Curation Department

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**Proposal to access the Arnold Arboretum Living Collections for scholarly purposes**

The collections and natural areas of the Arnold Arboretum support scholarship in a wide array of disciplines; scholarship includes all forms of research projects, teaching activities, and artistic endeavors. These may involve the formal, accessioned plants in the collection, the unaccessioned or spontaneous vegetation in natural areas, as well as the environments within the 281-acre urban ecosystem. Prior to beginning, however, all activities must be approved, and upon completion must be documented.

Applicants must complete and submit this proposal for review *at least* five business days before the initial access date. Submitting proposals well in advance of the five-day deadline is appreciated, particularly for complex projects or those which involve many accessions. E-mail proposals, ***as a* Microsoft Word file**, to the appropriate contacts listed below.

All attempts will be made to support projects as they are initially proposed, however modifications may be required. All applicants will be made aware of their proposal status within five business days of receipt of a completed proposal. Successful applicants will be provided with a collections-access letter as well as a signed research/collecting permit, if appropriate. Scholars are not allowed to collect from the collections or conduct their study until approval is provided.

Please submit proposals to both Michael Dosmann and Kathryn Richardson:

Michael Dosmann Kathryn Richardson

Keeper of the Living Collections Curatorial Assistant

[michael\_dosmann@harvard.edu](mailto:michael_dosmann@harvard.edu) [kathryn\_richardson@harvard.edu](mailto:kathryn_richardson@harvard.edu)

***Contact Information:***

**1. Primary Contact Name:** Elizabeth Wolkovich

**2. Primary Contact Email Address:** e.wolkovich@ubc.ca

**3. Name of Principle Investigator (if different from above):** NA

**4. Names and affiliation of other researchers working on project:** Christophe Rouleau-Desrochers (MSc student at UBC with Wolkovich lab) christophe.rouleaudesrochers@ubc.ca

**5. Institutional Address and phone number:** If this request pertains to the shipment of materials, include a building shipping address, and not a PO Box number.

We do not need any items shipped, but here is information:

Forest and Conservation Sciences

University of British Columbia

3041 - 2424 Main Mall

Vancouver, BC V6T 1Z4

Office: 604-827-5246

**6. Are Arboretum staff members formally collaborating with this project?** If so, please list names and describe in what capacity:

Not currently, though we would be happy to collaborate if staff are interested. Additionally, this project leverage long-term data from the Tree Spotters, and Wolkovich is a Visiting member of OEB at Harvard.

***Project Details:***

**7. Project title:** Do longer seasons lead to increased tree growth? A case study across species at the Arnold Arboretum

**8. Initial access date:** Some flexibility, but ideally April 2025.

**9. Full date range if for extended periods, with intended frequency of visits/shipments:** One visit of 5-7 days if only one person works and 3-4 for two people to one week to core trees, with a return short visit by Wolkovich once the cores have dried and can be imported to Canada for sampling.

**10. Briefly describe the project (1 paragraph is sufficient**):

Numerous studies have shown that climate change extends the growing season in many temperate ecosystems. Plants have tracked this through shifts in phenology. While the assumption that a longer growing season leads to increased growth is an intuitive one, recent evidence shows that this may not be the case. In addition, changes in growing season length are likely to affect trees’ reproductive processes and this could in turn affect growth, but the strength of this relationship lacks evidence.

Hence, we aim to couple ground phenological observations (leaf-out, flowering, fruiting, leaf coloring) with tree ring data to test how phenological season length and reproduction relate to growth. This is a major question in fundamental biology, but also critical to forecasts of climate change itself, since most carbon models assume that plants experiencing longer seasons will sequester more carbon, but recent studies have called this assumption into question. We would like to take two cores per tree with phenological data from the treespotters program and we would standard dendrochronological protocols to minimize damage.

