

## A PRELIMINARY INVESTIGATION OF THE EFFECT OF THE DESCALING OF WINTER BUDS ON THEIR GROWTH IN EAST CENTRAL ILLINOIS\*

JOHN W. VOIGT

*Eastern Illinois State Teachers College, Charleston, Illinois*

This study arose from a preliminary investigation conducted by Dr. Priestly of Leeds University, England.<sup>1</sup> Priestly's work consisted only of the effect of winter climate on the viability of descaled buds. Priestly's results are being checked with those of this experiment in determining whether buds live through the winter without bud scales. A study was made of buds after they had been three months in the descaled condition, to determine whether or not there were any structural modifications occurring in the exposed scales between the time the buds became dormant and the time they broke their dormancy in the spring.

Thirty-five buds from specimens of each of these trees, *Liriodendron tulipifera*, *Betula nigra*, and *Tilia europea* were descaled the fifteenth of November, 1941. The buds were all tagged with linen cloth tags which were dated and duly marked with India ink, and then coated with paraffin before being tied to the twig bearing the descaled bud. These buds were carefully watched for the duration of the winter. After three months, twigs bearing descaled buds were brought into the laboratory and sections of the bud scales of the undissected buds made. These were the control groups. Sections were made of the second pair unexposed, and second pair exposed of the dissected buds. The sections were about twenty-five microns in thickness.

In the buds of *Liriodendron tulipifera* it was observed that the exposed leaf turned brown and later dried up. There was no change in the scales except in the deposition of resin in each of the epidermal cells of the second scale which was exposed.

*Tilia* (Dissected buds). In the second pair of scales exposed there was found—cutin, pectin, suberin, and resinous de-

posits in the lower epidermis. These materials were identified by the conventional microchemical tests. There were also scattered areas of lamellated material for which we could find no positive test. This material was thought to be mucilage. (The deposits are assumed to be mucilages because of their transparency in the fresh material and solubility in water. The material was thought to have coagulated as the sections were dehydrated in the making of the slides. The unidentified material has resemblance in crystalin form to inulin crystals.

Diagrams of cross sections of the second bud scales unexposed and exposed indicate that there is a difference in the number of the unidentified deposits and likewise in their distribution. In the unexposed scales, the deposits are scattered irregularly. In the second exposed scale the deposits are in the center of the section and evenly distributed throughout the middle of the scale and there is an appreciable increase in the amount of this material. There was no increase in the thickness of the cuticle in the exposed scale.

*Betula* (The first and second scales were sectioned in the same manner as were those in the preceding buds). Examination of the sections showed that there were no appreciable modifications.

**Summary.** Priestly's results indicate that a number of buds lived through the winter in the absence of the scales and in *Aesculus hippocastanum* and *Castanea sativa* almost half of the buds lived. In this experiment seventeen of the River birch buds lived and thirteen of them died, thus giving a percentage of 56.7%. Twenty-nine out of thirty-two tulip tree buds survived for a percentage of 90.6%. It is not known just how many basswood buds would have survived, because this

\* Contribution from the Collegiate Section.

<sup>1</sup> Priestly.

part of the experiment was maliciously destroyed by some unappreciative individual.

In this experiment more buds survived than in the experiment recorded by Priestly. Some of the buds were small and it is highly probable that in the removal of the scales they were mutilated to the extent that they did not survive. Some of the buds of river birch in this experiment were victims of faulty technique we are quite sure.

Priestly found that, when dormant, the buds contain very little water and are relatively insensitive to the external conditions, while actively growing buds absorb much water and are easily killed by frosts or sharp changes in temperature. We had no spring frosts after the

buds started to swell so we cannot draw any conclusion as to the importance of the amount of water contained in the parts which grew.

Some naked buds such as those of the way-faring tree (*Viburnum lentans*) are resistant to winter conditions and the buds of *Cornus sanguinea* and *Alnus rotundifolia*, where the scales often do not completely enclose the leaves within, are also resistant to winter conditions. In this country attention is called to the pawpaw tree which has no scales, but yet is able to endure the winter climate.

This as well as the results of the two experiments hint that bud scales, as protective structures, are not so very important. The problem probably needs more experimental data before being concluded definitely.