



# Plant Biomechanics: An Engineering Approach to Plant Form and Function

*Karl J. Niklas*

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## **Plant Biomechanics: An Engineering Approach to Plant Form and Function** Karl J. Niklas

In this first comprehensive treatment of plant biomechanics, Karl J. Niklas analyzes plant form and provides a far deeper understanding of how form is a response to basic physical laws. He examines the ways in which these laws constrain the organic expression of form, size, and growth in a variety of plant structures, and in plants as whole organisms, and he draws on the fossil record as well as on studies of extant species to present a genuinely evolutionary view of the response of plants to abiotic as well as biotic constraints. Well aware that some readers will need an introduction to basic biomechanics or to basic botany, Niklas provides both, as well as an extensive glossary, and he has included a number of original drawings and photographs to illustrate major structures and concepts.

This volume emphasizes not only methods of biomechanical analysis but also the ways in which it allows one to ask, and answer, a host of interesting questions. As Niklas points out in the first chapter, "From the archaic algae to the most derived multicellular terrestrial plants, from the spectral properties of light-harvesting pigments in chloroplasts to the stacking of leaves in the canopies of trees, the behavior of plants is in large part responsive to and intimately connected with the physical environment. In addition, plants tend to be exquisitely preserved in the fossil record, thereby giving us access to the past." Its biomechanical analyses of various types of plant cells, organs, and whole organisms, and its use of the earliest fossil records of plant life as well as sophisticated current studies of extant species, make this volume a unique and highly integrative contribution to studies of plant form, evolution, ecology, and systematics.

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