

Unraveling a Gordian knot: Biodiversity of Gordian worms, phylum Nematomorpha

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Hairworms are one of the most poorly studied groups in the animal kingdom and their relationships and diversity are currently unknown. Freshwater hairworms, commonly called Gordian worms, can be up to three meters long and seem to appear suddenly in domestic sources of water (swimming pools, toilets, pet bowls, etc.), thus making human interactions with them quite common. These encounters have led to unnecessary panic and numerous trips to doctors and veterinarians. Hairworms, are parasites of terrestrial arthropods, but are free-living in aquatic environments as adults. Terrestrial arthropods become infected with nematomorphs when they ingest cysts that infect most aquatic invertebrates. Previous studies on the relationships and biodiversity of this group of parasites have been hindered by the lack of reliable ways to collect and differentiate adult free-living hairworms. The Nematomorpha is a small phylum, with five marine and about 300 freshwater species. The 300 freshwater species are divided into 19 extant and two extinct genera, and are distributed globally. However, recent estimates suggest that only 15% of hairworm species have been described worldwide; of these, many descriptions are inadequate, lack type specimens, and/or were based on single worms. The taxonomy is in such disarray, that the order Gordiida contains only two named families (considered orders by some), no orders, and the validity of the 19 extant genera is uncertain. We discuss recent advances in the use of non-adult cyst stages, the most common life stage of horsehair worms in the environment, and the use of modern DNA techniques to match cysts and adult worms in future studies of nematomorph systematics and biodiversity. (Supported by NSF awards 0949951 and 0950066).