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APPENDIX 1. Revisions to tooth selection protocols of Huff et al. (2003).

Lobe vs. tooth rule (addendum to the ¼ rule)—The pre-existing definition of lobes is given by Ash et al. (1999, p. 25): "Lobes are marginal indentations that reach ¼ or more of the distance to the midvein, measured parallel to the axis of symmetry of the lobe." This definition is not explicit with regard to how the distance to the midvein should be determined. The revised definition is as follows (Fig. S1): find the axis of symmetry of the indentation, and project a line (*d*) along this axis from the apex of the indentation to the midvein. Typically, the axis follows the trend of the feeder vein for the indentation. Project a perpendicular (*p*) from the *apical* sinus of the indentation to *d*. If the distance from the apex to *p* is greater than 0.25*d*, the feature is a lobe. It is possible that this definition may lead to some large indentations being selected as teeth, for example leaves with compound lobes (e.g., species of *Crataegus*); this problem, however, was not encountered in the current study.

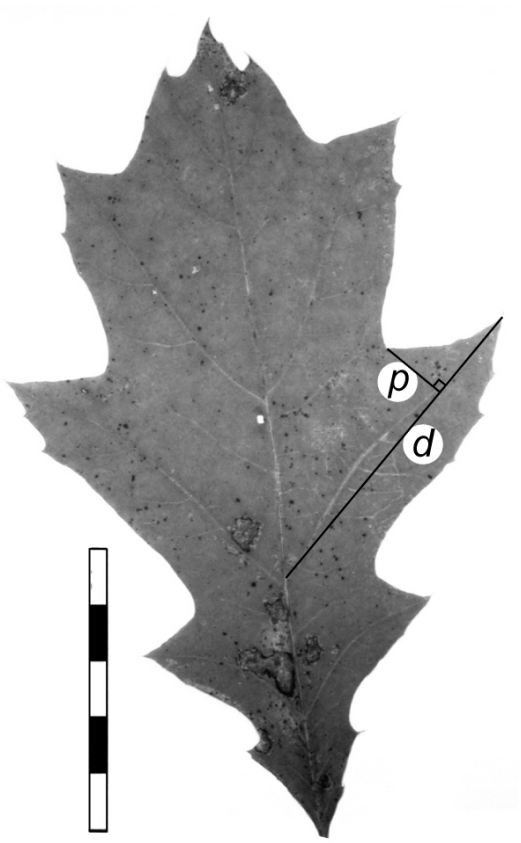

FIG. S1. *Quercus rubra* leaf from Harvard Forest (see Supplementary Appendix 2 for details) illustrating the lobe vs. tooth rule. Line segments *p* and *d* are defined in text. Scale bars = 1 cm.

Differentiating secondary from primary teeth—Tooth type is broken into two categories: primary and secondary, or "teeth on teeth" (Fig. S2). Both primary and secondary teeth are included for tooth count, but for tooth area the selection of only primary teeth yielded the most reliable results; if all teeth were selected, tooth areas would be biased towards unreasonably small values (Fig. S3A).

The default category for tooth selection is primary. If a tooth passes either of the following criteria, it is selected as a secondary:

i. Degree of sinus incision. Secondary teeth have markedly unequal amounts of incision, with one sinus being less incised than the other.

ii. Vein thickness. Secondary teeth are typically associated with veins of markedly thinner gauge relative to veins in neighboring primary teeth.

