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HABIT, BIOMETRY AND TAXONOMY OF THE DORMOUS (*GLIS GLIS*, LINNAEUS, 1776) OF THE ASIAGO *PLATEAU* (1)

Abstract

Observations on morphometry and taxonomy have been carried out on a Dormous population trapped on the Venetian PreAlps, mainly through a statistic elaboration of morphometric data. The population seems to belong to a transitional form between *Glis glis glis* and *Glis glis italicus* or to *Glis glis vagneri*, but a definitive taxonomic assessment seems to be difficult. A discriminative character seems to be the peculiar cranium shape. No significant statistic differences have been pointed out beetwen the two sexes.

Riassunto

Habitus, biometria e tassonomia del ghiro (Linnaeus, 1776) dell'Altopiano di Asiago.

Vengono riportate alcune osservazioni sulla biometria e tassonomia di una popolazione di Ghiro trappolata sulle Prealpi Venete, soprattutto in base ad una elaborazione statistica dei dati morfometrici. La popolazione sembra appartenere ad una forma di transizione tra le sottospecie *Glis glis glis* e *Glis glis italicus* oppure a *Glis glis vagneri*, ma una valutazione tassonomica definitiva risulta difficile. Un carattere discriminativo si può forse riscontrare nella particolare conformazione craniale. Nessuna differenza statisticamente significativa è stata rilevata tra i due sessi.

Introduction

The study of Dormous systematics (GRASSÉ, 1955; KÖNIG, 1960; SANTINI, 1983; TOSCHI, 1965) has been carried out by means of biometry (NIETHAMMER & KRAPP, 1978) and the chromatic analysis of furs.

Only a few of the numerous subspecies previously identified in Italy are now considered as valid by taxonomists (DULIC & VIDNIC, 1964; KAHMANN, 1965; MARTINO & MARTINO, 1939; MONTAGU, 1923; VON STORCH, 1978; VON WITTE, 1962).

This paper, being part of a series of studies carried out on a Dormous population of Venetian PreAlps, aims to eva-

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luate the taxonomic relationships of this population and to find out eventual morphological differences between males and females specimens by means of the statistic elaboration of morphometric data and the comparative analysis of furs coloration, followed by a thorough comparison with observations and measures found in the literature.

Materials and methods

A sample of 221 specimens, trapped in the woods of Asiago Plateau, was studied. The sampling cannot be considered a random one, owing to the features of the traps and the baits used, to the space distribution of the traps and the time distribution of the captures.

The animals were captured during a wide ranging trapping ([2]), carried out in order to reduce a harmful Dormous population: the Dormous gnaw away in a ring-like manner the branches of various trees, especially young Norway Spruce, in artificial pure stands, where predatory balance had been altered by the wrong hunting management in the past (FRANCO, 1986; pers. com. of Dr. Zovi, Forest Inspector in Asiago).

All external somatic measures mentioned in the following (Tab. 1, 2) were available for biometric analysis for all the 221 specimens. The sample included animals of both sexes and all age classes of the population.

The specimens were frozen and preserved at −20°C until utilization: the measures were token with a precision balance

Table 1. External measures taken on the body (mm)

LC, tail length: taken between the tail root and the last vertebra.

LTC, body length: taken between the nose top and the last tail vertebra.

LPP, hinder foot length: taken between the calcaneum and the third finger-tip, having stretched the foot.

LO, ear length, from the ear meatus to the auricle top.

Table 2. Measures taken on the crania and the pelvis (mm)

LCB, condylo-basal length: taken from the condylus-occipitalis to the incisor insertion in the praemaxillare.

LN, nasals lenght: taken from the nasals top and their insertion in the frontale.

LOZ, upper teeth series length: taken from M1/1 to P4/4 insertion.

LZY, zygomatic width: taken between the two jugalis.

LIOB, inter-orbits width.

LMD, jawbone length: taken between processus articularis and the internal incisors insertion in the corpus mandibulae.

LBA, pelvis width: taken between the two ilia.

