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RESEARCH NOTE

RARE DIATOM *Stauroneis schinzii* (Brun) Cleve var. *schinzii* MICROFOSSIL COLLECTED AND GEOREFERENCED IN ALABAMA

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Diatoms (Bacillariophyceae) are ubiquitous in marine and aquatic ecosystems and the microfossil remains of their valves are stored in high numbers within submerged sediments. Due to these properties, diatom repositories in sediments are robust data proxies containing historical information about landscape evolution, climate change, and species distribution (Cohen 2003). As part of a landscape evolution study (Hodgson 2009), we cored the sediments of Touson Lake, which is an oxbow lake cutoff from the Black Warrior River in west-central Alabama (surface area = 7.5 ha, maximum depth = 6.3 m, N 33° 00' 15.7", W 87° 39' 51.1"), to a core depth of 71 cm to interpret environmental changes over time. Within those sediments, we subsampled every 0.5-cm increment and counted 40,608 individual diatoms consisting of 27 genera and 62 species following the identification methods of Patrick and Reimer (1966, 1975) and Wehr and Sheath (2003). Sedimentary digestion methods of acid washing and hydrogen peroxide oxidizing sediment material followed Battarbee (1986). Digested materials were permanently mounted on glass slides and coverslipped with the resin Naphrax and viewed at 1000X.

All of our recorded microfossil species in the sediment core are native and common to Alabama with the exception of one observation. We recorded a single specimen of the diatom *Stauroneis schinzii* (Brun) Cleve var. *schinzii*. This species was first described by Brun (1891) with the basionym *Navicula schinzii* and has the homotypic synonym *Schizonema schinzii* (Brun) Kuntze (Kuntze 1898). *Stauroneis schinzii* is distinguished by its large size (130–170 µm long by 11–12 µm wide), striae density of 19–20 per 10 µm, and central stauros (Cleve 1884). Our specimen is 161 µm long by 14 µm wide at the stauros with radiate striae ranging 16–19 per 10 µm throughout its length (Figure 1). The differences in width and striae density in our specimen may be due to natural variation or from improvements in measuring technology; we used a digitally calibrated camera and micrometer.

Collectively, *S. schinzii* has an underreported autecology, distribution, and natural history. The European Diatom Database (http://craticula.ncl.ac.uk/Eddi/jsp) has no records of any of the four currently accepted *S. schinzii* varieties and the Global Biodiversity Information Facility (http://data.gbif.org/welcome.htm) also has no georeferenced records of them. It is a recognized species in the Integrated Taxonomic Information System database (https://www.itis.gov; taxonomic serial number 4276) and DiatomBase (http://www.diatombase.org; AphiaID 699609), but no other information, including locational data, is provided. *Stauroneis* (Ehrenberg) 1843 is a diverse freshwater genus found in lakes and streams across North America (Wehr and Sheath 2003). However, our specimen, *S. s.* var. *schinzii*, is considered native to Africa where it can be found in freshwater ponds and riverbed pools persisting during dry seasons (Woodhead and Tweed 1957; Foged 1966; Smith et al. 2015), but may be rare in North America (Patrick and Reimer 1966). For example, Patrick and Reimer (1966) used a type specimen catalogued in southwest Africa to acknowledge the presence of *S. s.* var. *schinzii* collected from a freshwater dry dock in Mobile, Alabama, but did not elaborate any further on its potential distribution. A single valve of *S. schinzii* was found in a diatometer sample retrieved from the Savannah River in Barnwell County, South Carolina, in 1998 (http://diatom.ansp.org/taxaservice/ShowTaxon1.ashx?naded_id=62066), but no other information was provided. Our observation will improve its distribution record and provide a georeferenced location.

