

A closer look at *Cryptobia dahli*: a parabodonid flagellate from the stomach of the Atlantic lumpfish

M. A. Freeman^{1*} and Á. Kristmundsson²

¹Ross University School of Veterinary Medicine, Basseterre, St. Kitts, West Indies; ²Institute for Experimental Pathology at Keldur, University of Iceland, Reykjavík, Iceland

Abstract

Cryptobia dahli is a biflagellated endocommensal parabodonid, commonly found in the stomach of the Atlantic lumpfish, *Cyclopterus lumpus*. The SSU rDNA sequence obtained for *C. dahli* is the first gastric *Cryptobia* to be sequenced from fish, and in phylogenetic analyses it is robustly grouped with *Cryptobia helicis* an endocommensal from the reproductive system of land snails, and the type species of the genus, along with free-living *Parabodo* spp. This grouping forms as a sister clade to the parasitic haemoflagellates, *Cryptobia* spp. and *Trypanoplasma borreli*. This grouping lends support for a more clear distinction to be assigned between the haematozoic parasitic forms (*Trypanoplasma* spp.) and the endocommensal forms from the digestive system of fishes and reproductive system of land snails (*Cryptobia* spp.). The prevalence in wild caught adult lumpfish from Iceland was 100% with high numbers of flagellates present in all fish. Histological sections of stomach tissues from fish with high numbers of flagellates in their stomach contents were not found to cause any pathological changes to the stomach epithelium, suggesting that this flagellate will not become problematic in the future development of lumpfish culture for the aquaculture industry.

Introduction

Parabodonid flagellates are an order (Parabodonida) of kinetoplastid flagellates that contain many free-living, commensal and parasitic forms (Moreira et al., 2004). The genus *Cryptobia* was originally described for endocommensal flagellates, *Cryptobia helicis*, found in the seminal receptacle of three species of land snails (Leidy, 1846) and as the type species for the genus it was recently redescribed (Kozloff, 2004). Kozloff (2004) noted that the three species of snails all had morphologically distinct forms of *Cryptobia* and that *C. helicis* was only found in *Neohelix albolabris albolabris*, the first of three snails men-

tioned by Leidy (1846) and the others represented new species of *Cryptobia*. *Cryptobia* spp. also infect many species of marine and freshwater fishes (Woo, 1987). They can be ectoparasitic on the gills and skin, endocommensal in the digestive tract and endoparasitic in the blood, the latter normally requiring a leech for transmission between fish (Woo, 1987). The genus *Trypanoplasma* was originally proposed for the endoparasitic flagellates found in the blood of fishes (Laveran and Mesnil, 1901). However, it was later synonymized with *Cryptobia* due to the lack of morphological differences between

* Corresponding author's e-mail: mafreeman@rossvet.edu.kn