([2]) I want to thank the C.F.S. (State Forest Service) Office of Asiago, that kindly provided me during 1984 and 1985 with part of the abundant captures.

and precision calipers during the winters of 1984 and 1985. After measuring external dimensional parameters on the whole bodies (Tab. 1), the animals were skinned and the morphologic and chromatic characteristics of their furs were observed. This latter aspect will be developed in a future paper (see also FRANCO, 1986).

Flesh was taken off from the crania and the pelvis by boiling and by oxydative treatment with 50 and 25 v/v H_2O_2; the whole crania and pelvis of only a part of the adults subsample (66-75 specimens) were intact and suitable for the measuring. Measurements taken are described in Tab. 2 and shown in Fig. 1.

The morphometric data have been processed according to statistical procedures suggested by SOKAL & ROHLF (1969).

Results

A summary of the external somatic measures is given in Tab. 3.

Applying multivariate data analysis for Principal Components to the correlation matrix obtained from the external body measures, 64.67% of variance was due to the first principal component (pc1). Length (LTC = .518 LC = .499) and weight (W = .517) variables were those which affected more this component. By means of pc1 it was possible to distinguish two groups of specimens on the basis of weight and lenght values, roughly corresponding to juvenile and adult specimens.

The statistic relation between these parameters showed a clearly covariant relation (r = 0.90) in the first group of 75 specimens; in the other group the little variation in body length, due to the end of the growth in the adult animals, did not match the large seasonal variation in body weight (r = 0.57). Figure

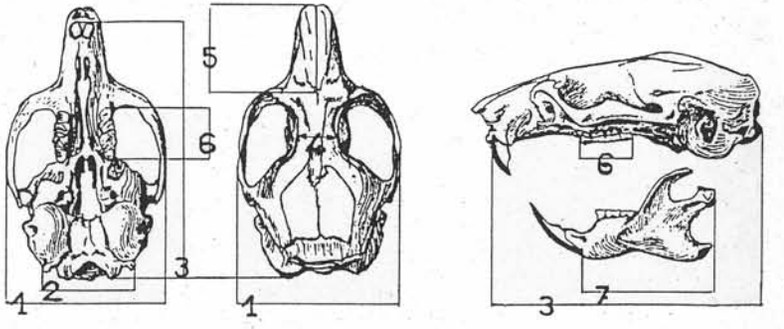

Figure 1

Symbols used for the crania and the pelvis measures: 1) LZY, 2) LSB, 3) LCB, 4) LIO, 5) LN, 6) LOZ, 7) LMD

2 shows the distribution of the two groups after linearisation of the original data.

The dimensional data reported in literature are usually referred to animals defined as matures or adults in the same way, but it is not generally clear whether the discrimination should rely on the onset of the sexual maturity or on the sum of external somatic characters. According to the first criterion we should have considered several animals belonging to the first 75 specimens subsample (Tab. 4), which, having overcome winter, would have been ready for mating, i.e. sexually mature, but still actively growing.

Therefore, a subsample of 146 adult specimens has been utilized for comparisons with literature data (Tab. 5). There is no significant differences between the two sexes as far as

