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Poster Abstract - C.36

MUTATIONS OF COROLLA SYMMETRY IN SUNFLOWER

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The plant family Asteraceae (Compositae) is characterized by head-like inflorescences (capitula), which are considered to be directly derived from either a contracted raceme or a racemose umbel. The inflorescence of sunflower (*Helianthus annuus*) is heterogamous, with flower heads bearing two distinct flower types. Zygomorphic flowers (ray flowers), with one plane of reflectional symmetry, are characterized by three elongated petals fused to form strap-like structures surmounting a short corolla tube. They are located in the outermost whorl of the head and are sterile, retaining only filamentous remnants of the aborted style and large flat ovaries with no ovules. Actinomorphic disk flowers (tubular flowers) are arrayed in arcs radiating from the center of the head to form distinct left and right turning spiral rows. They are hermaphrodite flowers, carrying both male and female organs. Each disk flower is subtended by a sharp-pointed chaffy bract and it consists of an inferior ovary carrying a single ovule, two pappus scales (highly modified sepals) and a 5-lobed tubular-like corolla. The five anthers are joined together to form a tube, with separate filaments attached to the base of the corolla tube. Inside the anther tube is the style, terminating in a divided stigma with receptive surfaces in close contact in the bud stage before the flower opens. Two mutants with altered corolla symmetry have described. The *Chrysanthemoides* (*Chry*) mutant is characterized by a shift from the polysymmetric corolla of disk flowers into a monosymmetric ray-like corolla. Genetic analysis revealed the *Chry* phenotype to be controlled by a semidominant mutation. In Asteraceae, the bilateral symmetry of ray flowers to form abaxialized zygomorphic patterns (0:5 and/or 0:3) could be evolved either as a result of loss of an adaxial identity gene activity, such as *CYCLOYDEA*- and/or *DICHOTOMA*-like, or overexpression of an abaxial identity gene such as *DIVARICATA*-like. The *Chry* mutant, result in a capitulum comprising only ray-like flowers. This might be explained in terms of an extension of *DIVARICATA*-like gene activity into the central dome of the head. The *tubular ray flower* (*turf*) mutant is characterized by a shift from the zygomorphic corolla of ray flowers into a nearly actinomorphic tubular-like corolla. Genetic analysis of *turf*, showed that a single nuclear recessive gene controls the trait. Furthermore, we characterized in detail the morphological floral features of *Chry* and *turf*, demonstrating that both mutations also affect the development of stamens and carpels. Most disk flowers found in the peripheral whorls of *Chry* heads, showed drastic reduction in stamen length, as well as absence of ovules, and developed an unbranched style. By contrast, tubular-like ray flowers of *turf* achieved the ability to differentiate both fertile stamens and ovules. Homeotic transformations were also identified in the tubular-like ray flowers of *turf*, affecting both filaments and anthers that displayed petaloid-like traits. It is tempting to speculate that in sunflower, a regulatory network should exist between genes with a key role in the programming of corolla symmetry (i.e., *TURF* and *CHRY*) and floral organ identity genes. This interaction could be related to expression domains of *TURF* and *CHRY* not restricted to the corolla region, but extended to stamen and/or carpel primordia.