**11. Briefly describe the necessity/importance of using the Arboretum collections for the project:** From 2015 to 2020, the Tree Spotters program trained hundreds of citizen scientists to collect phenological data from 57 trees representing 11 native species. To our knowledge, no one has coupled ground observations and growth data. Hence, coring Tree Spotters individuals at the Arnold Arboretum would allow us to test how phenology and growth are related. This is very unique data that could also allow us to investigate the trade-off between growth and reproduction.

A study conducted at the Arboretum by our lab was published in 2018: <https://bsapubs.onlinelibrary.wiley.com/doi/full/10.1002/ajb2.1174>

Another paper was published on the data collected at the Arboretum:

<https://harvardforest1.fas.harvard.edu/publications/pdfs/Chamberlain_CCE_2023.pdf>

The cores will be further scanned with a tree-ring imaging machine that was built in our lab at UBC. You can find a blog post showing the device operation: <https://www.tumblr.com/temporalecology/765354938781040641/tree-ring-analysis-is-ongoing?source=share>

**12. Is this project currently supported through external funding (e.g., grants)? If so, please list:** It is related to Wolkovich’s current NSERC Discover grant:How shifts in biological time and extended seasons alter plant growth across species with climate change

***Collections Use and Request Details:***

**13. List the Arboretum resources to be monitored or collected.** Consult the Arboretum’s online inventory of living collections (<https://arboretum.harvard.edu/plant-search/>), or Arboretum Explorer (<http://arboretum.harvard.edu/explorer/>) for information about the Arnold Arboretum’s accessioned holdings, Herbarium of Cultivated Plants, and to use the download function to create your lists and maps. **Please select all access types that apply to your project**.

Plants within the Living Collections

Please provide a list of taxa and/or specific accession numbers and send as a separate .csv file.

Acer\_saccharum, Aesculus\_flava, Betula\_alleghaniensis, Betula\_nigra, Carya\_glabra, Carya\_ovata, Fagus\_grandifolia, Populus\_deltoides, Quercus\_alba, Quercus\_rubra, Tilia\_americana

Environmental Access

Select all that apply:

spontaneous flora (non-accessioned plants); please describe:

other (describe):

Herbarium of Cultivated Plants

Select all that apply:

in-person visit to the herbarium

destructive sampling (attach file with barcode numbers located on your download list via Plant Search to this proposal), please describe:

request for scanning services (attach file with barcode numbers located on your download list via Plant Search to this proposal)

other (describe):

**14. Does this project require the removal of tissue, propagules, or other plant material from the Arboretum?** Describe, as necessary. Please specify the intended use for the material you receive (molecular, propagation, herbarium, other (please describe)).

Yes, check all that apply:

fresh material; please describe: tree cores using an increment borer of 7mm\*\*\* Will have to check with Mao

silica dried; please describe:

vouchers of your plant collections; please describe:

propagule type; please describe:

other (describe):

**15**. **Does this project require arboretum staff to collect and ship tissue for molecular analyses or require you to voucher your plant collections?**

Yes

**When shipping, the Arboretum prefers to use FedEx, UPS, and USPS as couriers whenever possible. \*Please note that all international shipments are sent via USPS.** Please confirm that the shipping address and contact telephone number are correct in question 5 above.

**Do you have an account number?**

Yes, please provide:

No, but we will ask to leave cores to air-dry then pick them up to image at our lab at UBC.

**\*If making a request for shipments, please list any import requirements below.** It is the responsibility of all scholars requesting material to first investigate their own specific import requirements and supply the Arboretum with instructions and documents as needed well in advance of the request date.

**16.. Will you conduct environmental sampling or monitoring?**

Yes, please describe:

Please attach a full schematic of device(s), if any, which you would like to deploy in the landscape to this proposal:

**17. Will you require landscape areas/plants to be managed in a particular way?** Please know that horticultural and landscape needs and requirements determine whether a request is fulfilled.

Yes, please describe:

**18. Will you require specialized assistance from Arboretum staff or access to equipment?**

Yes, please describe:

**19. Can any products of this proposed project result in commercialization? Are there any intentions to do so? Please describe.**

No.