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## Morphogenesis related with flowering in poplar (*Populus deltoides*)

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### Objectives

Temporal and spatial formation and differentiation of axillary buds in developing shoots of cottonwood (*Populus deltoides*) were investigated. Shoots sequentially initiate early vegetative, floral, and late vegetative buds. Associated with these buds is the formation of three distinct leaf types. The objectives of this work were to define the shoot developmental pattern with bud/leaf types in relation to flowering, and to determine the sequence of initiation and development of reproductive meristem in the axillary buds of cottonwood.

### Materials and Methods

#### 1. Material

Poplar: Cottonwood (*Populus deltoides*)

#### 2. Methods

The buds of cottonwoods were prepared for scanning electron microscopy (SEM) by removing bud scales, leaf primordium, and other extraneous parts in a 0.2 mol/L phosphate buffer (pH 7.2) under a dissecting microscope to expose the bud meristem.

### Results and Discussion

The floral meristem subsequently forms floral organs by the end of the second growing season. The floral buds over winter with floral organs, and anthesis occur in the third growing season. The third type of leaf forms and develops entirely outside the terminal buds in the second growing season. These leaves bear the late vegetative buds in their axils. On the basis of these and other supporting data, we hypothesize a 3-yr flowering cycle as opposed to the traditional 2-yr cycle in eastern cottonwood. Identification of such negative regulators in cottonwood would allow the testing of the significance of preformed leaf development and verbalization on regulation of flowering-time genes in developing shoots during the first and second growing seasons. It is also important to characterize if a control mechanism is imposed by early preformed leaves in Vegetative Zone I on the initiation of floral buds in the Floral Zone.

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