

*Research Note*

**Parasites of the Red Jollytail, *Brachygalaxias bullocki* (Osmeriformes: Galaxiidae), from the Maullín River, Patagonia, Chile**

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**ABSTRACT:** *Brachygalaxias bullocki* (Regan, 1908) is a fish species endemic to Chile, and its distribution is restricted from Concepción to Chiloé Island. A survey conducted during January 2007, involving 26 fish from the Maullín River in Southern Chile, shows that infracommunities richness ranged from 0 to 5 with a mean species richness of 2.3 (SD = 1.3). Nine species of parasites were recorded, and 8 constitute new records of parasites for *B. bullocki*: *Ichthyophthirius* sp., *Trichodina* sp., Epistylididae, *Myxobolus* sp., *Myxidium* sp., *Tylodelphys* sp., *Stephanoprora uruguayense*, and *Diplodon chilensis*.

**KEY WORDS:** *Brachygalaxias bullocki*, red jollytail, Ciliophora, Myxozoa, Digenea, Bivalvia, Chile.

The galaxiids (Galaxiidae) are scaleless, freshwater fishes and have a wide distribution in cool temperate waters of the Southern Hemisphere. *Brachygalaxias bullocki* (Regan, 1908) has only landlocked populations and is endemic to Chile (McDowall, 2006). The distribution of *B. bullocki* in Chile ranges from Concepción (36°46'S) to the Chiloé Island (42°30'S) (Cussac et al., 2004; McDowall, 2006). This species attains a maximum total length of 56 mm and can be found in wetland margins and small streams, living for up to 2 yr. This species was classified as data deficient (Campos et al., 1998; IUCN, 2007).

The parasitological records of galaxiid fishes mainly include species of the genera *Galaxias* and *Aplochiton* as hosts (Beumer et al., 1983; Hine et al., 2000; Ortubay et al., 1994; Olmos and Muñoz, 2006). As a consequence, the parasitological records for *B. bullocki* are scarce, including 3 parasite species: the nematodes, *Camallanus corderoi*, and *Contracaecum* sp., and the digenean *Acanthostomoides apophalliformis* in Calle-Calle River (39°46'S; 73°11'W)

(Torres, Arenas, et al., 1988; Torres, Franjola, et al. 1988; 1990). Thus, the purpose of the present work is to enlarge the list of parasites of *B. bullocki*.

The sampling site was a shallow backwater in the coast of the Maullín River (41°16'S; 73°01'W). This river is 85 km long, belongs to an Andean hydrographic watershed, begins in the Llanquihue Lake, and finishes in the Pacific Ocean. Maullín River mean depth is 3 m, and its width varies from 50 to 600 m (Soto et al., 2006).

A sample of 26 specimens of *B. bullocki* was collected in January 2007 by electrofishing. Fish were transported to the laboratory and measured. Specimens were examined within 48 hr of capture. The fins, skin, eyes, gills, heart, body cavity, liver, gall bladder, stomach, intestine, gonads, kidney, and brain of each fish were examined under a dissection microscope. The parasites were collected, counted, identified, and discriminated by organs. Prevalence, mean intensity, and richness were calculated following Bush et al. (1997). Microparasites were not counted, so mean intensity could not be calculated. Voucher specimens of parasites (*Tylodelphys* sp., *Acanthostomoides apophalliformis*, *Myxidium* sp., *Myxobolus* sp., and *Diplodon chilensis*) were deposited in the Museum of Zoology, Universidad de Concepción, Concepción, Chile, accession numbers MZUC 033157 to 033161.

Fish length varied from 21 to 39 mm (29.8 ± 4.3). Only 1 (4%) fish had no parasites. Parasite species of *B. bullocki*, site of infection, stage, prevalence, and mean intensity are shown in Table 1. Nine parasites species were found: 3 ciliophorans, 2 myxozoans, 3 digeneans, and 1 mollusk. All the macroparasites (digenean and mollusks) were in larval stages. *Tylodelphys* sp. had the highest prevalence and mean intensity. The species richness ranged from 0 to 5, with a mean of 2.3 (SD = 1.3). Six fish (23%) were

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**Table 1.** Data of parasite infections of *Brachygalaxias bullocki* from Maullín River, Chile.

