



A General Paleoethnobotanical Analysis of Aventura, Belize

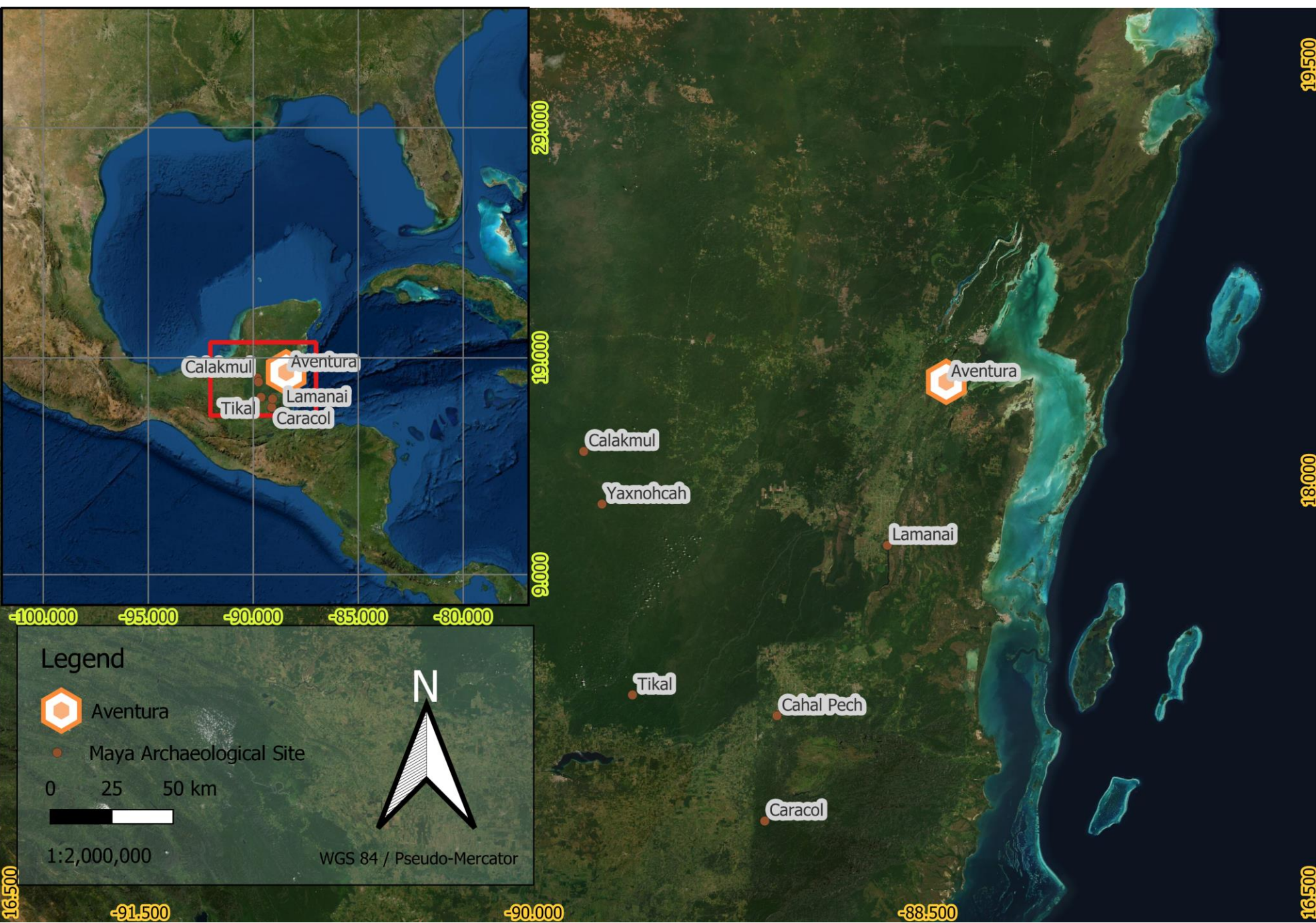


Kyra Johnson, Natalie Detwiler, David Lentz, Department of Biological Sciences, University of Cincinnati

