Fall 1971

# Some observations on corticolous cryptogams

William J. Woelkerling
*University of Wisconsin-Madison*

# SOME OBSERVATIONS ON CORTICOLOUS CRYPTOGAMS

## *INTRODUCTION*

The reliability of direction finding, as stated in the old adage—"moss grows best on the north sides of trees"—is subject to various interpretations. A personal evaluation of the reliability of this adage was attempted in a study of the corticolous cryptogams (non-seed plants which grow on the bark of trees) at The University of Wisconsin—Milwaukee Cedar-Sauk Field Station and adjacent Cedarburg Bog. In this study the trees were inspected not only for the presence of the true mosses but also for algae, fungi, lichens and liverworts. It is assumed that growth of these plants is related to the presence and persistence of moisture, and since the incoming radiant energy is less effective on the north sides of trees, there is less moisture loss and the most luxuriant corticolous growth should appear there.

The results summarized in this report are based on observations of over 2000 separate pieces of data which were collected from 432 "microquadrats" on 72 trees which were located along three separate transects.

## *METHOD OF STUDY*

Three 30m transects were established, one on the ridge in the beech-maple forest and the others along the east and west sides of a ridge at the periphery of the bog. At 6m intervals along these transects trees were selected at random for observation. On these test trees two sets of quadrats, each 12.5cm on a side, were established at ground level and at heights of 0.75m and 1.5m. The center line of one set of quadrats coincided with the north compass point while the center line of the other set coincided with the south compass point. A 1.25cm mesh screen containing 10 squares on a side was used to tally the plants. Within each $100cm^2$ quadrats the occurrence of the various species of cryptogamic growth was recorded together with the percentage of area covered by each species.

## *RESULTS AND DISCUSSION*

The occurrence of true mosses and fungi was too infrequent to yield any conclusive data. Of the 432 quadrats examined, an unidentifiable fungal mycelium appeared in only two (both at ground level), and mosses belonging to the genera *Dicranum*, *Mnium*, and *Neckera* appeared only in nine (all at ground level).

Algal growth, on the other hand, dominated the corticolous community at all levels on both sides of all trees examined. Commonly the entire quadrat would be covered with numerous individual plants of *Pleurococcus (= Protococcus)*. The extensive development of algae may in part be explained by a rapid rate of asexual reproduction which is not normally attained by other groups of cryptogams.

Next to algae, the liverworts were the most frequent plants encountered and included species of *Bazzania, Frullania* (at least 2 species), *Lophocolea,* and *Porella.* In some cases, especially in ground level quadrats, liverwort growth covered an area nearly as great as that of algal growth, but in general, liverworts colonized less than half the area occupied by algae.

The extent of lichen growth was much less pronounced than either the algae or liverworts and tended to be more patchy in occurrence. *Parmelia* sp. seemed to be the most abundant lichen.

Tree bark texture, proximity to ground level, and protection from direct sunlight all appear to influence the amount of available moisture and thus help to determine the extent of cryptogamic growth on tree trunks. Tree species with smooth bark (e.g. beech, white birch) generally harbor a less extensive corticolous community than do species with comparatively rough bark (e.g. white ash, ironwood). In the quadrats sampled, only 25-30% of the smooth bark areas were colonized while 50-60% of the rough bark areas bore cryptogamic growth. Evidently rougher bark not only provides greater protection (in the form of crevices) from desiccating winds but also provides a better substrate upon which various cryptogams can get a foothold.

The occurrence of cryptogamic growth also appears to vary inversely with height (Table 1). Quadrats at ground level contained far more colonization than those at 0.75m or 1.5m. Proximity to soil and leaf litter moisture may account in part for the greater cryptogamic growth near ground level.

Protection from direct sunlight also appears to favor cryptogamic development (Table 1). Thus growth on the north sides of trees always covered a considerably greater area than the corresponding level on the south side.

---

Table 1. Extent of Corticolous Growth in Quadrats Examined

| Height | % Cover North Side | % Cover South Side |
|---|---|---|
| Ground level | 80% | 43% |
| 0.75m | 27% | 9% |
| 1.5m | 25% | 7% |

All these observations certainly suggest that in some cases at least, 'mosses' or more correctly cryptogams do appear to grow best on the north sides of trees. Many exceptions to the general rule exist, however, particularly in dense woods, and more sophisticated means of direction finding will probably prove more reliable than the directional distribution of corticolous cryptogams.

More detailed studies of the corticolous communities (excluding algae and fungi) of Wisconsin forests are presented in the following articles:

Culberson, W. L. 1955. The corticolous communities of lichens and bryophytes in the upland forests of northern Wisconsin. *Ecol. Monogr.* 25:215-231.

Culberson, W.L. 1955a. Qualitative and quantitative studies on the distribution of corticolous lichens and bryophytes in Wisconsin. *Lloydia 18:*25-36.

Hale, M. E. 1952. Vertical distribution of cryptogams in a virgin forest in Wisconsin. *Ecology 33:*398-406.

Hale, M. E. 1955. Phytosociology of corticolous cryptogams in the upland forests of southern Wisconsin. *Ecology 36:*45-63.

William J. Woelkerling
*Department of Botany*
*The University of Wisconsin, Madison*