Zebra mussel (*Dreissena polymorpha*) parasites: Potentially useful bioindicators of freshwater quality?

Laëtitia Minguez a, Daniel P. Molloy b, François Guérol d, Laure Giambérini a,*

a Université Paul Verlaine – Metz, Laboratoire des Interactions, Ecotoxicologie, Biodiversité, Ecosystèmes (LIEBE), CNRS UMR 7146, Campus Bridoux, Rue du Général Delestraint, F-57070 Metz, France

b Division of Research and Collections, New York State Museum, Albany, NY 12230, USA

**Abstract**

In environmental quality bioassessment studies, analysis of host–parasite interactions may well be a valuable alternative to classical macroinvertebrate sampling approaches. Herein, we investigated whether zebra mussel (*Dreissena polymorpha*) parasites could be useful biomonitoring tools. Mussel populations were sampled twice at two sites in northeastern France representing different levels of contamination and were characterized for parasite infection following standard histological methods. Our results indicated that sites of different environmental quality (i.e. chemical contamination) exhibited different parasite communities characterized by different trematode species and parasite associations. An additional significant finding was the positive correlation established between the prevalence of Rickettsiales-like organisms and metal contamination. Multivariate analyses were valuable in examining parasite communities.

© 2010 Elsevier Ltd. All rights reserved.

1. Introduction

The constant threat of anthropogenic pollution to aquatic habitats requires ongoing and comprehensive monitoring efforts. In this regard, biological methods have proven valuable in assessing environmental impacts. Such methods have included quantification of changes in biological responses by using biochemical, physiological, morphological, and behavioural biomarkers, as well as the measurement of ecological parameters focusing on the structures and the taxonomic composition of communities (e.g. diversity indices), indicator species (e.g. biotic indices) (Hawkes, 1997), or life history traits (Bournaud et al., 1992). As indicator species, macroinvertebrates are by far the most commonly used and convenient group for these investigations (Connell et al., 1999). Among freshwater macroinvertebrates, zebra mussels, *Dreissena polymorpha*, are considered a reliable bioindicator species for use in such studies (Sures et al., 1997). *D. polymorpha* is an invasive species which has successfully colonized a wide range of ecosystems throughout Europe and North America where it became common over wide areas (McMahon, 1996). These mussels have been documented to have a variety of parasites (Molloy et al., 1997), and in the study reported herein we investigate whether these parasites could also be useful as indicator species of aquatic pollution.

The concept of using parasites as a bioassessment tool is not new, but has focused mainly on fish parasites (Dušek et al., 1998; Broeg et al., 1999, 2005; Sures et al., 1999; Dzikowski et al., 2003; Schmidt et al., 2003; Blanar et al., 2009; Vidal-Martínez et al., 2010). Up to now, little attention has been paid to parasitism in molluscs, and when studies exist, they deal mostly with marine organisms (Kim et al., 1998; Heinonen et al., 2000; Chu et al., 2002; Moles and Hale, 2003). Parasites are important in ecosystem structure...