Introduction

During the Late Classic Period (600-900 CE), the Maya city of Aventura was flourishing whereas other Mayan cities were facing decline. This is because Aventura had access to water sources that other cities did not. Due to heavy association between nature, religion, and political power in Mayan culture, cities suffering from prolonged drought were also facing political and religious turmoil. The city of Tikal is theorized to have collapsed during the Terminal Classic Period (850-900 CE) due to drought and contamination of their reservoir system (Lentz et al.) and the failing faith in their leader as a result (Grauer). Aventura was able to avoid sociopolitical unrest through their access to *bajos*, small wetlands, and the New River that starts in the Bay of Corozal, the resting point of Aventura. This close relationship with the natural world permeates through all aspects of life for Mayan citizens. Everything from what they ate to what they constructed their homes from is tied to the land they occupied. Having ancestral ties in Mesoamerica for thousands of years, Mayan influence can be seen in the people and the landscape today. Many of the same species used in the daily life of Mayans continue to flourish naturally today in the essence of a “feral garden” of a people once more prevalent (Ross).

Project Location

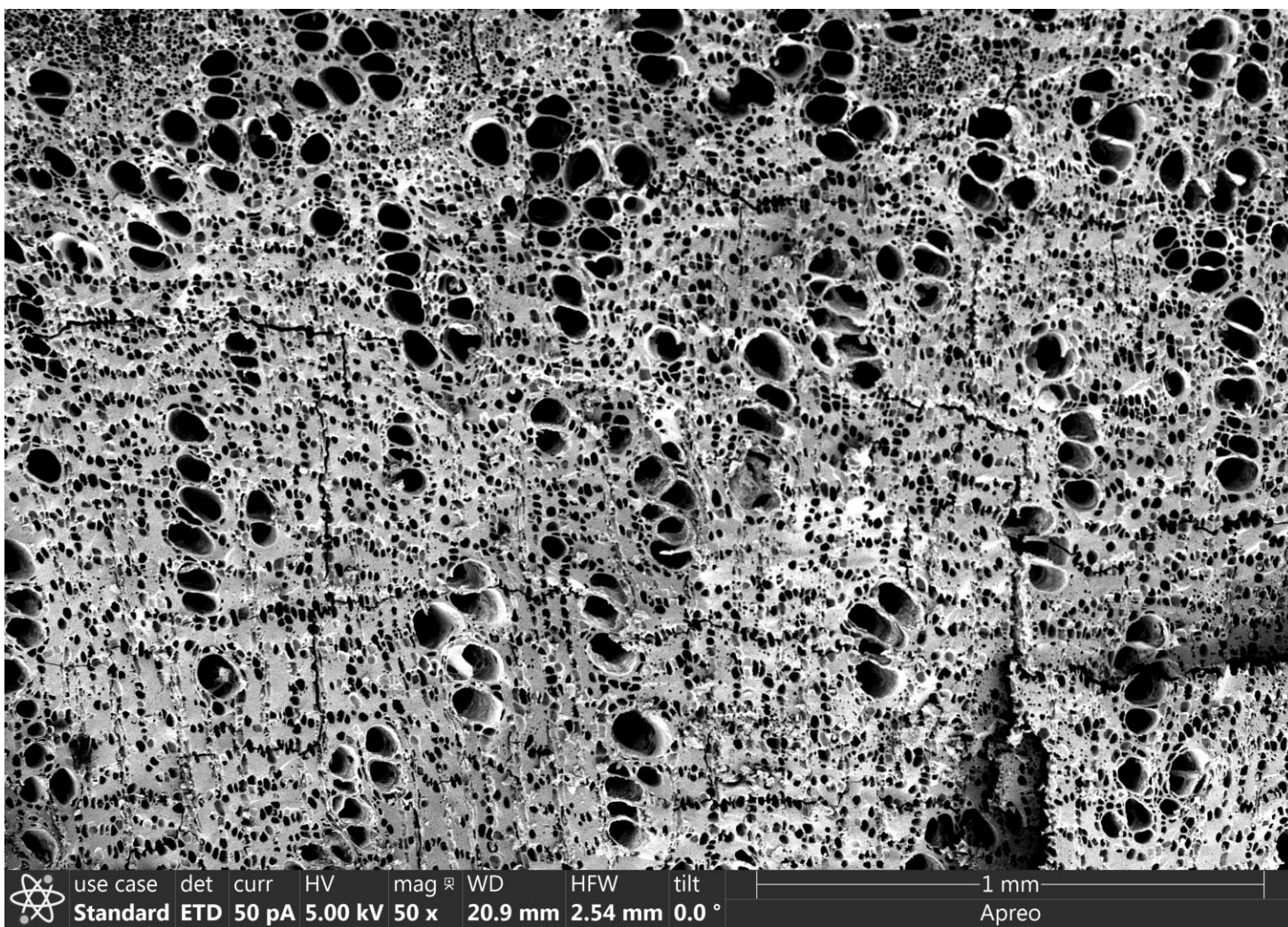


Methods

The carbonized plant remains were retrieved from Aventura during the 2017-2019 field seasons. Each sample was individually analyzed under a microscope and grouped based on their unique anatomical patterns. The samples were quantified, weighed, and determined suitable for imaging under a Scanning Electron Microscope. Images taken in SEM allow the measurement of vessel element length and diameter that are crucial for species identification.

