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Two new acoels (Acoelomorpha) of the genus *Haplogonaria* from the northwest Atlantic

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Abstract

Two previously unknown species of *Haplogonaria* (Acoela), *H. schillingi* **sp. nov.** and *H. baki* **sp. nov.**, are described from the coastline of Maine, USA. The two species are morphologically similar to each other but *H. schillingi* can be distinguished from *H. baki* by its red pigmentation, its possession of a large genital atrium that branches posteriorly to the seminal vesicle and anteriorly to the vagina, a seminal vesicle that is more ellipsoid-shaped than spherical, and a well-defined wall in the seminal bursa.

We provide a description of the new species using live observation, light microscopy of serial sagittal sections, and confocal microscopy imaging of F-actin. We compare the morphology of the new species with other members of the genus and discuss the phylogenetic position of *H. schillingi* in light of conflicting morphological and molecular data.

Key words: Meiofauna, turbellarians, Acoela, Xenacoelomorpha, interstitial

Introduction

The Acoela is a diverse group of flatworms that live in intertidal, subtidal and pelagic habitats. The majority of known acoel species are interstitial, and the many sheltered coves and bays along the coastline of the northeast United States create ideal habitats. Hooge & Tyler (2003a) described 12 species from Maine, and provided new distributional records for another six species, bringing the total number of acoels known from Maine to 28 (Tyler *et al*. 2006-2015). We herein describe two additional species from Maine, closely related species belonging to the genus *Haplogonaria*.

Materials and methods

Sampling. Sediment samples were transported to the University of Maine for extraction and observation of the animals. Specimens were extracted from sediment using magnesium-chloride anesthetization (Sterrer 1971). Live animals were viewed by light microscopy in squeeze preparations and photographed.

Histological study. Specimens were fixed in warm Stefanini's fixative (Stefanini *et al*. 1967), washed in phosphate buffer (Millonig's, 0.1 M), fixed in phosphate-buffered 1% (v/v) osmium tetroxide, dehydrated in acetone, and embedded in EMBed/Araldite epoxy resin. Dehydration was quickened by microwave radiation (Samsung oven, two 7-sec irradiations at 650 W separated by 20-sec interim, with specimen-vial on ice and with water ballast of two filled 300-ml beakers [Giberson & Demaree 1995]). Serial thick sections of 2.0 µm were made according to Smith & Tyler (1984) using a Diatome diamond knife mounted in a Butler trough (Butler 1979) and stained with toluidine blue or with hematoxylin and eosin after deresination.

Phalloidin staining. Body musculature was revealed through F-actin staining of whole mounts with fluorescently labeled phalloidin (Alexa 488; Molecular Probes, Eugene, OR) according to Hooge (2001) and viewed with Leica TCS SP2 confocal laser scanning microscope using a glow LUT (flourescence intensity represented through yellow-orange look-up table).

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