



ELSEVIER

Available online at www.sciencedirect.com

SCIENCE @ DIRECT®

Marine Environmental Research 59 (2005) 47–64

MARINE
ENVIRONMENTAL
RESEARCH

www.elsevier.com/locate/marenvrev

The effect of pollution on scope for growth of the mussel (*Mytilus edulis* L.) in Iceland

H.P. Halldórsson^{a,b,*}, J. Svavarsson^{a,b}, Å. Granmo^c

^a Institute of Biology, University of Iceland, Sturlugata 7, 101 Reykjavík, Iceland

^b Sandgerði Marine Centre, Garðvegi 1, 245, Sandgerði, Iceland

^c Kristineberg Marine Research Station, SE-450 34 Fiskebäckskil, Sweden

Received 27 March 2003; received in revised form 23 January 2004; accepted 28 February 2004

Abstract

In order to evaluate effects of contaminants at high latitudes, the effects on scope for growth (SFG) were evaluated for both transplanted and resident blue mussel (*Mytilus edulis* L.) near large and small harbours in Iceland. Low SFG values were found for mussels at the mouth and in the inner part of the large Reykjavík harbour, which could be attributed to elevated levels of organotins and polyaromatic hydrocarbons. Mussels in smaller and/or less polluted harbours and sites off Reykjavík harbour only showed a slight reduction in SFG. No major effects were found at sites >3 km from the large harbour of Reykjavík. SFG provides valuable information on the effects of harbour pollutants in Iceland, in particular in areas of extensive shipping activity. The use of this biomarker on high latitude organisms is highly relevant due to extended oil exploration at higher latitudes.

© 2004 Elsevier Ltd. All rights reserved.

Keywords: Scope for growth; Pollution; Harbours; Iceland; *Mytilus edulis*

1. Introduction

There is a growing concern about the state of the marine environment at high latitudes, because recent studies have shown that high levels of many contaminants are found at these latitudes (AMAP, 1998, 2003). This holds true for organometals

* Corresponding author. Tel.: +354-5254610; fax: +354-5254069.

E-mail address: halldor@hi.is (H.P. Halldórsson).

(Me–Hg, Organotins) as well as persistent organic pollutants (POPs) and polyaromatic hydrocarbons, PAHs (AMAP, 1998; AMAP, 2003; Muir et al., 2003; Skarphéðinsdóttir, Ólafsdóttir, Svavarsson, & Jóhannesson, 1996; Valette-Silver, Hameedi, Efurð, & Robertson, 1999). There is still a limited amount of information concerning the effects of these contaminants on the high latitude biota.

Harbours and shipping routes are well-known sources of various pollutants, in particular oil compounds, PAHs and antifouling substances (ten Hallers-Tjabbes, Kemp, & Boon, 1994; Wang, Zhang, & Chen, 2001). Perhaps the best known biological effect of organotins is imposex of gastropods, i.e. the development of penis and vas deferens in females, caused by tributyltin (TBT). Imposex has been observed in the dogwhelk *Nucella lapillus* L. and the common whelk (*Buccinum undatum* L.) at high latitudes, such as in Northern Norway, Faeroe Islands, Greenland and Iceland (Brick & Bolte, 1994; Følsvik, Brevik, Berge, & Dam, 1998; Følsvik, Berge, Brevik, & Walday, 1999; Strand & Asmund, 2003; Svavarsson, 2000), indicating that organotin pollution is locally severe at northern latitudes. Little information is available on the effects of PAHs on high latitude organisms, apart from studies of PAHs originating from industry (Holte, Dahle, Gulliksen, & Næs, 1996; Næs, Hylland, Oug, Förlin, & Ericson, 1999). Recent studies have shown genotoxic damage, seen as DNA adducts in the blue mussel, *Mytilus edulis* L., near harbours (Ericson, Skarphéðinsdóttir, Zuanna, & Svavarsson, 2002), and effects on various biomarkers in the shorthorn sculpin (*Myoxocephalus scorpius* L.) in Iceland (Stephensen et al., 2000) and the bivalve *Mya truncata* L. in Svalbard (Camus et al., 2003).

The objective of the present paper was to evaluate physiological effects caused by contaminants occurring near harbours in Icelandic waters. To study this we used scope for growth (SFG) of the blue mussel (*M. edulis*). This method has been widely used to estimate stress on mussels in European waters (see Widdows & Donkin, 1992; Widdows et al., 1995). We addressed the questions: Are high levels of contaminants reflected in reduced scope for growth of the blue mussel near harbours at high latitudes? Which contaminants are likely to have adverse effects on the scope for growth?

2. Material and methods

2.1. Sampling sites

Blue mussels (*M. edulis*) were studied at various coastal sites in SW Iceland on several occasions, from 1999 to 2001 (Tables 1 and 2, Fig. 1). The studies were confined to the period from September to April. The period between April and September was excluded, due to extensive release of gametes of the mussels upon retrieval in the laboratory (pers. obs.). The studies were based on both resident and transplanted mussels. The sites studied were selected on the basis of mussel availability and harbour types and sizes. Major emphasis was placed on Reykjavík harbour, the largest harbour in Iceland (lagoon-like, with a narrow mouth; intensive traffic of small and large vessels; 80–100 vessels docking, in particular fishing vessels,

Download English Version:

<https://daneshyari.com/en/article/9484372>

Download Persian Version:

<https://daneshyari.com/article/9484372>

[Daneshyari.com](https://daneshyari.com)