Numerical variation in the permanent dentition of the Polecat, *Mustela putorius* (Linnaeus, 1758), from the Netherlands

By G. H. Glas

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After the elaborate studies by Colyer (1936) and Hall (1940) on variations in the dentition of Carnivora, relatively few data are to be found concerning the genus *Mustela*. Mostly individual cases are being reported (Reinwaldt 1958; Mazak 1964; Ruprecht 1965; Opatrný 1973) without any indication of the overall occurrence of the variations in the species mentioned. Larger numbers of Mustelidae were examined by Herán (1970, 1971), Bateman (1970) and Neuenschwandler and Lüps (1975). Herán studied 27 species of Mustelids (n varying from 1 to 86), but reported on *Meles meles* (Linnaeus, 1758), *Lutra lutra* (Linnaeus, 1758) and *Martes pennanti* (Erxleben, 1777). Since he reported on "... only the most interesting cases ...", it must be assumed that perhaps only positional variations were found in the other species, including the genus *Mustela* represented by 39 *Mustela erminea* (Linnaeus, 1758), 62 *M. nivalis* (Linnaeus, 1766), 30 *M. lutreola* (Linnaeus, 1761) and 52 *M. putorius* (Linnaeus, 1758).

A total of 385 Polecats (206 ♂♂, 179 ♀♀) with fully erupted permanent dentition were examined for this study; most of the animals were dealt with earlier in a study on weights and measurements (Glas 1974). Correct identification of absent teeth may be difficult, as previously mentioned by Neuenschwandler and Lüps (l. c.). In their study on 93 Weasels *(Mustela nivalis)* 11 animals showed distinct

Table 1

Missing elements in the dentition of 385 Polecats from the Netherlands

missing tooth	♂♂ (n = 206)			♀♀ (n = 179)		
	left	right	both	left	right	both
I_1	—	1	—	—	—	—
I_2	—	1	—	1 ?	—	—
I_3	—	—	—	?	—	—
C_1	—	—	—	—	—	—
P_2	4	5	—	9	5	—
P_3	—	—	—	—	—	—
P_4	—	—	—	—	—	—
M_1	—	—	—	—	—	—
M_2	1	2	9	4	3	16
I^1	—	—	—	—	—	—
I^2	—	—	—	—	—	—
I^3	—	—	—	—	—	—
C^1	—	—	—	—	—	—
P^2	3	1	1	1	2	4
P^3	—	—	—	—	—	—
P^4	—	—	—	—	1	—
M^1	—	—	2	—	—	—

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numerical variation, while in 6 animals the reason for the absence of a tooth was uncertain. In the Polecats studied here some cases of missing teeth obviously had been caused by disease or damage in the bone tissue, especially in the mandible. Real hypodonty was only concluded where not the least appearance of a particular tooth could be seen. Even the apperent non-replacing of a deciduous by a permanent tooth (as concluded from an intact but partially bone-filled alveolus) was considered to be a case of normal formation.

From the data (Tables I–V) it was apparent that numerical variation was more likely to occur in females (23.5 %) than in males (16.0 %), and that hypodonty was by far more frequent than pleiodonty. It is considered as a general evolutionary trend that carnivore specialisation resulted in the loss of end-components in the premolar-molar tooth-row. As mentioned by SLAUGHTER et al. (1974) the Mustelidae have not specialised as 'true carnivores' like the Felidae and Canidae. Nevertheless, besides the canines for a grip on prey, the tooth-pair M_1/P^4 has developed to carnassial apparatus in *Mustela*. SLAUGHTER et al. (l. c.) suggest that the most important reason for maintaining the second premolars is their function as protection of the gum against sharp food particles.

The cases of supernumerary dentition as mentioned in Table IV can be divided into three types. Firstly, the ♂ with duplicated P_4 can be separated as a case of disturbed ontogeny. Secondly, the occurrence of small supernumerary upper molars were probably atavistics. In all three cases they were very small cylindrical teeth, some 2 mm of length, half root and half crown. Thirdly, supernumerary upper incisors, also mentioned by BATEMAN (1969), in reference to the frequently found initiation of 7 or 8 upper incisors in foetal and neonate laboratory-bred Ferrets (*Mustela putorius* f. furo). BATEMAN suggests that animals originally indentified as Polecats should be considered as possible Polecat×Ferret hybrids if supernumerary incisors are present. It is remarkable however, that in the Polecat all cases of supernumerary incisors have been found in upper jaws, and those of missing incisors in the mandibles (COLYER 1936; REINWALDT 1958; this study).

