A Dichotomous Key to Quickly Differentiate between Ostracodes to Establish Pre-European Ecosystem State from Conesus Lake

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Abstract

Conesus Lake experienced cultural eutrophication from the mid-late twentieth century until ongoing remediation efforts improved water quality. To improve water quality monitoring efforts, a geohistorical record from Conesus Lake is uniquely qualified to provide baseline data so that ongoing remediation efforts can be measured against a pre-European settlement baseline. Ostracods, microscopic crustaceans, are widely used as indicators of past environments. Six species of ostracods were recovered from sediment cores from the lake. The number of adult ostracod valves recovered can range into several dozens, so quick identification using a dichotomous key is useful.

To create this key, we standardized morphological terminology using Kesling (1951). We then generated a matrix of eighteen traits for all six species. Carapace texture, morphology of dorsal and ventral margin, as well as valve shape proved useful traits to differentiate these six species. Undergrad students have used this key to successfully and quickly identify ostracodes from Conesus Lake sediments. In addition, the standardized description of traits for all species enable the community-wide distribution of traits to be described for all stratigraphic intervals, thus creating a record not only of how species change as a result of trophic change, but also traits.

Introduction

Conesus Lake, the westernmost of the Finger Lakes in New York, has a long history of human activity that had caused eutrophic conditions to persist in it until remediation efforts returned the lake to a mesotrophic state (Moran and Woods, 2009). Ostracods, a kind of microcrustacean found in aquatic environments around the world, are useful as indicators of environmental conditions in lakes like Conesus (Lord et al., 2012). So a dichotomous key was created in order to more easily identify them when picking through sediment samples.

Methods

Using specimen collected from sediment samples taken from Conesus Lake, eighteen traits belonging to six different species of ostracod were used to create a trait by species matrix. Trait definition were standardized using Kesling (1951). The most identifiable of these traits were then used to create a dichotomous key for these six species. Carapace texture, morphology of dorsal and ventral margin, as well as valve shape were sufficient to differentiate between the six species recovered from Lake Conesus.

Discussion

For ease of use when using the key, the most easily identifiable traits of these six ostracods when viewed under a dissecting microscope were chosen. These traits were mainly the texture of the carapace and the shape of the valve itself since most of the species present lack more identifiable features like spines. Noticeably, the weighted averages of these traits, show that recent environmental conditions in Conesus' north basin favor ovate species, species with smoother carapaces, and species with straight ventral margin.

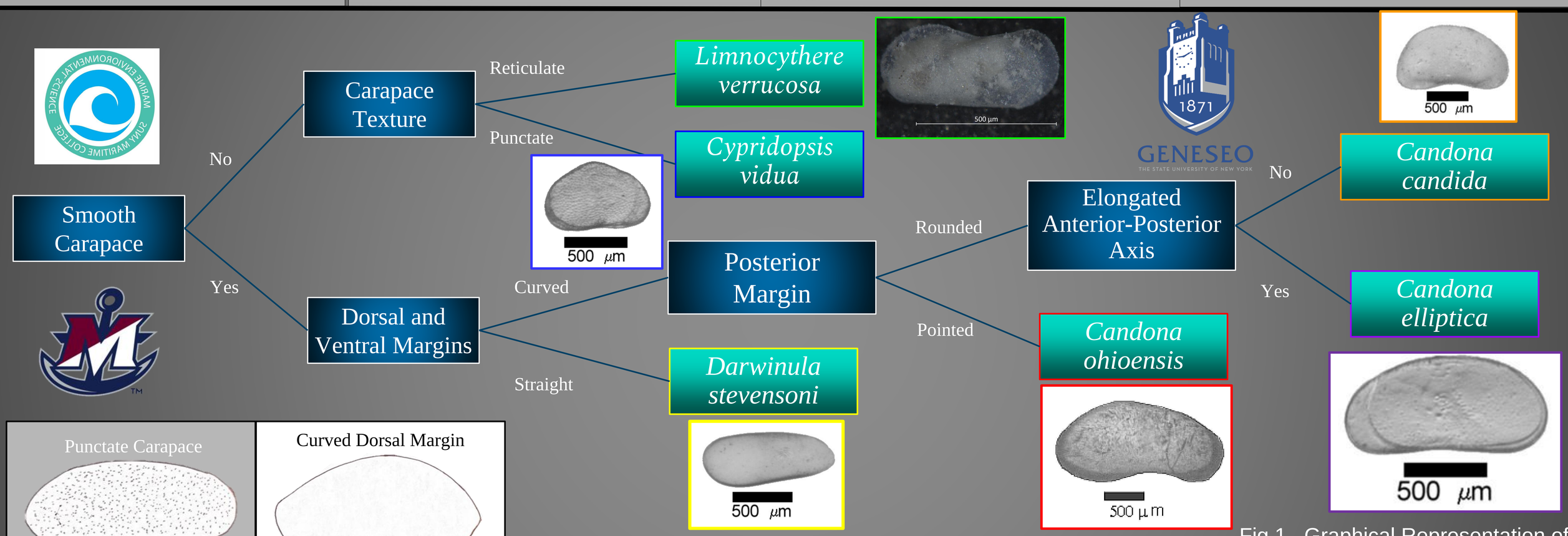

Fig 1. Graphical Representation of Dichotomous Key. All photos of ostraocdes from Smith et al. (2003), except *L. verrucosa* from this study.

