Report: Les Mehrhoff Botanical Research Fund

"Documenting the serpentine biota of Massachusetts: A study of the plant and lichen diversity of serpentine outcrops in Massachusetts, USA."

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Although the "Serpentine Rock Outcrop Community" is considered to be a distinct natural community by the Massachusetts Natural Heritage and Endangered Species Program (MNHESP), there are only a few published reports on the species of this habitat, no occurrences of this natural community mapped in the MNHESP database, and no studies comparing the lichen and bryophyte biota of different Massachusetts serpentine outcrops and other neighboring lithologies. This research project represents an attempt to rectify this gap.

From June through August 2015, I documented serpentine and neighboring schist and amphibolite outcrops in Western Massachusetts (Berkshire and Hampden counties), collecting rock and soil samples, plant tissue samples, and voucher specimens of vascular plants, lichens, and bryophytes. Soil and plant tissue specimens are currently being analyzed at the Analytical Lab of the University of Maine, Orono, and I am in the midst of identifying the c.a. 600 lichen and bryophyte collections. However, some preliminary findings can be reported, bearing in mind that all conclusions are, at this time, tentative.

Serpentine outcrops in Massachusetts do not, in general, have the appearance commonly associated with serpentine sites in California, Maryland, Newfoundland, and elsewhere. In Massachusetts, serpentine sites are generally closed-canopy forest habitats dominated by *Fagus grandifolia* and *Tsuga canadensis*. Trees did not appear stunted, and sites had well-developed forest soils. A herbaceous understory dominated by *Maianthemum canadense*, *Aralia nudicaulis*, and *Eurybia divaricata* was present on all lithologies, although there may be some differences in the composition of herbaceous species. Future soil chemistry results will hopefully help to explain these findings, but it is interesting to note that the lower horizons of the soil profiles appeared to include weathered serpentinite and not glacial till.

More striking were the differences in the cryptogam biota; for example, the lichen family Umbilicariaceae is wholly absent from the serpentine outcrops studied, but abundant on adjacent rock types. This has been reported elsewhere in the world, despite the reputation of serpentine outcrops as supporting a mix of silicious and calcicolous species. Mosses of the genus *Hypnum* were common on schist but only occurred on serpentine sites over decaying wood. One lichen—*Porpidia* sp.—was abundant on all lithologies; I will assess the secondary chemistry of these collections to look for any differences that correlate to rock type.

Cliff faces are probably the most distinctive part of the serpentine habitat in Massachusetts, as level ground in these habitats is barely distinguishable from the "Northern Hardwoods–Hemlock–White Pine Forest Community." Serpentine cliff faces

are characterized by the presence of the fern *Asplenium trichomanes* subsp. *trichomanes*, the liverwort *Porella platyphylloidea*, and the moss *Anomodon attenuatus*. None of these are exclusive to serpentine rocks in Western Massachusetts, but all were more abundant on serpentine than on other lithologies.

Because the overstory vegetation of serpentine outcrops is dominated by *Tsuga canadensis* and *Fagus grandifolia*, hemlock woolly adelgid and beech bark disease probably represent the greatest threats to the extant biota of these outcrops. Future management plans for this habitat should take this into account.