Table 2

Importance in the sexes of hypodonty in particular dentitional elements

missing tooth	♂♂ (n = 206)		♀♀ (n = 179)	
	involved	(%)	involved	(%)
P_2	9	(4.4)	14	(7.8)
P^2	5	(2.4)	7	(3.9)
M_2	12	(5.8)	23	(12.8)
M^1	2	(1.0)	—	—
other	2	(1.0)	2	(1.1)

Table 3

Dentitional numbers in 206 ♂♂ and 179 ♀♀ of the Polecat

number of teeth	28	29	30	31	32	33	34
number of ♂♂	—	1	12	15	173	4	1
number of ♀♀	1	3	16	20	138	1	—

N. B.: One female had both a supernumerary incisor and a missing molar.

Table 4

Supernumerary teeth in 206 ♂♂ and 179 ♀♀ of the Polecat

animal		sex	supernumerary teeth
RMNH	12.214	♂	duplication of P_1 dex.
RMNH	23.012	♂	extra I between I^1 and I^2 sin.
ZMA	12.589	♂	extra I between I^1 and I^2 sin.
RMNH	15.882	♂	two extra I between I^1 sin. and I^1 dex.
ZMA	15.752	♂	small extra molar posterior to M^1 sin.
RMNH	20.329	♀	small extra molar posterior to M^1 sin.
ZMA	16.165a	♀	small extra molar posterior to M^1 sin.

ZMA: Zoölogisch Museum, Amsterdam; RMNH: Rijksmuseum van Natuurlijke Historie, Leiden.

Table 5

Numerical variation in the dentition in some species of the genus *Mustela*

species	number of animals examined	with numerical variation (%)	pleiodonty	hypodonty
M. putorius ♂	206	33 (16.0)	5	28
M. putorius ♀	179	42 (23.5)	2	41
M. nivalis (a)	93	min. 11 (11.8)	5	min. 6
		max. 17 (18.3)		max. 12
M. vison (b)	272	4 (1.5)	—	4

Data from the present study (see also note below Table 3), compared with the data of (a): Neuenschwandler and Lüps 1975; (b): Hall 1940.

The occurrence of supernumerary teeth in general might be seen as evolutionary retrogressive, but the significance as a progressive trend of hypodonty could be easily overestimated. It is nevertheless remarkable that, besides three cases of missing lower incisors and one case of a missing P^4, all the other cases are concerning end-teeth of the premolar-molar tooth-row. In contrast to the cases of supernumerary teeth, hypodonty is most frequent in the mandibles. Two-sided loss of M^1 is exceptional in ♂♂; the loss of one or two P^2 occurs in ♂♂ and ♀♀; and P_2 and M_2 are frequently missing. It is noteworthy, that all cases of missing P_2 concerned only one tooth, while for M_2 mostly both sides are missing. These facts, together with the high percentages of animals involved in the hypodonty in M_2, support the possibility that in this Polecat-population M_2-loss is due to evolutionary pressure. The results for P_2 and P^2 are inconclusive.

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Summary

The data on numerical variation in the dentition of 385 Polecats are given in Tables I—V. Relating these data to the theory of dentitional reduction in carnivore specialisation, it is concluded that in these Polecats the loss of the second lower molar is subject to evolutionary pressure. The comparatively few cases of pleiodonty consist of some atavistic small upper second molars and some supernumerary incisors.

Zusammenfassung

Über Variationen der Zahnzahl bei Iltissen, Mustela putorius (Linnaeus, 1758), aus den Niederlanden

An 385 Iltissen *(Mustela putorius)* wurde die Variabilität der Zahnzahl untersucht (Tabellen I—V). Reduktionen betreffen fast stets die Endglieder der Backenzahnreihen (vorderste Praemolaren und letzte Molaren), die auch bei Carnivoren mit spezialisierterem Gebiß in der Phylogenie verlorengegangen sind. Aus dem häufigen Fehlen des M^2 bei den Iltissen wird auf einen Selektionsdruck auf dessen Eliminierung geschlossen. In den vergleichsweise seltenen Fällen von Pleiodontie traten atavistische kleine zweite obere Molaren oder überzählige Schneidezähne auf.

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Author's address: Drs. Gerhard H. Glas, Vogelkersstraat, 28, Bussum, The Netherlands