

REPRODUCTIVE BIOLOGY AND LIFE CYCLE OF *LEYDIGIA LOUISI MEXICANA* (ANOMOPODA, CHYDORIDAE), A RARE SPECIES FROM FRESHWATER LITTORAL ENVIRONMENTS

BY

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ABSTRACT

The family Chydoridae comprises a group of organisms that is relevant in an ecological sense, representing more than 40% of the total number of species of Cladocera recorded in Mexico until now. *Leydigia lousi mexicana* is a chydorid recently described in the “Los Baños” water reservoir (disappeared by now), located on the Central Mexican High Plateau. Scarce information exists on the maintenance and culture of Chydoridae in the laboratory in general, and on the reproductive biology of this species in particular. Therefore, the present work aimed at establishing the adequate conditions for the growth and reproduction of the species in the laboratory as a conservation strategy, considering that the type locality does no longer exist and the current distribution of this species is most restricted in Mexico. To this end, we experimentally studied the life cycle of *L. lousi mexicana* by developing a culture procedure in which we assessed three factors: food (*Pseudokirchneriella subcapitata* and *Saccharomyces cerevisiae*), type of substrate (commercial soil and artificial sediment), and temperature (20 and 25°C). Experiments were performed through individual assessment of reproductive responses, and by life table analysis. The highest longevity ( $52.70 \pm 2.16$  d) was observed in organisms fed *S. cerevisiae*, on artificial sediment, at 20°C. The highest fecundity ( $22.3 \pm 0.86$  neonates), the largest number of clutches ( $14 \pm 0.52$ ), and the highest intrinsic rate of population growth ( $r = 0.19 \pm 0.007$  d<sup>-1</sup>) were recorded in organisms fed with *S. cerevisiae*, on artificial sediment, at 25°C. The shortest generation time ( $T = 18.15 \pm 0.59$  d) was recorded when *L. lousi mexicana* was fed *P. subcapitata*, on artificial sediment, at 25°C. The best reproductive responses were obtained when *L. lousi mexicana* was fed *S. cerevisiae*, on artificial sediment. The procedure developed provides fundamental biological information, and could be an option for the maintenance and propagation of other chydorids.

RESUMEN

La familia Chydoridae constituye un grupo relevante de organismos, desde el punto de vista ecológico, y representa más del 40% del número total de especies de Cladóceros registrados en

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México hasta ahora. *Leydigia lousi mexicana* es un chidórido recientemente descrito del embalse “Los Baños” (ahora desaparecido), localizado en el Altiplano Mexicano. Existe escasa información sobre el mantenimiento y cultivo de chidóridos en el laboratorio en general, y sobre la biología reproductiva de esta especie en particular. Por lo tanto, el presente estudio tuvo como objetivo establecer las condiciones adecuadas para el crecimiento y reproducción en el laboratorio de esta especie, como una estrategia de conservación, puesto que la localidad tipo ya no existe y su distribución actual en México es muy restringida. Con este propósito se estudió experimentalmente el ciclo de vida de *L. lousi mexicana* mediante el desarrollo de un método de cultivo en el que se evaluaron tres factores: alimento (*Pseudokirchneriella subcapitata* y *Saccharomyces cerevisiae*), tipo de sustrato (suelo comercial y sedimento artificial) y temperatura (20 y 25°C). Los experimentos se desarrollaron mediante la evaluación individual de respuestas reproductivas, y también mediante un análisis de Tabla de Vida. La mayor longevidad ( $52,70 \pm 2,16$  d) se registró en los organismos alimentados con *S. cerevisiae*, en sedimento artificial, a 20°C. La mayor fecundidad ( $22,3 \pm 0,86$  neonatos), el mayor número de camadas ( $14 \pm 0,52$ ), y la mayor tasa intrínseca de crecimiento poblacional ( $r = 0,19 \pm 0,007$  d<sup>-1</sup>) se registraron en los organismos alimentados con *S. cerevisiae*, en sedimento artificial, a 25°C. El menor tiempo generacional ( $T = 18,15 \pm 0,59$  d) se registró cuando *L. lousi mexicana* se alimentó con *P. subcapitata*, en sedimento artificial, a 25°C. Las mejores respuestas reproductivas se registraron cuando *L. lousi mexicana* se alimentó con *S. cerevisiae*, en sedimento artificial. El método desarrollado proporcionó información biológica importante, y pudiera ser una opción para el mantenimiento y propagación de otros chidóridos.

## INTRODUCTION

Cladocera are able to inhabit diverse aquatic environments (Fryer, 1968), including the littoral zone in freshwater conditions, which realm is highly productive and favours the development of various taxa, particularly microcrustaceans of the family Chydoridae (cf. Santos-Wisniewski et al., 2002; Forró et al., 2008). This group represents the most abundant family among cladocerans in freshwater environments around the world, with 49 genera and 269 species, and with the highest number of species (89) distributed in the Neotropical biogeographic area (Forró et al., 2008).

Chydoridae constitute one of the main groups involved in mobilizing organic matter in sediments, since they feed on detritus (Smirnov, 1964; Dole-Olivier et al., 2000). These organisms can be associated with sediments and macrophytes (Smirnov, 1964; Whiteside et al., 1978), and are frequently found in Mexican impounded water bodies, where they represent more than 40% of the species recorded in the State of Mexico, located on the Central Mexican High Plateau (Elías-Gutiérrez et al., 1999). In particular, the species *Leydigia lousi mexicana* Kotov, Elías-Gutiérrez & Nieto, 2003, was collected and described as a new subspecies in the water reservoir “Los Baños”, in the State of Mexico (Kotov et al., 2003). This subspecies' distribution is restricted to the Mexican High Plateau (Elías-Gutiérrez et al., 2008), although it is phylogenetically related with a species of African origin (Kotov, 2003). It must be pointed out that the type locality does