Discovery of unreported sponge taxa, with potential as species new to science, from the Chicago area

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Although sponges are well studied in the ocean environment, relatively little is known about freshwater forms. Less than forty species of freshwater sponges have been described from North America, and many of those taxa are poorly understood. These primitive animals lack a nervous system or organs, and so have few macroscopic features that can aid in species identification. Instead, sponge taxa are distinguished by microscopic, glasslike spicules around which they organize their cells. The purpose of this study was to identify sponges from the Chicago area and to characterize their interspecific and intraspecific variation by analyzing the sponge spicules. The spicules were isolated by heating the sponges in nitric acid, which digested the soft tissue but left the glasslike, siliceous spicules intact. Spicules were then mounted onto microscope slides and analyzed at magnifications of up to 1000 times. Three spicule types were observed: megascleres (the largest and most common type of sponge spicule), microscleres (smaller and less common), and gemmoscleres (associated with reproductive bodies). Length (L), width (W), and height (H, or sagitta) were measured for the spicules using image analysis software. In addition, curvature of spicules was calculated with the formula $2H/((L/2)^2 + H^2)$. Five species were found, most of which were previously unreported from northeastern Illinois. Species, as well as populations within a single species, were easily distinguished by their spicule measurements. However, the ranges of measurements for specimens from the Chicago area were greater than given in the taxonomical literature, suggesting that current taxonomical descriptions should be expanded to more accurately reflect the ecomorphic variation that occurs in freshwater environments. Alternatively, it is possible that our current understanding of freshwater sponges is incomplete, and that what is assumed to be a single species actually consists of genetically distinct species or subspecies. In a collaboration with the Field Museum of Natural History, the intraspecific variation within species in the Chicago area is being compared with specimens collected from across North America. In addition, further specimens are being collected from the Chicago area for genetic analyses. As filter feeders, sponges remove organic matter, bacteria, and pollutants from water. This gives sponges great potential to impact water quality, and merits a better understanding of sponge species diversity.