Validation of daily microincrement deposition in otoliths of juvenile and adult Peruvian anchovy *Engraulis ringens*

G. Plaza*† and F. Cerna‡

*Escuela de Ciencias del Mar, Facultad de Recursos Naturales, Pontificia Universidad Católica de Valparaíso, Avenida Altamirano 1480, Casilla, 1020, Valparaíso, Chile and ‡División de Investigación Pesquera, Instituto de Fomento Pesquero (IFOP), Avda. Blanco Encalada 839, Valparaíso, Chile

(Received 18 January 2014, Accepted 25 September 2014)

Wild adult specimens of the Peruvian anchovy *Engraulis ringens* were captured and reared to validate the daily periodicity of otolith microincrement formation. The postcapture stress generated spontaneous spawning, making it possible to conduct a rearing trial on larvae first in an artificial nutrient-enriched system (ANES) for 52 days followed by an artificial feeding regime in a culture tank until day 115 post-hatch. Microincrements of the sagittal otoliths of sacrificed juveniles [mean ± s.d. total length (LT) = 5.13 ± 0.37 cm, range 5–6 cm; c.v. = 7.5%] showed very distinct light and dark zones. The slope of the relationship between the total number of increments after the hatch check and days elapsed after hatching was not significantly different from 1. The transfer from ANES to the artificial feeding regime induced a mark in the sagittal otoliths. The number of microincrements after this induced mark coincided with the number of days elapsed after the transfer date. In parallel experiments, adult *E. ringens* (mean ± s.d. LT = 14.92 ± 0.55 cm, range 13–16 cm) were exposed to one of two fluorescent marking immersion treatments with either alizarin red S (ARS; 25 mg l⁻¹ per 6 h) or oxytetracycline hydrochloride (OTC; 200 mg l⁻¹ per 10 h). The microincrements between fluorescent bands were distinct, ranging from 0.89 to 2.75 μm (mean ± s.d. =1.43 ± 0.28 μm; c.v. = 32%) and from 0.71 to 2.89 μm (1.53 ± 0.27 μm; c.v. = 35%) for ARS and OTC, respectively. The relationship between the number of microincrements between marks and the number of elapsed days for ARS and OTC treatments indicated that there was a significant correspondence between the number of increases observed and the number of days. Hence, daily microincrements of otoliths of *E. ringens* are likely to be formed in juveniles and adults under natural conditions.

Key words: alizarin red S; chemical markers; northern Chile; otolith; oxytetracycline hydrochloride; rearing conditions.

INTRODUCTION

Anchovies are small fishes belonging to the Engraulidae family, comprising c. 145 species in 17 genera that are distributed in nearly all the world’s oceans. The Peruvian anchovy *Engraulis ringens* Jenyns 1842 caught along the coasts of Peru and Chile, accounts for a substantial fraction (>60%) of the world’s total anchovy harvest. In areas where anchovies are commercially exploited, age-based stock assessment models have...