

Using Eye Lens Diameter as Age Indicator of Young *Lithognathus mormyrus* and *Diplodus vulgaris*

A. J. Conides and L. A. J. Al-Hassan

Abstract

Eye lens diameter was analyzed in two sparid fish species, *Lithognathus mormyrus* and *Diplodus vulgaris*, in order to determine the possibility of using these data for age determination. The results showed that the technique could be adopted for determining the age of the two species when the specimens are very young. The method is especially useful for age determination when otolith or scale rings are not visible or when false rings may give erroneous readings.

Introduction

Age determination is an important step in the process of studying growth in fish species. The method involves the counting of scale or otolith annuli and usually requires the measurement of a large number of specimens (Fletcher 1991). Otolith and scale readings require a variable and considerable effort to prepare each specimen and even then the readings are subject to both systematic and random errors in interpretation and require independent validation (Beamish 1979). Thus, a considerable time is needed to acquire the skill necessary for consistent interpretation of the materials. In addition, extra readings are usually needed in order to verify the age assigned to a specimen (Sandeman 1969).

Materials and Methods

Measuring the ocular lens has been a common technique for estimating the age of mammals and birds (Lord 1959; Friend 1967). Various authors have concluded that the eye lens diameter can be used to estimate the age of fishes (Al-Hassan et al. 1991, 1992; Al-Hassan and Al-Sayab 1994). The results presented in this paper are based on the measurement of the ocular lens diameter and the scale age determination of 250 specimens of *Diplodus vulgaris* and *Lithognathus mormyrus*. The fish were collected from the coastal waters around Benghazi City, Libya. The eye lenses were extracted, dried at room temperature and individually measured to the nearest mm (Carlton

and Jackson 1968). Both lenses from each specimen were measured. The age of the collected specimens of *Lithognathus mormyrus* ranged from zero to two years, while those of *Diplodus vulgaris* ranged between zero to four years.

Results

The results indicated that there is a marked increase in the average lens diameter with age in both species (Fig. 1). In *Lithognathus mormyrus*, the average lens diameter increases with age. However, there is a significant overlap between the average lens diameter values for age groups of one year and above (Fig. 1a). Therefore, this method cannot differentiate *Lithognathus mormyrus* specimens above one year of age. The relationship between the age and mean eye lens

diameter was: [Eye lens diameter, mm] = $2.05 e^{0.276[\text{Age}]}$, ($r^2=0.951$, s.e. = ± 0.13 mm, $F=19.42$, Durbin-Watson=2.937). In *Diplodus vulgaris*, the average lens diameter follows the same increasing trend as *Lithognathus mormyrus*, and there appears to be a significant overlap for specimens that are two years and above (Fig. 1b). Therefore, this method cannot differentiate *Diplodus vulgaris* specimens above two years of age. The relationship between the age and mean eye lens diameter was: [Eye lens diameter, mm] = $3.49 e^{0.172[\text{Age}]}$, ($r^2=0.745$, s.e.= ± 0.72 mm, $F = 8.78$, Durbin-Watson =1.659).

The results indicate that using eye lens diameter for the determination of age in young fish (as a supplement to other methods such as scale and otolith and ring counts) is feasible. This method is especially useful when the scales and otolith rings in some fish are very difficult to count or there are a number of false rings that may provide erroneous age determinations.

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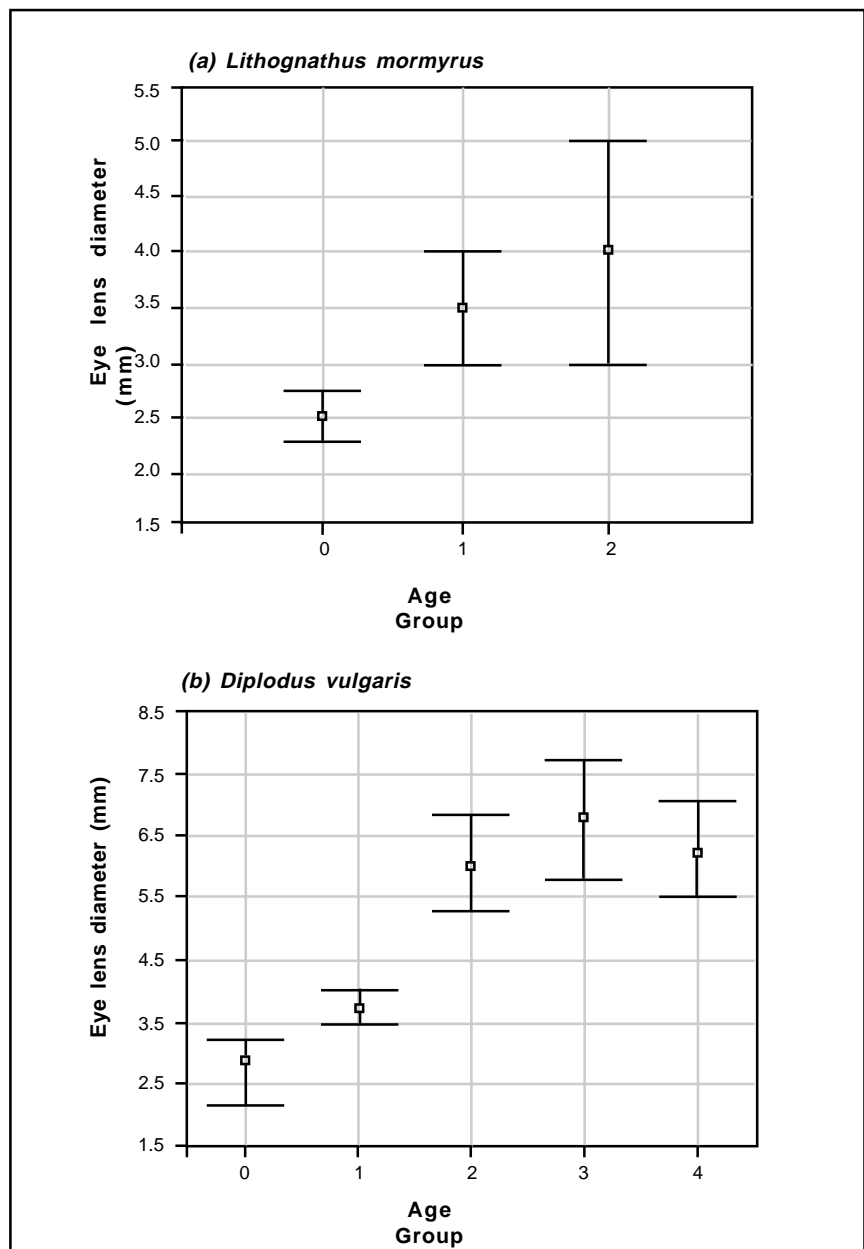


Fig.1. Box-Whisker graph (mean, min, max) of eye lens diameter versus age in (a) *Lithognathus mormyrus* and (b) *Diplodus vulgaris*.

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A.J. Conides is from the National Center for Marine Research, Athens 16604, Greece while **L.A.J. Al-Hassan** is from the School of Biological Science, University of Auckland, Private Bag 92019, Auckland, New Zealand. Address : Dr. Alexis J. Conodes, Aristotelous 130, GR-112 51 Athens, Greece