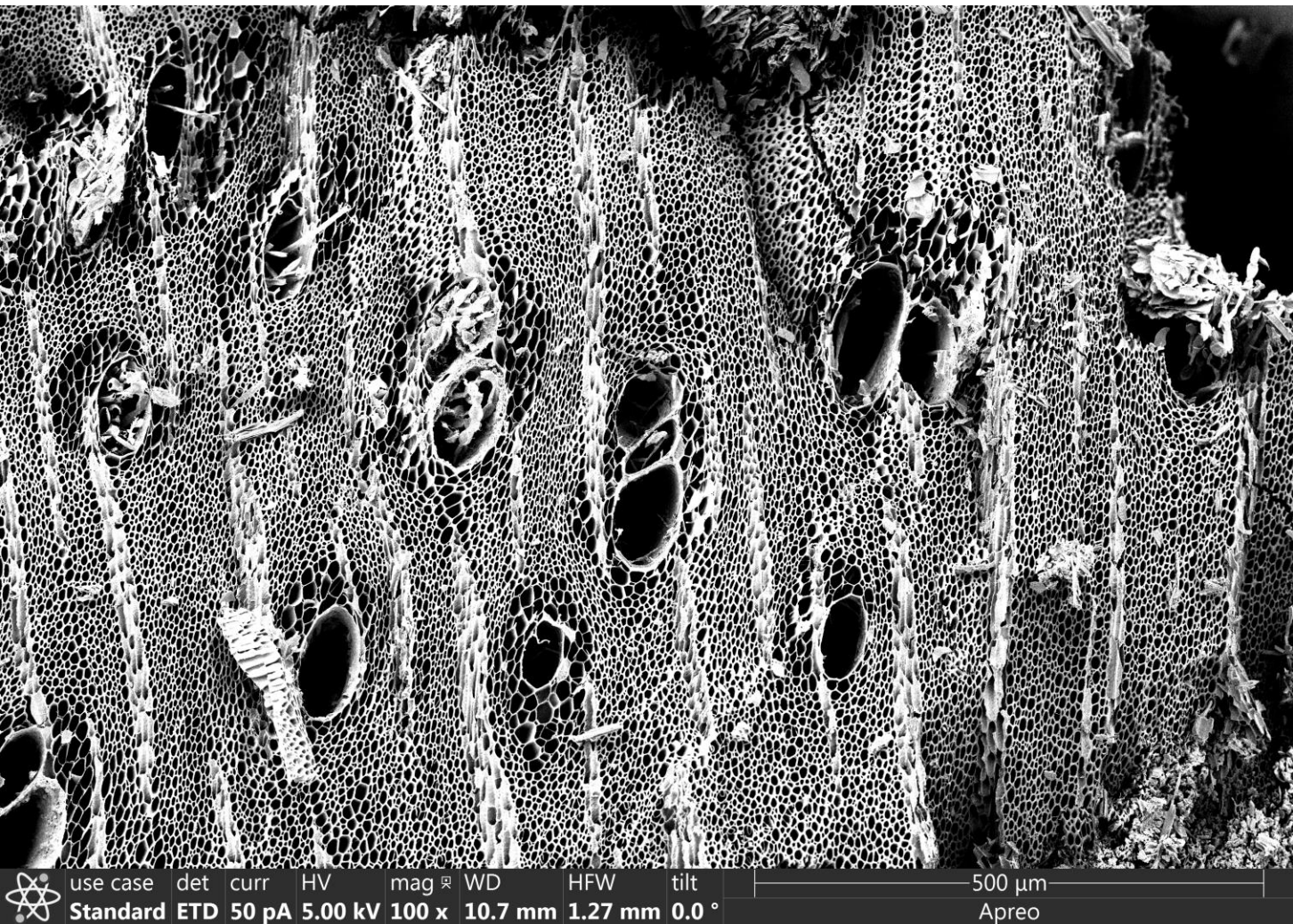
Following the imaging of the transverse and tangential section of the sample, an online database for wood identification was used to narrow the range of possibilities for species. From there, comparisons were made based on images, anatomy, and habitat to form the best conclusion.

