Jernstedt, J.A., and Curtis Clark. 1978. Stomata on the seed coats of *Eschscholzia* (Papaveraceae). Botanical Society of America, Misc. Ser., Publ. 156.

4:15 pm. B186

PHILIP R. LARSON. North Central Forest Experiment Station, U.S. Forest Service, Rhinelander, Wisconsin 54501. - Histogenesis of the leaf basal meristem in Populus deltoides.

During ontogenetic development of a leaf primordium, the meristematic region at the primordium base, the leaf basal meristem, appears to progress through a sequence of histogenic changes. At primordium inception, the leaf trace consists of a single bundle, the original procambial bundle, that developed acropetally into the primordium from the main axis. Shortly after primordium establishment, subsidiary procambial bundles differentiate from the leaf basal meristem both basipetally into the axis and acropetally into the primordium; these bundles use the original procambial bundle as a template in their descent and ascent, respectively. Coincident with origin of the subsidiary bundles, two bud traces differentiate acropetally toward the prospective axillary bud site from this same region of the central leaf trace. Protoxylem is initiated at an originating center that appears to coincide with the leaf basal meristem. From this center, it differentiates both basipetally and acropetally. Metaxylem differentiates from metacambial derivatives both basipetally and acropetally from a vessel generating center that also appears to coincide with the leaf basal meristem. The meristematic region has been given different names according to the tissue derived from it; i.e. leaf basal meristem, originating center of protoxylem pole, vessel-generating center. However, evidence suggests that different stages of the same meristem are being observed as it develops throughout leaf ontogeny.

3:30 pm. B187

ROMAN MAKSYMOWYCH. Department of Biology, Villanova University, Villanova, Pennsylvania, 19085. - Petiole development in Xanthium pennsylvanicum represented by the plastochron index.

The absolute and relative rates of elongation of petioles and laminae were calculated from measurements of fresh and fixed tissues during the entire period of leaf development. An exponential increase in petiole length was observed between LPIs -3.0 and +3.0 indicating a constant ($0.18 \cdot day^{-1}$) relative rate during that period. As evident from anatomical and growth studies, petiole of the tenth Xanthium leaf was mature at about LPI 9.0. The relative elemental rate of elongation correlated well with the basipetal pattern of leaf elongation. In this pattern the petiole was the last organ to cease elongating. The process of vascularization was assessed by the number of differentiated xylem vessels from procambial strands located at the adaxial side of the petiole. No mature xylem elements were observed at LPI -3.0. At this plastochron the average petiole length was about 480 µm. The first mature xylem vessels were observed at LPI -2.0. Their number increased almost linearly during the exponential phase of elongation. Mature petioles, on the average, contained about 25 differentiated xylem elements within one vascular bundle. The development of the vascular tissue will be discussed and correlated with the development of schizogenous canals in the petiole and midrib vein of the lamina.

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3:45 pm. B188

NANCY G. DENGLER. Department of Botany, University of Toronto, Toronto, Ontario, M5S 1A1. - Effect of light intensity on cell division and cell enlargement during leaf expansion in Helianthus annuus.

The developmental processes which give rise to the histological differences between leaves expanding under full daylight and 25% daylight are described for Helianthus annuus. Generally the pattern of cell division and cell enlargement in shaded leaves lags behind that in unshaded leaves by about two days. There is no significant difference in the amount of cell enlargement in the paradermal plane in the epidermis and palisade layers of shaded leaves as compared with leaves expanding in full daylight. However, cell division in all cell layers occurs at greater rates in unshaded leaves, resulting in greater final leaf area. Cell elongation in both palisade layers is of longer duration and occurs at a greater rate in unshaded leaves and is closely correlated with increase in leaf thickness. The volumes of palisade and spongy mesophyll are significantly greater in unshaded leaves than in shaded leaves, but the relative proportions of each tissue type does not change significantly. However, in shaded leaves there are fewer spongy mesophyll cells per unit area and a greater proportion of intercellular space than in unshaded leaves. Stomata are formed over the same time period in leaves grown at both intensities, but differentiate at greater rates in leaves grown in full sunlight, giving greater final stomatal density. These observations indicate that a sun plant such as Helianthus responds phenotypically to lowered light intensity primarily by a reduction in cell division (resulting in reduced leaf area), and secondarily by modifying cell expansion in a plane perpendicular to paradermal resulting in the characteristic anatomy of shaded leaves.

4:05 pm. B189

JUDITH A. JERNSTEDT* and CURTIS CLARK. Department of Botany, University of California, Davis CA 95616.--Stomata on the seed coats of Eschscholzia (Papaveraceae).

Stomata occur on the seed coats of all fourteen species of Eschscholzia. In immature seeds, the epidermal cells and guard cells are living and photosynthetic. A passage for gas exchange with the environment is provided by stomata on both inner and outer surfaces of the carpels and by the intercellular spaces of the carpels. Control of gas exchange rests with the stomata of the outer surface of the carpel, as those of the inner surface and seed coat always remain open.