# Immunohistological Visualization of Tetrodotoxin in *Micrura verrili* and *Dushia atra* (Phylum Nemertea)

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*Abstract*

Nemerteans are a phylum of soft-bodied coelomate protostome worms with a specialized coelomic cavity, the rhynchocoel, which houses an eversible proboscis used for prey capture. These animals are known as voracious predators on other marine worms and crustaceans in their microhabitats and frequently have conspicuous external coloration. Several neurotoxins have been extracted from nemertean tissues, suggesting their potential role in both prey capture and aposomatic coloration. One such neurotoxin is tetrodotoxin (TTX), best studied in puffer fish but also found in a wide variety of organisms, including several species of flatworms, starfishes, the blue-ringed octopus, gastropods, and even vertebrate species such as the California newt and goby fish. Previous studies conducted on nemerteans have indicated the presence of TTX in Cephalothrix, Lineus, and Tubulanus species. In this study, immunohistological methods were utilized to determine if TTX is present in other nemertean species. An antibody to tetrodotoxin (TTX) was used to visualize and localize the presence of TTX in histological tissue sections of two species of nemerteans, Dushia atra and Micrura verrilli. In both species, TTX was indicated as brown/red pigment in gland cells of the dermis, intestinal epithelium, and outer proboscis epithelium including pseudocnidae containing gland cells. These results suggest that nemerteans are able to ingest and store TTX in their body tissues, which may account for their coloration, as well as incorporate it into their proboscis for prey capture.