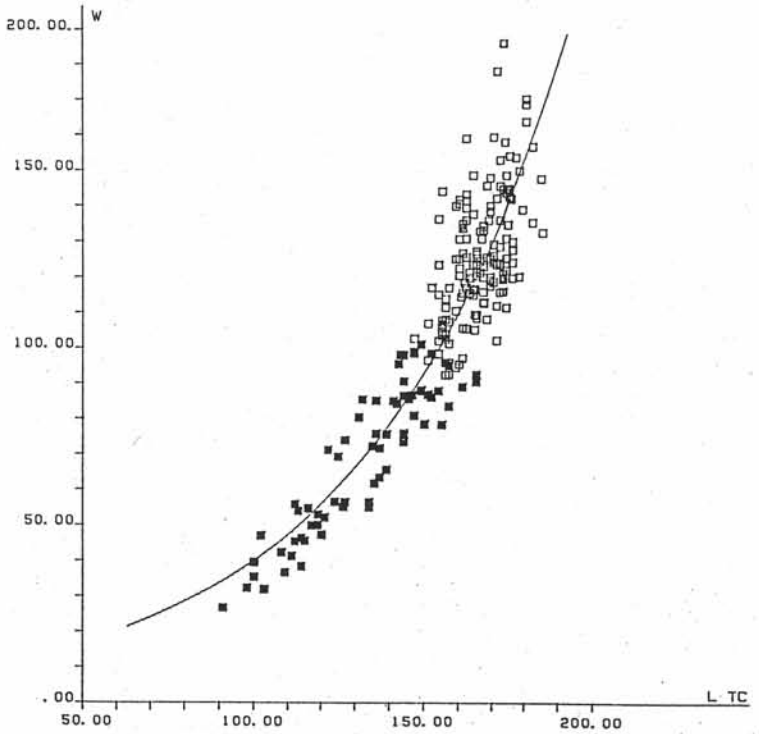

Figure 2

Relation between body weight and body length. The units are g for weight and mm for length. Black symbols represent youngs and white symbols represent adults.

the means of all parameters. A slight weight excess in the females may depend on the presence of some pregnant females (Tab. 6).

The crania measurements (Tab. 7) derive from the adult subsample.

The simple and partial correlation coefficents have been computed among all variables; Loz measure is scarcely correlated with the other cranial ones, and Liob does not at all. Even in this case there are not significant statistic differences between males and females.

Table. 3. External measures of the whole sample and their statistic parameters (Prob. level .95)

Size	Ltc	Lc	Lpp	Lo	W
N°	221	221	221	221	221
Min.	91.0	85.0	21.8	15.3	26.7
Max.	185.0	168.0	31.0	23.4	186.3
mean	155.30	125.61	27.77	19.59	107.70
C.i. ±	2.62	1.89	.22	.24	4.29
S	8.13	8.24	1.39	1.8	18.72

Table 4. Measures of the youngs and adults, subsample and their statistic parameters

Size	youngs Ltc	adults Ltc	youngs W	adults W
N°	75	146	75	146
Min.	91.0	147.0	26.7	92.4
Max.	173.0	185.0	133.8	186.3
mean	135.52	166.35	74.19	125.99
C.i. ±	4.37	1.27	5.58	3.00
S	19.12	7.70	24.44	18.15

Table 5. External measures taken on the adults sample and their statistic parameters

Size	Ltc	Lc	Lpp	Lo	W
N°	143	143	143	143	143
Min.	135.5	111.0	23.6	16.6	78.0
Max.	185.8	168.0	31.6	29.0	186.3
mean	166.05	133.27	28.29	20.39	166.05
C.i. ±	1.33	1.34	.22	.29	1.33
S	8.13	8.24	1.39	1.8	18.72

Table 6. Differences between the means, with their confidential intervals of males and females external measures

	Ltc	Lc	W	Lpp	Lo
males	166.22±1.82	133.34±2.07	124.00±4.30	28.50±.33	20.27±.44
significance	NS	NS	NS	NS	NS
females	166.03±1.97	133.35±1.81	126.81±4.40	28.07±.31	20.48±.90

Table 7. Crania and pelvis measures taken on the adults' subsample

Size	LCB	LSB	LN	LZY	LMD	LOZ	LIOB	LBA
N°	73	73	66	73	73	73	75	66
Min.	28.5	11.5	12.2	20.5	9.2	5.7	4.1	66.1
Max.	39.6	16.6	15.0	26.7	21.8	7.2	5.2	17.3
mean	36.11	13.60	13.58	23.44	18.17	6.74	4.97	10.95
C.i. ±	.55	.34	.17	.29	.44	.62	.03	.33
S	2.35	.66	.70	1.27	1.92	.27	.15	1.35

Discussion and conclusion

The comparison with the data reported in the literature is made difficult by the exiguity of the samples and by the widespread lack of precision or clearness on the published data. For these comparisons the most complete and reliable series have been chosen (see Tab. 8).

Within these limits the observed Dormouse population seems to have intermediate body size between *G.g. glis* (Linnaeus, 1776) (terra typica: Germany) and *G.g. italicus* Barrett-Hamilton, 1898 (terra typica: Siena). The relation with *G.g. melonii* Thomas, 1907 (terra typica: Sardinia), hasn't been considered for geographic reasons.

