



## Checklist of Protozoan parasites of fishes from Brazil

JORGE C. EIRAS<sup>1</sup>, RICARDO M. TAKEMOTO<sup>2</sup>, GILBERTO C. PAVANELLI<sup>2</sup> & JOSÉ L. LUQUE<sup>3</sup>

<sup>1</sup>*Departamento de Biologia, and CIIMAR, Faculdade de Ciências, Universidade do Porto, Rua do Campo Alegre, s/n, Edifício FC4, 4169-007 Porto, Portugal. E-mail: jceiras@fc.up.pt*

<sup>2</sup>*Departamento de Biologia, Universidade Estadual de Maringá, NUPELIA, Av. Colombo 5790, 87020-900 Maringá, PR, Brasil. E-mail: takemotorm@nupelia.uem.br; E-mail: pavanelli@nupelia.uem.br*

<sup>3</sup>*Departamento de Parasitologia Animal, Universidade Federal Rural do Rio de Janeiro, Caixa Postal 74508, Seropédica, RJ, Brasil, CEP 23851-970. E-mail: jlluque@ufrj.br*

### Abstract

Provided is a list of the protozoan parasites of freshwater and marine fishes from Brazil. This report includes information about the site of infection, host habitat, localities and references of 100 parasite species (1 amoeba, 70 flagellates, 13 apicomplexa and 16 ciliates) distributed among 112 different host species, mainly from freshwater. It is concluded that the diversity of protozoan parasites from Brazilian fish is understudied, and it is suggested that appropriate measures be taken in the research efforts to increase studies on the diversity of Protozoans parasites of fish from Brazil.

**Key words:** Biodiversity, parasites, protozoan, fish, Brazil

### Introduction

Brazil is the largest country of the Neotropical region and one of the largest countries of the world. Besides having a very long coast, Brazil has a large number of rivers, some of them several thousands of kilometers long, which includes the Amazon River, the longest river in the world.

The biodiversity of Brazilian fishes is very high. According to Levêque *et al.* (2008) there are at least about 4,035 different freshwater fish species in Brazil (2,978 species in FishBase), which represent about 31% of the world's known species of freshwater fish. In addition, there are 1,266 (FishBase) species of marine fish. Considering the large number of marine and freshwater fish species from Brazil, the number of parasites infecting these fish species is likely to also be very high, and considering that each fish species may be parasitized by several different parasites, the diversity of parasites is certainly much greater than known to date.

The study of fish parasites in Brazil, both from freshwater and marine species, increased in the last years. As a consequence the number of parasite species reported so far is much higher than it was about 10 or 15 years ago. This resulted in the publication of several checklists and, sometimes, revisions about several groups of parasites, mostly from freshwater fish. However, those checklists concern only metazoan parasites. So, there is limited information on protozoan parasites, even for the several protozoan taxa that is known. Recently, Eiras *et al.* (2010) produced a book listing parasites of all the taxa, including protozoa, infecting the fish from Brazil, but including only freshwater species and without references to localities.

Therefore, an updated list of parasites including freshwater and marine fish parasites is severely lacking. The utility of such a report is evident to the fish parasitologists and fish farmers.

### Material and methods

The generation of the present list was made by consulting published (printed and electronic) records on parasites from Brazilian fish species (journal papers, abstracts of meetings, etc.) in an attempt to include as many species as