Parasite	Family	Species	Stage	Site of infection	Prevalence %	Mean intensity (SD)
Ciliophora	Trichodinidae	<i>Trichodina</i> sp.	fully mature	gills and fins	11.5	-
	Epistylididae		solitary zooid	gills	11.5	-
	Ichthyophthiriidae	<i>Ichthyophthirius</i> sp.	trophont	tegument	3.8	-
Myxozoa	Myxidiidae	<i>Myxidium</i> sp.	plasmidium	gall bladder	7.7	-
	Myxobolidae	<i>Myxobolus</i> sp.	plasmidium	liver	3.8	-
Digenea	Acanthostomidae	<i>Acanthostomoides apophalliformis</i>	metacercaria	liver	57	1.4 (0.5)
	Diplostomidae	<i>Tylodelphys</i> sp.	metacercaria	brain	96.2	9.3 (6)
	Echinostomatidae	<i>Stephanoprora uruguayense</i>	metacercaria	gills	26.9	1.9 (1.5)

infected with 1 parasite species, 8 (31%) with 2 species, 7 (27%) with 3 species, 3 (12%) with 4 species, and 1 (4%) with 5 species.

The parasite fauna of *B. bullocki* in the Maullín River (41°16'S; 73°01'W) is characterized by micro-parasites (3 ciliophorans and 2 myxozoans) and macroparasites (3 digeneans and 1 mollusk). *Trichodina* sp., *Ichthyophthirius* sp., *Myxobolus* sp., and *Myxidium* sp. were determined at genus level because of the scarce material and the low degree of maturity of myxozoans spores. More samples should be taken to properly identify the material to specific level, and compare them with other species of these genera parasitizing galaxiids (Viozzi, 1996; Kalavati et al., 2000; Flores and Viozzi, 2001, 2007; Viozzi and Flores, 2003). The macroparasites *Tylodelphys* sp., *A. apophalliformis*, *Stephanoprora uruguayense*, and *Diplodon chilensis* are not host-specific species, and they can also be found parasitizing other native fish hosts and introduced salmonids from Chile and Argentina (Ortubay et al., 1994; Olmos and Muñoz, 2006). The helminth community was composed of 2 autogenic (*A. apophalliformis* and *C. corderoi*) and 3 allogenic species (*Tylodelphys* sp., *S. uruguayense*, and *Contracaecum* sp.).

This checklist contributes 8 new parasites recorded for the first time from *B. bullocki*: *Ichthyophthirius* sp., *Trichodina* sp., Epistylididae, *Myxobolus* sp., *Myxidium* sp., *Tylodelphys* sp., *S. uruguayense*, and *D. chilensis*.

