



An essay on precision in morphometric measurements in anurans: inter-individual, intra-individual and temporal comparisons

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Abstract

Morphometric comparisons among specimens continue being an important tool for biological and taxonomical studies and are indispensable for the description of new species. However, there are few works that have been done to compare the precision of the measurements that different investigators take in live or preserved animals with different body sizes and time of preservation. Herein we evaluate statistically this information. The results indicate that there are significant differences among the measurements taken by different people (inter-individual comparisons), but not within each of them (intra-individual comparisons). Also, there are temporal differences in the morphometric measurements among living animals, freshly preserved specimens and specimens after five months of preservation. These results demonstrate that morphometric measurements must be made by just one person and that for any morphometric analysis it is important to keep in mind the preservation time differences of the animals in the museums.

Key words: Frogs, morphological measures, repeatability, Manova, discriminant analysis

Introduction

Morphometrics is a fundamental area of research in biology which studies the quantitative description, analysis and interpretation of shape and shape variation (Rohlf 1990). Data for morphometric analyses are particularly important and for many years have served as support to explain evolutionary and ecological phenomena and for the classification of new species, mainly in the lower taxonomic levels (Lee 1982). Moreover, they are still very important in any systematic study that is based on the morphology of organisms, whether phenetic or cladistic. However, morphometric comparisons are frequently made between specimens preserved for a long time in museums and freshly preserved animals. Also, it has been assumed that people who take the data are sufficiently trained, so that the possible differences in their measurements are considered insignificant for the analyses or are attributed to the natural variations of the populations (Kerfoot 1969; Johnston 1976; Sokal 1976).

Lee (1982) demonstrated that there are morphometric differences between fresh and preserved frogs, and Myers and Böhme (1996) emphasized that it is difficult to obtain morphometric repeatable measures from one observer to another and within the same observer. Hayek *et al.* (2001) also found that inter-observer measurements differ statistically in specimens of *Leptodactylus discodactylus*, and Measey *et al.* (2003), working with live animals of the caecilian *Chthonerpeton indistinctum*, indicated that morphometric measurements must be taken by a single operator. Other studies on testing for repeatability of morphometric measurements in different vertebrates, such as birds (Lougheed *et al.* 1991), fish (Arnqvist & Martensson 1998), bats (Palmeirin 1998), rodents and marsupials (Blackwell *et al.* 2006) have obtained similar results as mentioned for anurans.