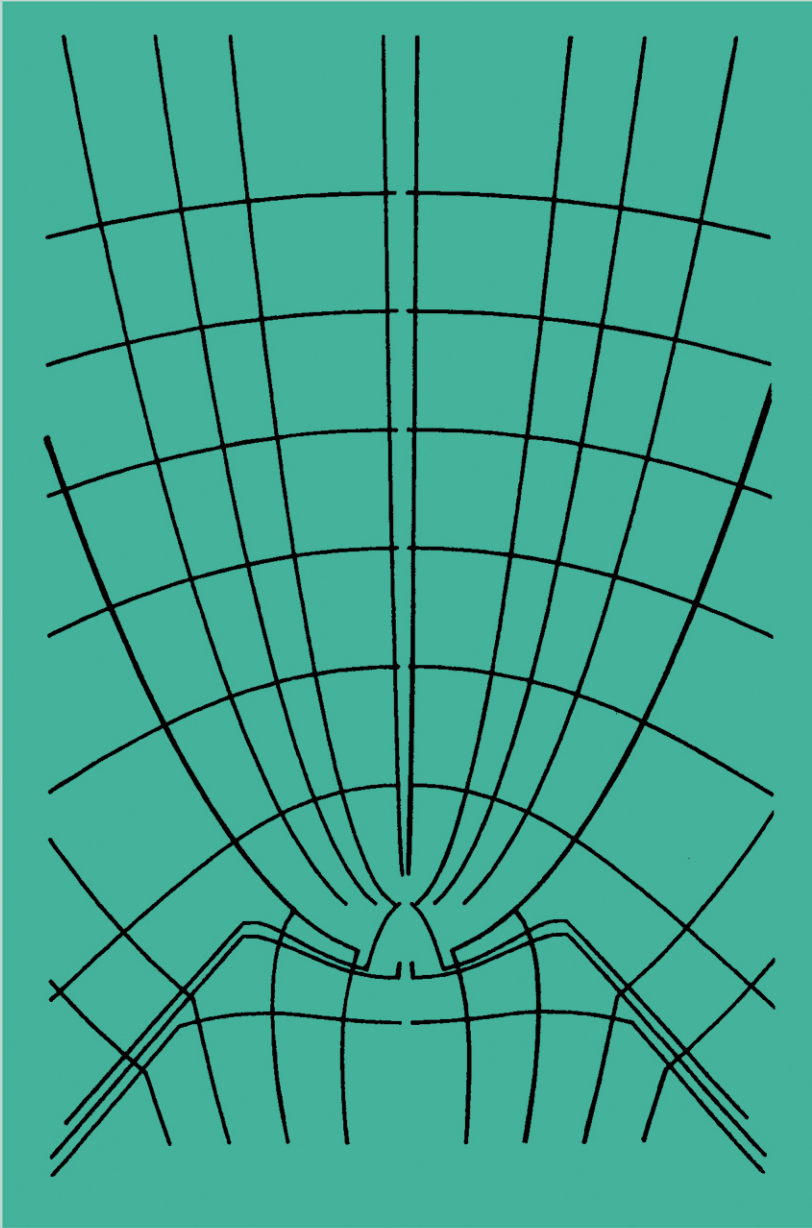


Differential Growth in Plants

Edited by
Peter W. Barlow



PERGAMON PRESS Oxford New York
Beijing Frankfurt São Paulo Sydney Tokyo Toronto

Differential Growth in Plants

Guest Editor

PETER W. BARLOW

Department of Agricultural Sciences, University of Bristol, AFRC Institute of Arable Crops Research,
Long Ashton Research Station, Long Ashton, Bristol, BS18 9AF, U.K.



