Coral Reefs (2010) 29:521–525
DOI 10.1007/s00338-010-0590-9

NOTE

Influence of size and seasonal factors on the growth of the deep-sea coral *Flabellum alabastrum* in mesocosm

J.-F. Hamel · Z. Sun · A. Mercier

Received: 10 August 2009 / Accepted: 11 January 2010 / Published online: 27 January 2010

Abstract Growth rate (linear skeleton extension) was determined in live specimens of the deep-sea cup coral *Flabellum alabastrum* (Anthozoa: Flabellidae) collected between 600 and 1,200 m off insular Newfoundland (eastern Canada) and kept under laboratory conditions for over 2 years. Smaller individuals grew faster ($\sim$5 mm year^{-1}) than larger ones ($\sim$1 mm year^{-1}). Seasonal variations in extension rates and qualitative appearance of the growth bands were recorded, with maximum extension occurring in late summer and early fall during maxima in seawater temperature, zooplankton levels, and deposition of suspended detritus. Estimates from a growth model indicate that the largest individuals of *F. alabastrum* ($\sim$43 mm calyx height) are at least 45 years old.

Keywords Growth rate · Scleractinian · Deep-water · Solitary coral · Environmental factors

Introduction

Deep-sea coral communities worldwide are under growing anthropogenic pressure, especially from bottom trawling (Roberts and Hirshfield 2004; Edinger et al. 2007). In the context of deep-water ecosystem management, determining age and growth rates of deep-sea corals can help assessing their regeneration potential (Tracey et al. 2007; Sherwood and Edinger 2009). Although empirical data remain sparse, many deep-water and cold-water corals are presumed to be slow growing and long lived. Most of the published estimates are based on banding patterns and/or radiometric analysis of skeletal fragments (Andrews et al. 2002; Risk et al. 2002; Roark et al. 2007; Tracey et al. 2007; Sherwood and Edinger 2009), and only exceptionally on the monitoring of live animals (Cordes et al. 2001; Orejas et al. 2008). In contrast, several publications on shallow tropical and temperate-subtropical species report direct growth measurements in colonial and solitary scleractinians (e.g., Fowler and Laffoley 1993; Lough and Barnes 2000; Goffredo et al. 2004). Studies show that reef coral growth responds to environmental conditions, including temperature (Clausen and Roth 1975; Jokiel and Coles 1977; Weber and White 1977; Lough and Barnes 2000), nutrients (Atkinson et al. 1995), and depth (Barnes and Taylor 1973; Buddemeier et al. 1974; Baker and Weber 1975; Huston 1985; Bell and Turner 2000). However, given the scarcity of direct observations, the influence of exogenous factors on the growth of deep-sea stony corals remains elusive.

The present study provides the first measurement of growth rates in live deep-sea solitary scleractinian corals. *Flabellum alabastrum* Moseley, 1873, is common in the Northwest Atlantic off the coast of eastern Canada where it occurs on soft substrata at depths of 400–2,000 m (Buhl-Mortensen et al. 2007; Wareham and Edinger 2007). It is among the stony corals with the deepest occurrences. The species has also been reported in deep waters off eastern United States and in the eastern Atlantic from the Hebrides to the Gulf of Guinea (Buhl-Mortensen et al. 2007). Specimens of *F. alabastrum* were collected at bathyal

Communicated by Geology Editor Prof. Bernhard Riegl

J.-F. Hamel (✉)
Society for the Exploration and Valuing of the Environment (SEVE), 21 Phils Hill Road, Portugal Cove-St. Philips, Newfoundland and Labrador A1M 2B7, Canada
e-mail: hamel@seve.cjb.net

Z. Sun · A. Mercier
Ocean Sciences Centre (OSC), Memorial University, St. John's, Newfoundland and Labrador A1C 5S7, Canada