Structural changes of aerial adventitious roots during shoot development in Boston Ivy

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Plants of Boston Ivy develop aerial adventious roots at the shoot apex upon growth. In this species, several aerial adventious roots (AAR) originate from each apex and they are able to adhere the wall with supporting petioles. The present study has focused and examined the shoot development of Boston Ivy by using scanning electron microscopy. With rapid cell division, about 5-8 AAR were produced during meristematic stage, but immature AAR soon elongated and differentiation occurred very rapidly. The epidermis were smooth and both upper and lower surfaces were almost identical in appearance at this young stage. However, the developing AAR soon demonstrated conspicuous morphological changes in both surfaces with the contact to the wall, differentiating the two distinguishable surfaces. The upper surface became irregularly swollen in contrast to the lower surface where cells in the margin were elongated. The vacuoles of the latter were filled with electron-dense substances. As they grew, the lower surface of the expanded AAR was covered with secreted substances. The upper surface was not influenced by this secretion leaving upper cells more or less similar shape and texture as the previous stage. When the AAR contacted the wall with the adhering means possibly by the secreting materials produced from the cells beneath, the lower side of AAR attached tightly to the wall. The AAR and supporting petioles soon underwent the aging process sometime during this stage with decreses in the volume of their structures. Anatomical and other ultrastructural changes that followed during development in several stages of these AAR are also compared and discussed.