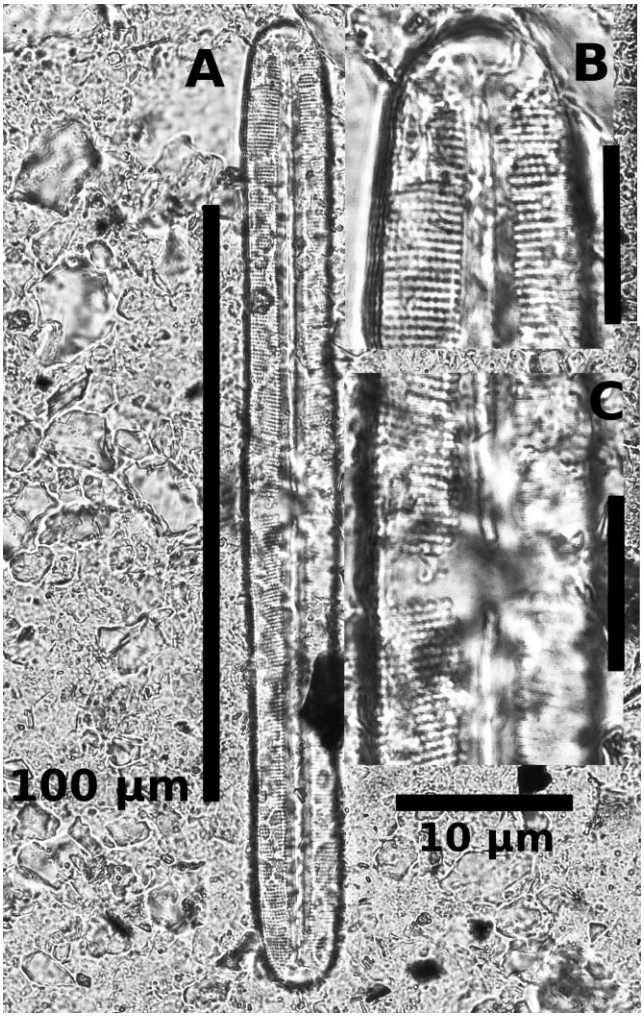

Figure 1. Photomicrograph of the *S. s.* var. *schinzii* specimen collected in Touson Lake, Alabama. The photograph was taken at 1000x under oil immersion. Panel A shows the whole specimen. Panel B is a 250% enlargement that illustrates its blunt ends and regular puncta spacing. Panel C, also a 250% enlargement, shows its central stauros.

We propose that *S. s.* var. *schinzii* was not anthropogenically introduced to North America. Our specimen was removed from a sediment sample collected 26 cm below the water-sediment interface with an estimated ^{14}C date of approximately 1450 ± 35 years before present. Previous research on Touson Lake based diatom community changes suggested that the oxbow lake became completely cut off from the Black Warrior River between 1950 and 1450 years before present (Hodgson 2009). Based on this time frame, it is difficult to distinguish if our specimen was a lotic species that was carried to the lake via overland flooding or from direct river channel connectivity, or if it was a lentic species

characteristic of coastal plain wetlands. It is possible that the species was introduced from Africa via eolian transport (e.g., Delaney et al. 1967; Folger et al. 1967). Alternatively, the presence of *S. schinzii* in Brazil (Villac et al. 2008) may also serve as a source for this species in North America. Nevertheless, because no immigration events by European and African settlers are currently recognized to have occurred between 1950 and 1450 years before present, and Native American cultures did not peak in the region until 750 to 550 years before present (Ward et al. 2005), it is unlikely that the specimen was anthropogenically introduced from another continent.

REFERENCES

Brun, J. 1891. Diatomées espèces nouvelles marines, fossiles ou pélagiques. Mémoires de la Société de Physique et d'Histoire Naturelle de Genève 31 (part 2, no. 1).

Cleve, P.T. 1894. Synopsis of the naviculoid diatoms. Part I. Kongliga Svenska Vetenskapsakademiens Handlingar, series 4 26(2), 1–194.

Cohen, A.S. 2003. Paleolimnology. Oxford University Press.

Delaney, A.C., D.W. Parkin, J.J. Griffin, E.D. Goldberg, and B.E.F. Reimann. 1967. Air borne dust collected at Barbados. Geochimica et Cosmochimica Acta, 31, 885–909.

Foged, N. 1966. Freshwater diatoms from Ghana. Biologiske Skrifter Kogl. Danske Videnskabernes Selskab, 15, 1–165.

Folger, D.W., L.H. Burckle, and B.C. Heezen. 1967. Opal phytoliths in a North Atlantic dust fall. Science, 155, 1243–1244.

Hodgson, J.Y.S. 2009. Diatom-inferred records of paleo-climate and paleo-hydrogeology from lakes in regions of different climate. Ph.D. dissertation, The University of Alabama.

Kuntze, O. 1898. Revisio generum plantarum. Pars III (3). Leipzig.

Patrick, R. and C.W. Reimer. 1966. The Diatoms of the United States. Volume I. Monographs of the National Academy of Science of Philadelphia number 13. Sutter House.

Patrick, R. and C.W. Reimer. 1975. The Diatoms of the United States. Volume II, Part I. Monographs of the National Academy of Science of Philadelphia, number 13. Sutter House.

Smith, T.E., C.J. Smith, and T. Nii Yemoh Annang. 2015. Taxonomic catalogue of algae from Ghana (Africa) and new additions. Algae Press.

Villac, M.C., V.A.P. Cabral-Noronha, and T.O. Pinto. 2008. The phytoplankton biodiversity of the coast of the State of São Paulo, Brazil. Biota Neotropica, 8(3).

Ward, G.M., P.M. Harris, and A.K. Ward. 2005. Gulf Coast Rivers of the Southeastern United States. Pp. 125–178. *In*: Benke, A.C., and C.E. Cushing (eds). Rivers of North America. Elsevier Press.

Wehr, J.D. and R.G. Sheath. 2003. Freshwater Algae of North America. Academic Press.

Woodhead, N. and R.D. Tweed. 1957. A checklist of tropical West African algae. Hydrobiologia, 11, 299–396.