1023-92-1269 **Pau Atela*** (patela@email.smith.edu), Department of Mathematics, Smith College, Northampton, MA 01063, **Jacques Dumais**, Harvard University, **Christophe Gole**, Smith College, and **Scott Hotton**, Harvard University. *New Geometric Concepts for Phyllotaxis.*

Phyllotactic patterns of botanical elements, such as leaves and petals, are established at a microscopic scale at the shoot apical meristem, the growing tip of the plant. These patterns typically display two sets of spirals — parastichies — winding in opposite directions. Strikingly, the number of parastichies in these two sets are most often two consecutive Fibonacci numbers. Traditionally, these regular arrangements have been modeled as spiral lattices, where units representing botanical primordia are placed around a center at a constant angular increment, and with distances to the center increasing by a constant factor. However, lattices are too restrictive to account for the variety of geometries of phyllotactic patterns. We introduce a new geometric and dynamical framework that views primordia formation as an essentially local phenomenon and yields practical methods for pattern analysis. We model the front of most recent primordia as a chain of mutually tangent disks around the meristem. Local parastichy numbers can be read off these fronts. Constance and transitions in parastichy numbers result from the shape of interspaces between primordia. We will discuss the various possible transitions in light of these concepts and give a new view of the Fibonacci phenomenon. (Received September 27, 2006)