1023-92-1890 **Richard S. Smith** (pwp@cpsc.ucalgary.ca), Calgary, AB T2N 1N4, Canada, **Soazig Guyomarc'h**, Berne, Switzerland, **Therese Mandel**, Berne, Switzerland, **Didier Reinhardt**, Berne, Switzerland, **Adam Runions**, Calgary, AB, Canada, **Cris Kuhlemeier**, Berne, Switzerland, and **Przemyslaw Prusinkiewicz*** (pwp@cpsc.ucalgary.ca), 2500 University Drive N.W., Calgary, AB T2N 1N4, Canada. *Modeling phyllotaxis: from molecules to patterns.*

Recent molecular-genetic experiments indicate that active transport of the plant hormone auxin is the key process regulating phyllotaxis. A conceptual model based on these experiments, introduced in 2003 by Reinhardt et al., provided an intuitively plausible interpretation of the data, but raised questions of whether the proposed mechanism was capable of producing the observed temporal and spatial patterns, was robust, could start de novo, and could account for phyllotactic transitions, such as the frequently observed transition from decussate to spiral phyllotaxis. To answer these questions, we created a computer simulation model based on data described previously, new experimental results, and reasonable hypotheses. The model reproduces, within the standard error, the divergence angles measured in Arabidopsis seedlings and the effects of selected experimental manipulations. It also reproduces distichous, decussate, and tricussate patterns. The model thus offers a plausible link between molecular mechanisms of morphogenesis and the geometry of phyllotaxis. Recent additions link this model to a model of vein pattern formation in leaves and a model of vasculature formation in stems. (Received September 27, 2006)