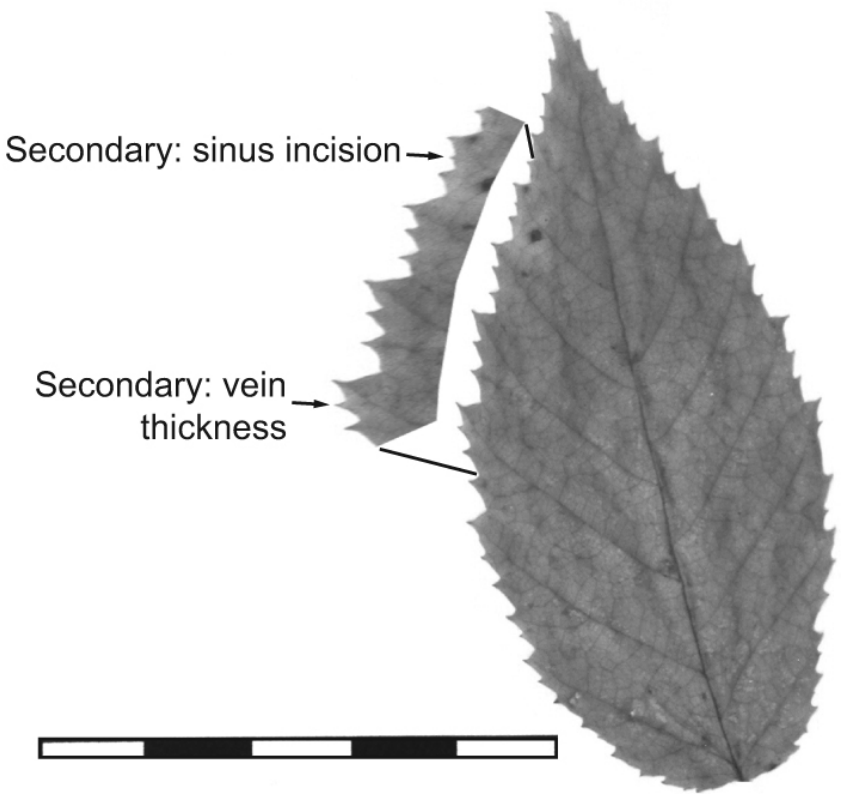

FIG. S2. *Betula lutea* leaf from Harvard Forest illustrating the rules for differentiating secondary teeth from primary teeth. The isolated leaf segment has been magnified 2X. All teeth in isolated segment are primary except those marked as secondary. Scale bars = 1 cm.

