

Cyclocoelids (Trematoda: Echinostomata) from Gadwall *Mareca strepera* in the South of the Russian Far East

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Abstract : Introduction: The trematodes from the family Cyclocoelidae (cyclocoelids) belong to the superfamily Echinostomatoidea infecting air sacs and trachea of wild birds. At present, the family Cyclocoelidae comprises nine valid genera in three subfamilies: Cyclocoelinae (type taxon), Haematotrematinae, and Typhlocoelinae. To our best knowledge, in this study, molecular genetic methods were used for the first time for studying cyclocoelids from the Russian Far East. Here we provide the data on the morphology and phylogeny of cyclocoelids from gadwall from the Russian Far East. The morphological and genetic data obtained for cyclocoelids indicated the necessity to revise the previously proposed classification within the family Cyclocoelidae. Objectives: The first objective was performing the morphological study of cyclocoelids found in *M. strepera* from the Russian Far East. The second objective is to reconstruct the phylogenetic relationships of the studied trematodes with other cyclocoelids using the 28S gene. Material and methods: During the field studies in the Khasansky district of the Primorsky region, 21 cyclocoelids were recovered from the air sacs of a single gadwall *Mareca strepera*. Seven samples of cyclocoelids were overstained in alum carmine, dehydrated in a graded ethanol series, cleared in clove oil, and mounted in Canada balsam. Genomic DNA was extracted from four cyclocoelids using the alkaline lysis method HotShot. The 28S rDNA fragment was amplified using the forward primer Dig12 and the reverse primer 1500R. Results: According to morphological features (ovary intratesticular, forming a triangle with the testes), the studied worms belong to the subfamily Cyclocoelinae Stossich, 1902. In particular, the highest morphological similarity was observed in relation to the trematodes of the genus *Cyclocoelum* Brandes, 1892 – genital pores are pharyngeal. However, the genetic analysis has shown significant discrepancies between the trematodes studied regarding the genus *Cyclocoelum*. On the phylogenetic tree, these trematodes took the sister position in relation to the genus *Morishitium* (previously considered in the subfamily Szidatitrematinae). Conclusion: Based on the results of the morphological and genetic studies, cyclocoelids isolated from *Mareca strepera* are suggested to be described in the previously unknown genus and differentiated from the type genus *Cyclocoelum* of the type subfamily Cyclocoelinae. Considering the available molecular data, including described cyclocoelids, the family Cyclocoelidae comprises ten valid genera in the three subfamilies mentioned above.

Keywords : new species, trematoda, phylogeny, cyclocoelidae

Conference Title : ICFAVS 2022 : International Conference on Fisheries, Animal and Veterinary Sciences

Conference Location : Beijing, China

Conference Dates : October 06-07, 2022