CRANIOMETRIC DIFFERENCES AMONG RED SQUIRREL (*SCIURUS VULGARIS*) POPULATIONS IN ITALY

BIANCARDI C.M., DI CERBO A.R.

Centro Studi Faunistica dei Vertebrati - Società Italiana di Scienze Naturali, C.so Venezia 55, 20121 Milano.

The Eurasian red squirrel, *Sciurus vulgaris*, is a morphologically variable species widespread in the Palaearctic. Three out of the 17 described subspecies can be found in Italy: *S.v. fuscoater* (SVF) in the north; *S.v. italicus* (SVI) in central Italy and *S.v. meridionalis* (SVM) in the south (Calabria region). The elevation of *S.v. meridionalis* to the status of species has been under discussion several times. The question is not trivial, as conservation efforts strongly depend on the status of a population, endemic species being more "important" than sub-species.

We analysed the skull morphology of 65 skulls from the collection of the Natural History Museum of Milan. Twenty craniometric measures were taken: Condylo-Basal Length, Cranial Breadth, Cranial Height, Condylo-Incisive Length, Interorbital Breadth, Diastema Length, Superior Incisives Breadth, Nasal Length, Occipitonasal Length, Palatal Length, Palatal Bridge Length, Postdental Breadth, Toothrow Length, Posterior Zygomatic Breadth, Mandibular Height, Mandibular Length, Postorbital Breadth, Coronoid fossa Length, Inferior Diastema, Orbitotemporal Length. Age, sex, colour phase and biometric data were filed when available. According to literature, the locality of collection and morphological characteristics, after a preliminary analysis the sample was divided into three potential population (subspecies): SVF (N = 48), SVI (N = 8), SVM (N = 9).

A first PCA gave 3 principal components. The first one explained 54.5% of total variance and was strongly positively correlated to skull size: Condylo-Basal Length (0.950); Zygomatic Breadth (0.935); Nasal Length (0.864). Second (9.3%) and third (8.0%) principal components were related to the shape of the skull: Postdental Breadth (2^{nd}: 0.650); Cranial Height (2^{nd} : 0.606); Superior Incisives Breadth (3^{rd} : 0.846).

The regression scores of the group SVM were significantly separated from the others on the first axis (ANOVA with contrasts SVM *vs* SVI and SVF: 1.89, $p < 0.001$; contrasts SVM *vs* SVF: 2.19, $p < 0.001$; contrasts SVM *vs* SVI: 1.59, $p < 0.001$; Obs. power = 1.0; partial eta squared = 0.72).

Condylo-Basal Length, the main predictor of skull size, gave the following significant different mean values (mm ± SD) : SVM: 50.7 ± 1.4; SVI: 46.6 ± 1.1; SVF: 44.3 ± 1.3; ANOVA: $p < 0.001$; obs. power = 1.0; partial eta squared = 0.76).

An ANCOVA using Condylo-Basal Length as covariate, in order to correct for size, gave significant differences among the subspecies for Interorbital Breadth (SVM: 21.1 ± 1.4; SVI: 18.3 ± 1.6; SVF: 17.1 ± 1.1; $p = 0.014$; obs. power = 0.76; partial eta squared = 0.15), Superior Incisives Breadth (SVM: 5.4 ± 0.6; SVI: 5.2 ± 0.4; SVF: 4.6 ± 0.3; $p = 0.008$; obs. power = 0.81; partial eta squared = 0.17), Palatal Length (SVM: 21.9 ± 2.8; SVI: 18.5 ± 2.1; SVF: 17.6 ± 1.2; $p = 0.024$; obs. power = 0.69; partial eta squared = 0.14) and Mandibular Height (SVM: 20.0 ± 0.9; SVI: 17.6 ± 1.1; SVF: 17.6 ± 0.8; $p = 0.003$; obs. power = 0.96; partial eta squared = 0.26).

Although in the last years genetic analyses strongly improved systematics, osteological museum collections can still contribute to tassonomic disputes.