Furthermore, in terms of crania measures, they substantially correspond to those of *G.g. vagneri* Martino & Martino, 1939 (terra typica: Kaminske Alps, Slovenia), apart from LIOB and LZYG parameters that are lower in this population (Tab. 8).

It turns out from the ratios between crania length (LCB) and width (mean of LZYG and LIOB) of the cranium (used as cranium shape index) that this population has an intermediate cranium shape between the big and long cranium of *G.g. italicus* and the little cranium of *G.g. glis* (Tab. 9). Moreover this PreAlps population presents a taper skull shape in comparison with that of Eastern Alps (*G.g. vagneri*). A multivariate analysis of cranium shape could be an interesting form of taxonomic discrimination among these rodents.

Other observations on chromatic characteristics and morphology of these animals' furs (FRANCO, 1986) would suggest that the studied population belong to *G.g. vagneri* or to what VON WITTE (1962) calls *G.g. italicus* $\geqslant\leqslant$ *G.g. glis*[3] (with references to population from Southern Alps).

Summing up, it still remains difficult, however, to correctly place this population within the species (see ELLERMAN & MORRISON-SCOTT, 1951; KAHMANN, 1965; MARTINO & MARTINO, 1939; VON STORCH, 1978; VON WITTE, 1962), due to the large variation of the biometric parameters, which cover typical Central-European and Mediterranean values, and to the remarkable variability of furs coloration.

(3) This symbol was used by the Author in order to define the particular situation of transition between the two subspecies.

Table 8. Principal data series related in the literature with all the statistic parameters there available

Size	LTC	LC	LPP	LO	W	LCB	LZY	LIOB	LOZ
Glis g. glis: France (Saint Girons, 1973)									
N°	51	26	52	53	3	49	48	52	49
Min.	133.0	110.0	123.0	13.7	78.0	32.9	21.9	4.2	6.1
Max.	176.0	148.0	132.0	19.0	185.0	38.7	25.0	6.0	7.2
mean	151.2	125.4	26.9	16.4	129.3	35.64	23.27	5.09	6.7
Glis g. glis: Poland (Sidrowicz, 1959a)[4]									
N°									
Min.	120.0	105.0	26.0			34.9	22.0	4.8	6.2
Max.	160.0	126.0	29.0			36.9	23.6	5.0	6.5
Glis g. italicus: Monte Gargano (Kahmann, 1965)									
N°	17	15		17		13	13	13	13
Min.	175.0	155.0		21.0		39.6	25.0	5.3	7.7
Max.	210.0	190.0		27.0		43.5	27.2	5.7	8.5
mean	192.0	175.0		24.2		42 1	26.3	5.5	8.0
Glis g. postus: Croatia (Dulic & Vidnic, 1964)									
N°	17	11		17		12		12	12
Min.	163.0	144.0		17.0		38.4		4.8	7.1
Max.	197.0	171.0		23.0		42.1		5.3	7.8
Glis g. meloni: Sardinia (Saint Girons, 1973)[4]									
N°						21	6	13	14
Min.	154.0	134.0		29.0		35.2	23.7	5.0	6.8
Max.	184.0	153.0		32.0		41.0	24.7	5.3	8.0
Glis g. vagneri: Slovenia (Martino & Martino, 1939)									
N°						33	8	8	35
Min.						33.0	23.6	4.9	6.4
Max.						39.0	24.9	5.4	7.4
mean						36.0	24.2	5.1	6.3
Asiago population									
N.	146	146	146	146	146	73	73	75	66
Min.	135.5	111.0	23.5	16.5	78.0	32.0	20.5	4.1	6.4
Max.	185.8	168.0	31.6	29.0	186.0	39.6	26 7	5.2	7.2
mean	166.05	133.27	28.29	20.39	166.05	36.76	23.44	4.97	6.77
C.i. ±	1.33	1.34	.22	.29	1.33	1.50	.29	.03	.34

(4) Quoted by Von Storch, 1978.

Table 9. Cranium length and width ratio as index for cranium shape in some related populations

Population	Index
Glis glis glis (Saint Girons, 1973)	2.58
Glis glis italicus (Kahmann, 1965)	2.64
Glis glis vagneri (Martino, 1939)	2.46
Asiago population	2.59

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