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#### LITERATURE CITED

- Beumer, J., L. Ashburner, M. Burbury, E. Jette, and D. Latham. 1983. A checklist of the parasites from Australia and its adjacent Antarctic territories, No. 48. Commonwealth Agricultural Beaureaux, Institute of Parasitology Technical Communication, London. 99 pp.
- Bush, A. O., K. Lafferty, J. Lotz, and A. Shostak. 1997. Parasitology meets ecology on its own terms: Margolis et al. revisited. *Journal of Parasitology* 83:575–583.
- Campos, H., G. Dazarola, B. Dyer, L. Fuentes, J. F. Gavilán, L. Huaquín, G. Martínez, R. Melendez, G. Pequeño, F. Ponce, V. H. Ruiz, W. Siefeld, D. Soto, R. Vega, and I. Vila. 1998. Categorías de conservación de peces nativos de aguas continentales de Chile. *Boletín del Museo Nacional de Historia Natural de Chile* 47:101–122. (In Spanish.)
- Cussac V., S. Ortubay, G. Iglesias, M. Milano, M. Lattuca, J. P. Barriga, M. Battini, and M. Gross. 2004. The distribution of South American galaxiid fishes: the role of biological traits and post-glacial history. *Journal of Biogeography* 31:103–121.
- Flores, V., and G. Viozzi. 2001. Redescription, seasonality and distribution of *Myxobolus magellanicus* (Myxosporaea) in *Galaxias maculatus* (Osmeriformes, Galaxiidae) from Patagonian Andean lakes (Argentina). *Acta Parasitologica* 46: 159–163.
- Flores, V., and G. Viozzi. 2007. Infection of *Myxobolus galaxii* (Myxozoa) in *Galaxias maculatus* (Osmeriformes, Galaxiidae) from Northwestern Patagonian Andean lakes (Argentina). *Journal of Parasitology* 93:418–421.
- Hine, P. M., J. B. Jones, and B. K. Diggles. 2000. A checklist of the parasites of New Zealand fishes, including previously unpublished records, technical report. National Institute of Water and Atmospheric Research, Wellington, New Zealand. 75 pp.
- [IUCN] International Union for the Conservation of Nature. 2007. 2006 International Union for the Conservation of Nature red list of threatened species [Internet]. IUCN Species Survival Commission, Cambridge, U.K.; <http://www.iucnredlist.org>. Accessed 2007 Jun 12.
- Kalavati, C., P. Brickle, and K. Mackenzie. 2000. Two new species of myxozoan parasites (Myxosporaea, Multivalvulida, Bivalvulida) from fishes of the Falkland Islands. *Acta Parasitologica* 45:285–288.
- McDowall, R. M. 2006. Crying wolf, crying foul, or crying shame: alien salmonids and a biodiversity crisis in the southern cool-temperate galaxioid fishes? Review in *Fish Biology and Fisheries* 16:233–422.
- Olmos, V., and G. Muñoz. 2006. Estado de conocimiento

de los parásitos eumetazoos de organismos dulceacuícolas de Chile. *Gayana* 70:122–139. (In Spanish.)

- Ortubay, S., L. G. Semenas, C. A. Úbeda, A. Quaggiotto, and G. Viozzi.** 1994. Catálogo de peces dulceacuícolas de la Patagonia Argentina y sus parásitos metazoos. Dirección de Pesca de la Provincia de Río Negro. Argentina. 110 pp. (In Spanish.)
- Soto, D., I. Arismendi, J. González, J. Sanzana, F. Jara, C. Jara, E. Guzmán, and A. Lara.** 2006. Southern Chile, trout and salmon country: invasion patterns and treats for native species. *Revista Chilena de Historia Natural* 79:97–117.
- Torres, P., J. Arenas, A. Neira, X. Cabezas, C. Covarrubias, C. Jara, C. Gallardo, and M. Campos.** 1988. Nematodes anisákidos en peces autóctonos de la cuenca del Río Valdivia, Chile. *Boletín Chileno de Parasitología* 43:37–41. (In Spanish.)
- Torres, P., R. Franjola, X. Cabezas, A. Neira, and C. Covarrubias.** 1990. Distribución de la infección por *Camallanus corderoi* (Nemata; Spiruroidea) en distintos hospedadores autóctonos y sectores de la cuenca del Río Valdivia, Chile. *Boletín Chileno de Parasitología* 45:55–59. (In Spanish.)
- Torres, P., R. Franjola, V. Cubillos, J. Miranda, and R. Vera.** 1988. Parasitismo en ecosistemas de agua dulce de Chile. 1. Presencia de metacercarias del género *Stephanostomum* (Digenea, Acanthocolpidae) en peces. *Journal of Veterinary Medicine B* 35:169–177. (In Spanish.)
- Viozzi, G. P.** 1996. Presencia de protozoos parásitos en peces autóctonos de Patagonia Argentina. *Boletín Chileno de Parasitología* 51:32–34. (In Spanish.)
- Viozzi, G., and V. Flores.** 2003. *Myxidium biliare* sp. n. (Myxozoa) from gall bladder of *Galaxias maculatus* (Osmeriformes: Galxiidae) in Patagonia (Argentina). *Folia Parasitologica* 50:190–194.