

**Helminth Parasites of the Alchichica Silverside
Poblana alchichica (Atheriniformes: Atherinopsidae)
from the Alchichica Crater-Lake, Central Mexico**

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Abstract: In order to contribute to the knowledge on helminth parasites of freshwater fishes in Mexico, the helminth fauna of the Alchichica silverside *Poblana alchichica* was studied. Four species of helminths, including 2 species of digeneans (*Posthodiplostomum minimum* and *Tylodelphys* sp.), 1 species of cestode (*Ligula intestinalis*) and 1 species of nematode (*Rhabdochona canadensis*) were recovered from 25 examined hosts. Values of prevalence and abundance of each infection are provided. The present work provides the first report of *R. canadensis* in atherinopsid fishes in Mexico.

Key words: Digenea • Cestoda • Nematoda • Atherinopsidae • Mexico

INTRODUCTION

The Alchichica silverside *Poblana alchichica* (de Buen, 1945) (Atheriniformes: Atherinopsidae) is an epicontinental fish species with very restricted distribution, which is limited to the saline crater-Lake of Alchichica, in the state of Puebla, Mexico [1], even though some authors recognize three subspecies, each of these inhabiting three different saline lakes in the state of Puebla [2].

Probably because of its restricted distribution, not many studies on the helminth fauna parasitizing this fish species have been carried out. To date there are records of the parasites *Posthodiplostomum minimum* (McCallum, 1921), *Ligula intestinalis* (Linnaeus, 1758), *Eustrongylides* sp. and *Spiroxys* sp. for *P. alchichica* from the Alchichica crater-Lake [3, 4], as well as the records of *Tylodelphys* sp. and *Bothriocephalus acheilognathi* (Yamaguti, 1934) in the sub-species *Poblana alchichica squamata* from Quechulac crater-Lake [4]. The aim of this work is to provide complementary information about the parasitic fauna of *P. alchichica* from the Alchichica crater-Lake, in order to discover missing components of its parasitic spectrum.

MATERIALS AND METHODS

On April 2011, twenty-five individuals of *P. alchichica* were examined for helminth parasites. Fishes were captured in Alchichica Lake (19°24' N, 97°24' W, 2345 m asl), using nets. Individual fishes were kept alive and studied for helminths. All internal organs were analyzed separately in Petri dishes with 0.65% saline under the stereomicroscope. Parasites were removed to a Petri dish with saline 0.65%, prior to fixation. Digeneans and cestodes were fixed with hot (steaming) 4% formalin, while nematodes were fixed with hot (steaming) 70% ethanol. All helminths were processed following standard procedures. Identification was made using specialized literature and representative specimens of the helminth species were deposited at the Colección Nacional de Helmintos (CNHE), Universidad Nacional Autónoma de México, Mexico City. The use of prevalence (% infected) and abundance (mean number of parasites of a single species in the sample) follows Bush *et al.* [5].

RESULTS AND DISCUSSION

Four helminth species were found in the examined hosts: the metacercariae of *Posthodiplostomum minimum*

Table 1: Helminth parasites of *Poblana alchichica* in the Alchichica crater-Lake

Helminth taxa	Infection site	Infected hosts (n)	Prevalence and abundance (\pm SD)	CNHE No.
Digenea				
<i>Tylodelphys</i> sp.	Body cavity	2	8, 0.2 \pm 0.82	Not deposited
<i>Posthodiplostomum minimum</i>	Mesentery	5	20, 0.36 \pm 1.04	Not deposited
Cestoda				
<i>Ligula intestinalis</i>	Body cavity	2	8, 0.08 \pm 0.28	8367
Nematoda				
<i>Rhabdochona canadensis</i>	Intestine	16	64, 3.04 \pm 4	8368

and *Tylodelphys* sp., the plerocercoid of *Ligula intestinalis* and the adult nematode *Rhabdochona canadensis* Moravec and Arai, 1971. Twenty (80%) of the 25 individual hosts were infected, but only 4 fishes harbored more than one helminth species. The nematode *R. canadensis* showed the highest levels of infection reaching prevalence values higher than 60% and an abundance value higher than 3 parasites per sampled host. Infection site, number of infected fish, prevalence, abundance and accession number of voucher specimens of each helminth species are shown in Table 1.

Three of the helminth species recorded in this study are larval stages frequently found in a wide range of fish hosts and localities from Mexico [3, 6, 7], including the species *Poblana alchichica* [4]. These helminth species develop to the adult stage in fish-eating birds [3, 8], which have been historically recorded in the studied region, although recently their presence is scarce due to the reduced volume of the lakes [9]. Meanwhile, the finding of the nematode adult *Rhabdochona canadensis* result very interesting due this species seem to be part of the biogeographical core helminth fauna of cyprinid fishes [10], being frequently recorded for these fish in Mexico [6, 8, 10-12]. Present finding of this nematode species in *P. alchichica* represents the first report of this species in atherinopsid fishes, which must be added to the recent record of this nematode species in ictalurids [13], in order to re-evaluate current considerations on the degree of host-specificity of this species.

The data obtained from the present work represent just a new source of information on the inventory of the helminth parasites of fishes in Mexico, particularly from epicontinental saline lakes. However, relevance of this study lies in the generation of knowledge about diversity of species parasitizing fishes in these environments, which is the basis of further studies on ecology, feeding behavior, biogeography and general status health to evaluate mortality, risks and decisions for conservation of these hosts.

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