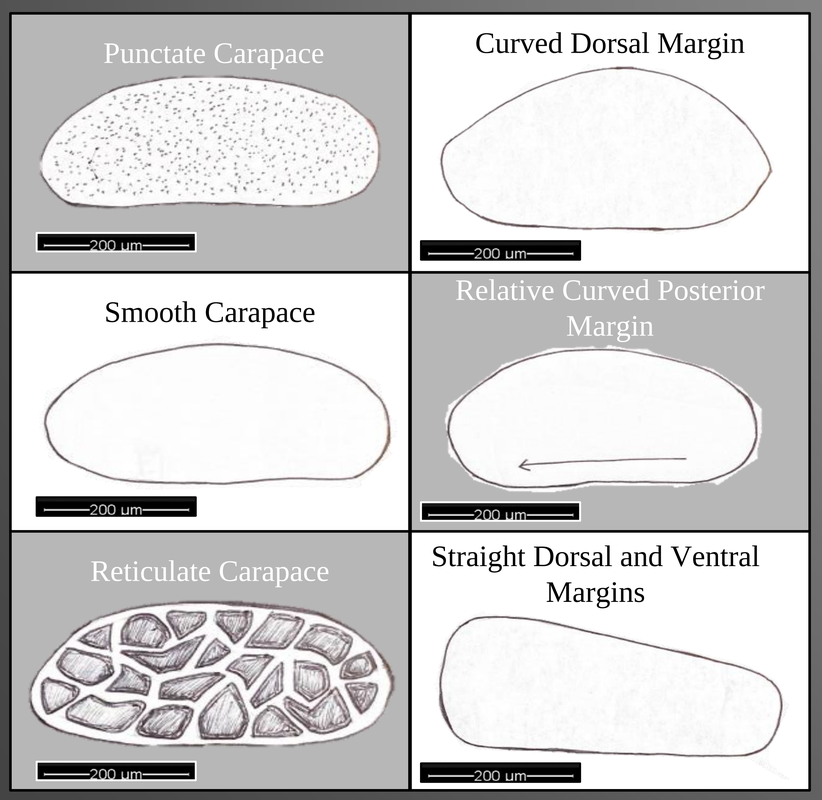

Fig 2. Illustrations of Traits used to Differential Species from Malone et al. (2020)

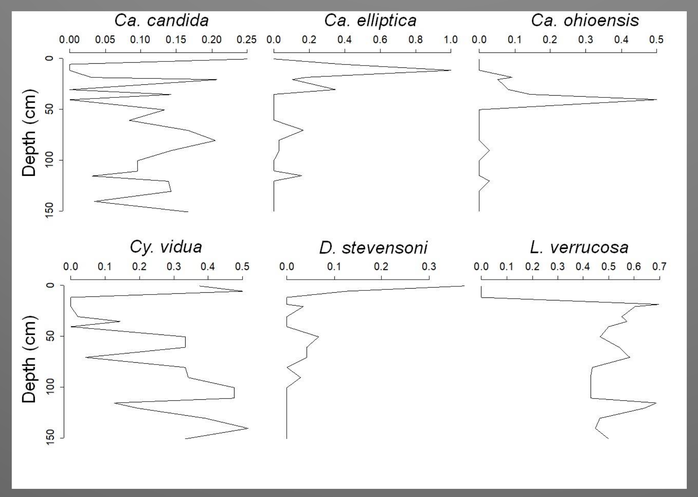

Fig 3. Percent Abundance per species from the north basin of Conesus Lake. *Candona candida, Ca. elliptica, Ca. ohioensis*, *Cypridopsis vidua*, *Darwinula stevensoni*, and *Limnocythere verrucosa* were recovered.

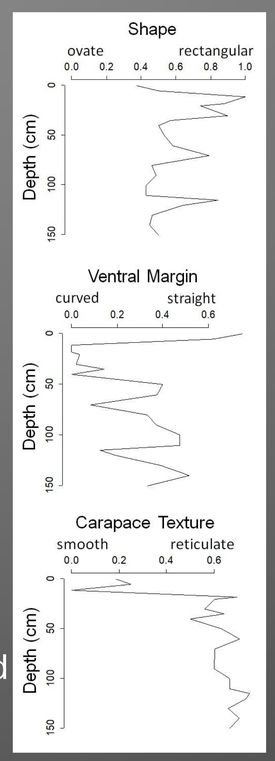

Fig 4. Weighted average of ostracode traits, shape, carapace texture, and morphology of ventral margin down the core from Conesus' north basin. Traits were assigned numeric values between 0 and 1: shape (rectangular 1, ovate 0), carapace texture (reticulate 1, punctate 0.5, smooth 0), and morphology of ventral margin (straight 1, curved 0). Average assemblage-wide values of these traits are weighted by the percent abundance of each species.

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