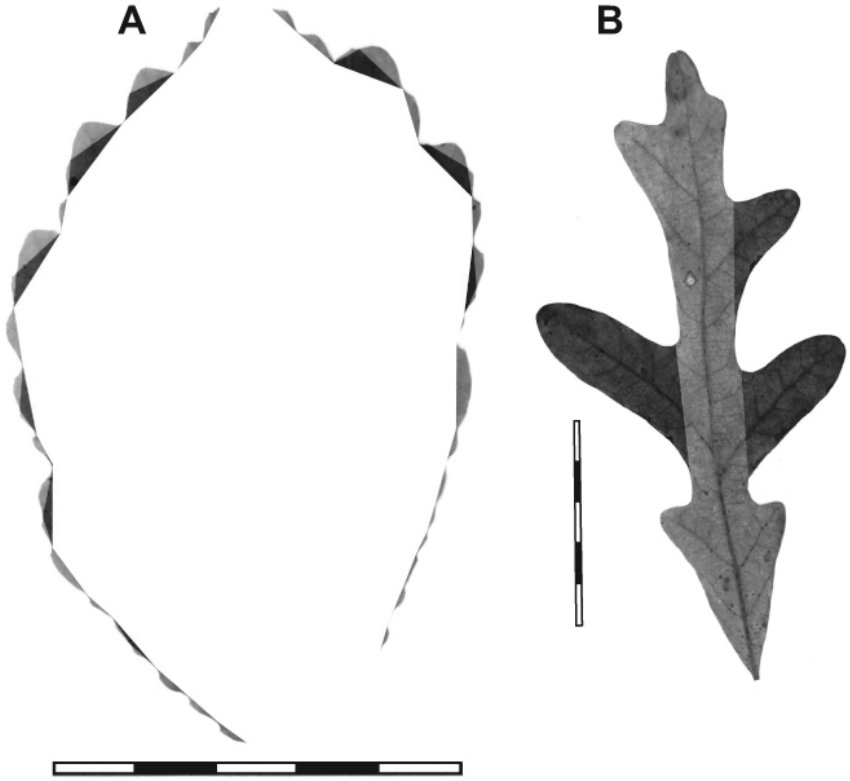

FIG. S3. (A) Tooth selection for a *Hamamelis virginiana* leaf from Huyck Preserve. The darkened areas correspond to leaf tissue that is included in total tooth selection because secondary teeth are differentiated from primary teeth. (B) *Quercus alba* leaf from IES illustrating the lobe priority rule. The darkened areas represent structures that would be analyzed as teeth following the criteria of Huff et al. (2003), but here are treated as lobes by the lobe priority rule. Scale bars = 1 cm.

***Pinnate lobe rule*—**In pinnately lobed leaves, all first-order marginal incisions that are geometrically similar to the lobes are treated as lobes. This rule replaces the *lobe / tooth majority rule* of Huff et al. (2003), which stated that if teeth constitute the majority of first-order incisions, then every similar extension is processed as a tooth, and likewise for lobes. The *lobe / tooth majority rule* was found to have inconsistencies, for example the problem of an equal number of teeth and lobes, or the selection of lobes as teeth leading to inflated tooth areas (Fig. S3B).

***Lobe priority rule*—**The sinus of a lobe cannot be processed as the sinus of a tooth. This rule prevents the selection of anomalously large teeth, for example in many *Acer* and *Quercus* species. In Fig. S4, the *extension rule* of Huff et al. (2003) has been used to select teeth that share sinuses with lobes. The *extension rule* states that when a tooth does not have a basal sinus, it should be selected from a straight line originating from the superjacent primary tooth.

***Solitary tooth rule*—**When there is no superjacent primary tooth, tooth selection is made as a line originating from the apical sinus and drawn perpendicular to the axis of symmetry of the feature (Fig. S4).

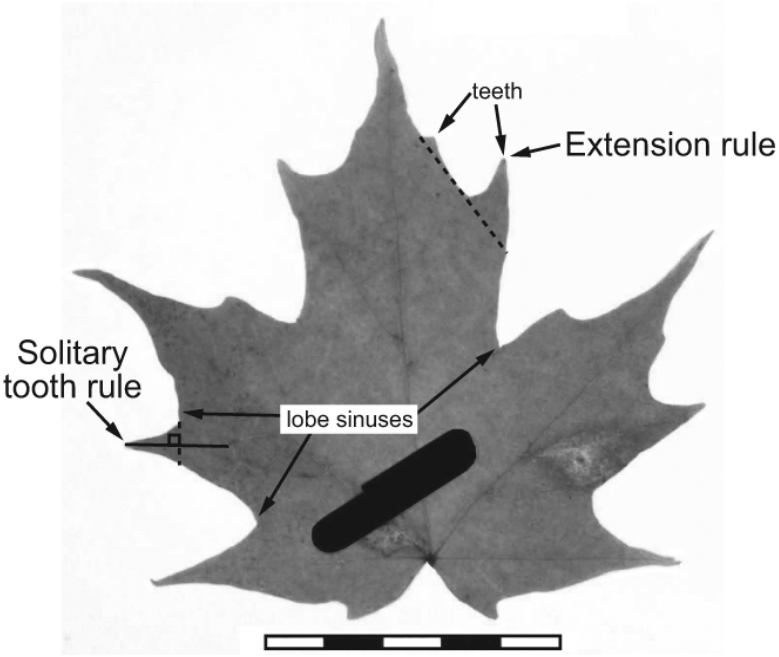

FIG. S4. *Acer saccharum* leaf from Allegheny National Forest illustrating the extension and solitary tooth rules. Dashed lines depict tooth selections. Solid line depicts the axis of symmetry for the associated tooth. Black area is a weight used to flatten leaf for photography. Scale bars = 1 cm.

***Primary vein rule*—**The intersection of a primary vein and the leaf margin cannot be processed as a sinus. This rule is most applicable to leaves with retuse and emarginate apices (Ash et al., 1999).

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