Results

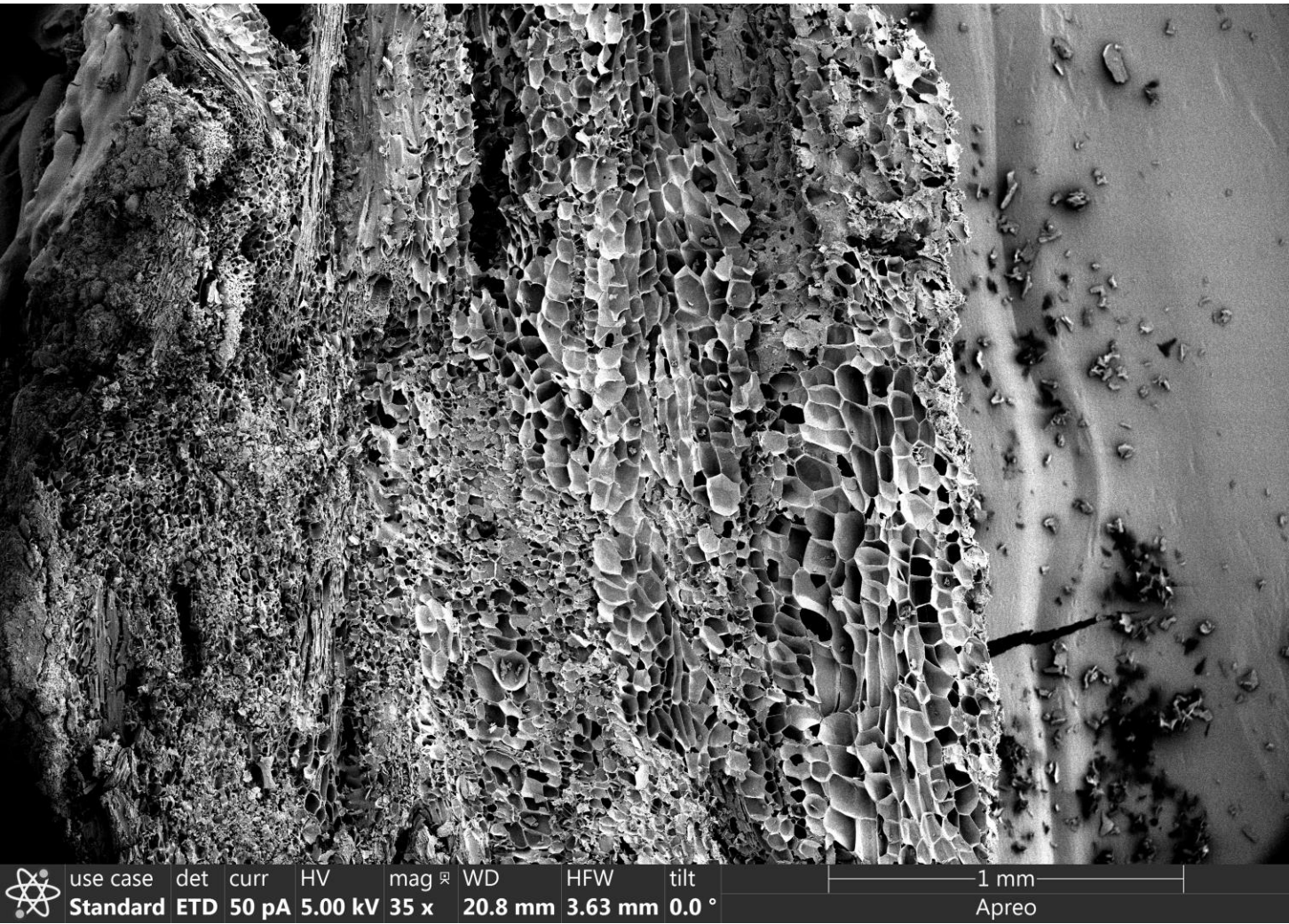


Manilkara zapota (Sapodilla)
Transverse Section (

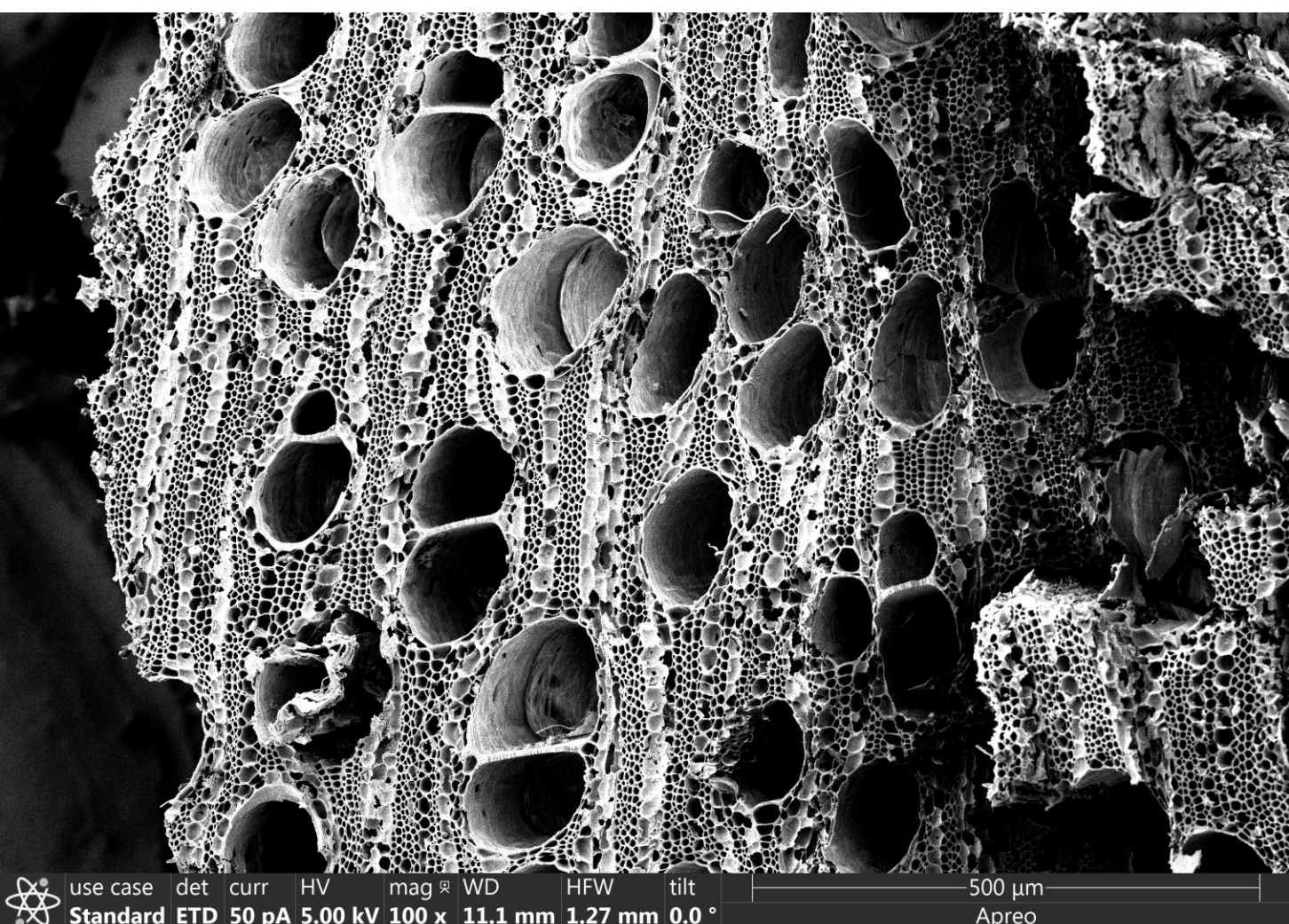
The Sapodilla Tree produces high quality, natural latex, or *chicle* (Dussol et al.). Maya ate the tree’s fruits (Lentz et al.) and used the wood for building temples and palaces (Lentz et al.).



Burseraceae
Transverse Section (Left)
Radial Section (Right)
Some trees in the *Burseraceae* were used to treat contact dermatitis from local poison woods (Arnason et al.) while others were burned as a calming incense (Merali et al.).



Pinus caribea (Caribbean Pine)
Transverse Section (Left)
Tangential Section (Right)
The Caribbean Pine tree was burned as an incense in ceremonial offerings and at burials (Lentz et al.). The tree’s wood was also used as a construction material and was one of the most abundant species identified at the Lamanai archaeological site (Lentz et al.).



