MORPHOMETRIC COMPARISON OF TWO *SCOMBER JAPONICUS* POPULATIONS IN EASTERN AND WESTERN MEDITERRANEAN

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Abstract

Two populations of *S. japonicus* from Eastern and Western Mediterranean were compared using multivariate morphometric analysis. The principal component analysis showed that the cephalic measurements are bigger in the Eastern Mediterranean population. These morphological differences may be related to genetic or environmental factors.

Keywords : Scomber japonicus, biometrics, Mediterranean

Introduction

Fisheries management is based upon stocks or population units (1), which may differ due to genetic and/or environmental factors (2). Fish morphology can be used to determine these differences (3,4) that can be directly related to genotype, although there is a likely variability related to environmental factors (5). The species *Scomber japonicus* denominated commonly as chub mackerel is a widely distributed pelagic species in the Mediterranean (6), but little is known about its population structure. The aim of this document is to study the populations of *S. japonicus* from two different sites of the Mediterranean and to examine their likely differences by comparing their morphomertric features.

Material and methods

The study was carried out in two geographically separated areas (Kavala, Greece, E. Med. and Barcelona, Spain, W. Med.) during the period April – June 2000. Samples with the maximum range of lengths were taken from each port and classified in length class intervals of 5 mm. 35 individuals are selected in each area. 15 morphological measurements were selected (Fig. 1). Body size and allometric effects that occur during fish growth were avoided by normalising all measurements to standard fork length (7). The standard fork length in this study is 25.0 cm. The principal component analysis (PCA) used in this study was carried out from the correlation matrix R from the standardised morphometric variables.

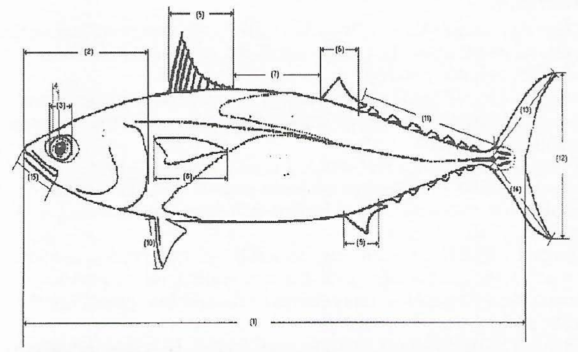

Fig.1. Scheme of 15 selected measurements. 1, Fork length. 2, Head length. 3, Orbital diameter. 4, Interorbital length. 5, First dorsal fin length. 6, Second dorsal fin length. /, Interspace. 8, Pectoral fin length. 9, Anal fin length. 10, Pectoral first fin ray length. 11, Tail length. 12, Caudal fin height. 13, Upper first ray length of caudal fin. 14, Lower first ray length of caudal fin. 15, Jaw length.

Results and Discussion

The PCA revealed a distribution gradient for the two groups analysed. Individuals from Barcelona are placed at the negative values, and those of Kavala at the positive values of the gradient. The first principal component explained 42.21% of the total morphometric variability (Fig. 2). The coefficient of morphometric variables of the first component, which were positive and negative, indicates shape differences along the first axis (Table 1). Kavala specimens are characterised by a greater relative size of the cephalic measurements (Fig. 1, Table 1). The second principal component (13.69%) showed much less variability than the first one (Fig. 2). This variability is related with intragroupal variation between specimens of the same area.

Multivariate morphometric analyses, used in this study, are good quantitative tool to identify intraspecific variation of *S. japonicus*. The principal factors of variability between the two groups are related with cephalic dimensions (head, eyes and jaw), that are bigger in the Eastern Mediterranean groups. Biometric studies carried out in *S. japonicus* along the W. S. Atlantic coast indicate differences in the development of cephalic measurements related with water temperature and stage of development (8). Studies based in otolith shape, found differences between two genetic separated populations of *S. scombrus* in the N. Atlantic (9). In our study, the size and allometric effect was removed. In consequence, the morphological differences may be related to genetic or environmental factors. Validation of our results is needed by comparing morphometric and genetic analyses.

Table 1. Factors loading the intraspecific variability in the PC analysis. The highest correlated variables with the axis 1 (PC1) and axis 2 (PC2) are indicated in black frame

Variables	PC1	PC2	VariablesN	PC1	PC2	Variables	PC1	PC2
2 Head l.	0.936	0.012	7 Interspace	-0.019	-0.193	12 Caudal h.	0.532	0.098
3 Orbital d.	0.902	-0.035	8 Pectoral l.	0.741	-0.087	13 Upp. caudal	0.707	0.222
4 Interorb. l.	0.729	-0.060	9 Anal l.	-0.124	0.831	14 Low. caudal	0.724	0.181
5 1st dorsal l.	-0.744	0.368	10 Pelvic l.	-0.026	0.864	15 Jaw l.	0.905	-0.120
6 2nd dorsal l.	0.454	0.292	11 Tail l.	-0.488	-0.323			

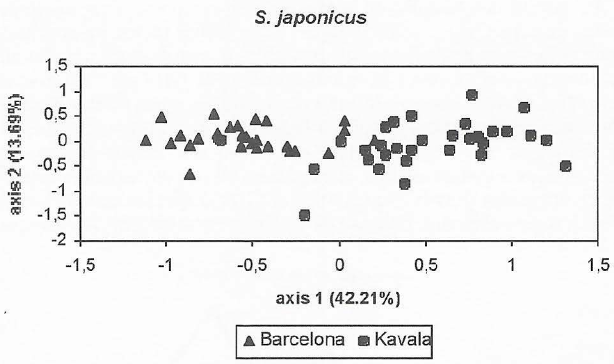

Fig. 2. Principal component analysis (PCA). Scatterplot of factor scores from the intraspecific principal components analysis of two geographic groups of *Scomber japonicus*.

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