

PREFACE

大學
物有本末、事有終始、知所先後則近道矣

*Every entity has Roots and Tips of branches
And every entity has a Beginning and an End
The one who is putting his mind to the Former
and to the Latter
He is Approaching the WAY!*

*(From the DA XUE – The Great Learning, one of
the Four Books of the Chinese cultural heritage)*

“Alle Theile der Pflanze – Stengel und Wurzel
ausgenommen – können auf die Form
des Blattes zurückgeführt werden; sie sind nichts
anderes als Modifikationen derselben.”

*All parts of the plant – except the shoot and the root –
can be attributed to the structure of the leaf;
they are nothing but modifications of leaves.*

*(From the Doctoral Thesis of Caspar Friedrich Wolff,
submitted in 1759 to the University of Halle, Germany, in
Latin; the German version is of 1812).*

*Places and times may have strange associations: shortly after
this German version was published in Leipzig there was
the great defeat of Napoleon at the “Battle of the Nations”
... in Leipzig).*

These two mottos represent two extremely different lines of thought. In the Chinese motto, the tips of the branches and roots were used as metaphors. It was probably intended to bring up two issues. One is that the entities should be studied thoroughly, from the roots to branch tips. The other issue is that a thorough knowledge can lead a person to the WAY. The Way has several meanings. Kung fu-Tze (Confucius) meant by Way morality and value. The Way can also mean all the events happening between the first step and the final goal.

In the German motto, from Caspar Friedrich Wolff, the plant is not a metaphor. It serves as an example of an approach to understand the development of organisms. Wolff was a pioneer in this approach, although he was ignored in the recent literature on plant development. This literature cites the claim of Goethe that floral members are leaves that underwent metamorphosis. Goethe's claim was made several years *after* the statement of Wolff.

This book aims to serve to bridge the gap between the metaphoric approach of Da Xue and the "down-to-earth" approach of Wolff. I shall attempt to update a wide range of readers on what we know about the processes that regulate the formation of patterns in plants. I shall also indicate clearly what is not yet known. By "plants" I mean angiosperm plants. Other, lower plants, will be mentioned only rarely. The deliberations will be on different levels of complexity, such as single cells, meristems, tissues and plant organs (e.g. roots, shoots, floral members). Wherever applicable the use of methodologies such as genetics, molecular biology and structural analyses will be described, and I shall attempt to show how the application of these methodologies led to additional knowledge on the control of plant patterning.

As with my previous books (Galun and Breiman, 1997; Galun and Galun, 2001; Galun, 2003; Galun, 2005a) the present book is aimed at a wide range of readers. Basic knowledge of plant biology, genetics and molecular biology should be helpful for the readers. However, where required, the various studies on patterning and the methodologies that were used in these studies, will be introduced and explained. Thus, the book should be of interest and useful for the novice in molecular developmental biology as well.

Because the book is comprehensive with respect to its topics (dealing with different plant components), scholars who are engaged in the study of specific aspects of plant differentiation, may benefit from the overall view of the present book. On the other hand, this book should also be useful as a companion-text for courses on plant development.

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