Protium copal (Copal Tree)
Transverse Section (Left)
Tangential Section (Right))
The modern practice of burning Copal resin beneath the cribs of babies to stave off *Espantajo* comes from the ancient Maya (Arnason et al.). The Copal resin can also be used to aid in the removal of teeth (Arnason et al.).



Conclusions

All plants identified remain integral to contemporary Mayan and Mesoamerican culture and how these woods are used today provide insight on how they may have been used then. The samples from this study were recovered from a marketplace; the heart of the city for trade..

The belief in *Mal Ojo*, Evil Eye, and *Espantajo* was passed down from generation to generation and so were the cures to these maladies. Contemporary women will burn Copal incense around babies to prevent *Espantajo*, a malady caused by surprise or shock that leaves the infant restless. Copal incense has been proven to have an anxiolytic, or calming, effect (Merali et al.) on those exposed to the smoke. Therefore, the babies would be less susceptible to *Espantajo*, or shock, if their mothers burnt it in the home.

Beyond this the Mayans left a lasting impact on the landscape through their overexploitation of the *Pinus caribaea*. The Caribbean Pine tree grows in savannas in Belize and burned as incense for ritual use as well used for (Lentz et al.). Pine might have even served as a form of currency to facilitate trade. In the Late Classic Period, the use of pine increased in the city of Lamanai in correlation with drought and conflict (Lentz et al.).

Protium copal and *Pinus caribaea* were recovered from the marketplace, where it may have been burned and sold by a merchant. *Manilkara zapota* was recovered from the marketplace, where the fruits and latex may have been sold to customers. A tree from the family *Burseraceae* was also recovered from the marketplace, merchants may have sold this as a cure for dermatitis caused by contact with poison woods.

Acknowledgements

- Dr. Cynthia Robin (Lead Archaeologist, Northwestern University Anthropology)
- Dr. Melodie Fickensher (Scanning Electron Microscopy, University of Cincinnati Materials Characterization Lab)
- Dr. Neçati Kaval (SEM Sample Preparation, University of Cincinnati Chemistry)
- Santiago Escobar (GIS Specialist, University of Cincinnati Geography)

References

Arnason, Thor, et al. “Maya Medicinal Plants of San Jose Succutz, Belize.” *Journal of Ethnopharmacology*, vol. 2, no. 4, 1 Jan. 1980, pp. 345–364, www.sciencedirect.com/science/article/pii/S0378874180810166, 10.1016/S0378-8741(80)81016-6. Accessed 11 Apr. 2021.

Dussol, Lydie, et al. “Ancient Maya Sylviculture of Breadnut (Brosimum Alicastrum Sw.) and Sapodilla (Manilkara Zapota (L.) P. Royen) at Naachtun (Guatemala): A Reconstruction Based on Charcoal Analysis.” *Quaternary International*, vol. 457, Nov. 2017, pp. 29–42, 10.1016/j.quaint.2016.10.014. Accessed 1 Oct. 2020.

Gruet, Kacey C. “Hierarchical Political Ecology: Commoner and Elite (Meta)Physical Access to Water at the Ancient Maya City of Aventura, Belize.” *Journal of Anthropological Archaeology*, vol. 62, June 2021, p. 101301, 10.1016/j.jaa.2021.101301. Accessed 14 Apr. 2022.

Lentz, David L., et al. “Agroforestry and Ritual at the Ancient Maya Center of Lamanai.” *Journal of Archaeological Science: Reports*, vol. 8, Aug. 2016, pp. 284–294, 10.1016/j.jasrep.2016.06.030. Accessed 7 Nov. 2021.

---, “Molecular Genetic and Geochemical Assays Reveal Severe Contamination of Drinking Water Reservoirs at the Ancient Maya City of Tikal.” *Scientific Reports*, vol. 10, no. 1, 25 June 2020, 10.1038/s41598-020-67044-z. Accessed 19 Apr. 2022.

Merali, Zul, et al. “Sacred Maya Incense, Copal (Protium Copal - Burseraceae), Has Anxiolytic Effects in Animal Models.” *Journal of Ethnopharmacology*, vol. 216, Apr. 2018, pp. 63–70, 10.1016/j.jep.2018.01.027. Accessed 8 Feb. 2022.

Ross, Nanci J. “Modern Tree Species Composition Reflects Ancient Maya “Forest Gardens” in Northwest Belize.” *Ecological Applications*, vol. 21, no. 1, 2011, pp. 75–84, www.jstor.org/stable/29779638. Accessed 19 Apr. 2022.