PERGAMON PRESS

OXFORD · NEW YORK · BEIJING · FRANKFURT
SÃO PAULO · SYDNEY · TOKYO · TORONTO

U.K.	Pergamon Press plc, Headington Hill Hall, Oxford OX3 0BW, England
U.S.A.	Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, New York 10523, U.S.A.
PEOPLE'S REPUBLIC OF CHINA	Pergamon Press Room 4037, Qianmen Hotel, Beijing, People's Republic of China
FEDERAL REPUBLIC OF GERMANY	Pergamon Press GmbH, Hammerweg 6, D-6242 Kronberg, Federal Republic of Germany
BRAZIL	Pergamon Editora Ltda, Rua Eca de Queiros, 346, CEP 04011, Paraiso, São Paulo, Brazil
AUSTRALIA	Pergamon Press Australia Pty Ltd., P.O. Box 544, Potts Point, N.S.W. 2011, Australia
JAPAN	Pergamon Press, 5th Floor, Matsuoka Central Building, 1-7-1 Nishishinjuku, Shinjuku-ku, Tokyo 160, Japan
CANADA	Pergamon Press Canada Ltd., Suite No. 271, 253 College Street, Toronto, Ontario, Canada M5T 1R5

Copyright © 1989 Pergamon Press plc

All Rights Reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means: electronic, electrostatic, magnetic tape, mechanical, photocopying, recording or otherwise, without permission in writing from the publishers.

ISBN 0 08 036841 7



Published as a special issue of the journal *Environmental and Experimental Botany*, Vol. 29, No. 1 and supplied to subscribers as part of their normal subscription. Also available to non-subscribers

Contents

Special Issue: Differential Growth in Plants

	v	Preface
P. W. BARLOW	1	Differential growth in plants—a phenomenon that occurs at all levels of organization
A. D. TOMOS, M. MALONE and J. PRITCHARD	7	The biophysics of differential growth
J. BRUINSMA and K. HASEGAWA	25	Phototropism involves a lateral gradient of growth inhibitors, not of auxin. A review
P.-E. PILET	37	Differential growth and hormone redistribution in gravireacting maize roots
R. D. FIRN and A. B. MYERS	47	Plant movements caused by differential growth—unity or diversity of mechanisms?
C. D. KNIGHT and D. J. COVE	57	The genetic analysis of tropic responses
P. W. BARLOW, P. BRAIN and J. S. ADAM	71	Differential growth and plant tropisms: a study assisted by computer simulation
Z. HEJNOWICZ	85	Differential growth resulting in the specification of different types of cellular architecture in root meristems
W. K. SILK	95	On the curving and twining of stems
A. RITTERBUSCH and U. WUNDERLIN	111	On growth and development—a spatio-temporal analysis of flower ontogenesis
	I	Subject Index

This page intentionally left blank

PREFACE

THIS volume contains for the most part the written version of papers presented in Symposia 2.04 "Spatial and temporal patterns of development" and 2.14 "Movements based on differential flank growth" at the XIV Botanical Congress held in Berlin during July 1987. As mentioned in the introductory article which follows, differential growth in plants (a phrase somewhat ambitiously chosen as a title for this collection of papers) is an extremely broad topic. Therefore, the best that can be done in discussing it within a limited space is to concentrate on certain areas of current interest. Since most of plant growth is "differential" in one way or another, there are inevitably many areas that are not represented here; perusal of volume 17 of the *Handbuch der Pflanzenphysiologie* (edited by W. RUHLAND) and volume 7 of the *Encyclopedia of Plant Physiology, New Series* (edited by W. HAUPT and M. E. FEINLEIB) will help fill these gaps. Nevertheless, despite these omissions, it is to be hoped that readers will find a certain degree of coherence amongst the papers offered herein.

I am grateful to Professors JOHAN BRUINSMA and PAUL-EMILE PILET for their encouragement of my proposal to gather these articles. Without their efforts in organizing the "differential flank growth" Symposium this collection of papers would probably not have been attempted. Also, I should like to thank Dr MORTON W. MILLER, Editor-in-Chief of *Environmental and Experimental Botany*, for his enthusiastic response to this project. Finally, I am glad to acknowledge my indebtedness to Mr ROBERT MIRANDA at Pergamon Press, New York. Without his generous support publication of these papers would not have been possible.

PETER W. BARLOW

This page intentionally left blank