indicative of the need to clarify the systematics of this group - which in the broadest sense form a syngameon. Ongoing genetic and morphological studies are examining the relationship between 'species' in this syngameon and hybridisation between *M. putorius* and *M. p. furo* in Britain (H. I. Griffiths, pers. comm.; Lynch, Kitchener & Pratt, unpubl.). There is a definite need to follow the morphological, genetic and behavioural changes that occur when previously captive ferrets become feral, and to assess their effects (if any) on resident polecat populations. As Clutton-Brock (1992) notes, domestication is a form of evolution. Similarly, hybridisation is not always a negative evolutionary force (Smith, 1992; De Marais *et al.*, 1992; Geist, 1992; Grant & Grant, 1992, 1994). Introgression between feral ferrets and polecats may be an evolutionary change which is of little consequence to whether we call a population one of polecats or not. In attempting to eradicate, or otherwise prevent, the process of hybridisation, we may be thwarting important evolutionary processes and decrea-

sing the potential for biological diversity in the future, especially in man-dominated environments (Cade, 1983). As Jones *et al.* (1995) note: "It seems to us that it would be necessary, as a first step, to make certain taxonomic decisions about hybrid populations and to draw meaningful taxonomic conclusions prior to justly applying the International Code [of Zoological Nomenclature] or promoting the legal preservation of biodiversity".

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