

the critical property of symbolizing as the emancipation of thought from action, and of meanings from the objects to which those meanings usually apply. What seems to be missing from *The First Idea* is an account of the mechanisms by which social influences allow children to ascribe alternative perspectives, recognized as such, to and through symbols. There are candidate explanations — my own view is that the emotionally grounded process of identification between a young child and others does the trick — but the authors seem to feel that their arguments suffice.

Through their creative thinking about emotional and interpersonal aspects of early human development, Greenspan and Shanker have helped us to find our bearings for the intellectual fight ahead. I just wish their map had been adjusted in scale, to something nearer pocket size. ■

Peter Hobson is at the Developmental Psychopathology Research Unit, Tavistock Clinic and University College London, 120 Belsize Lane, London NW3 5BA, UK. He is the author of The Cradle of Thought (Macmillan, 2002).

Sizing up a growing field

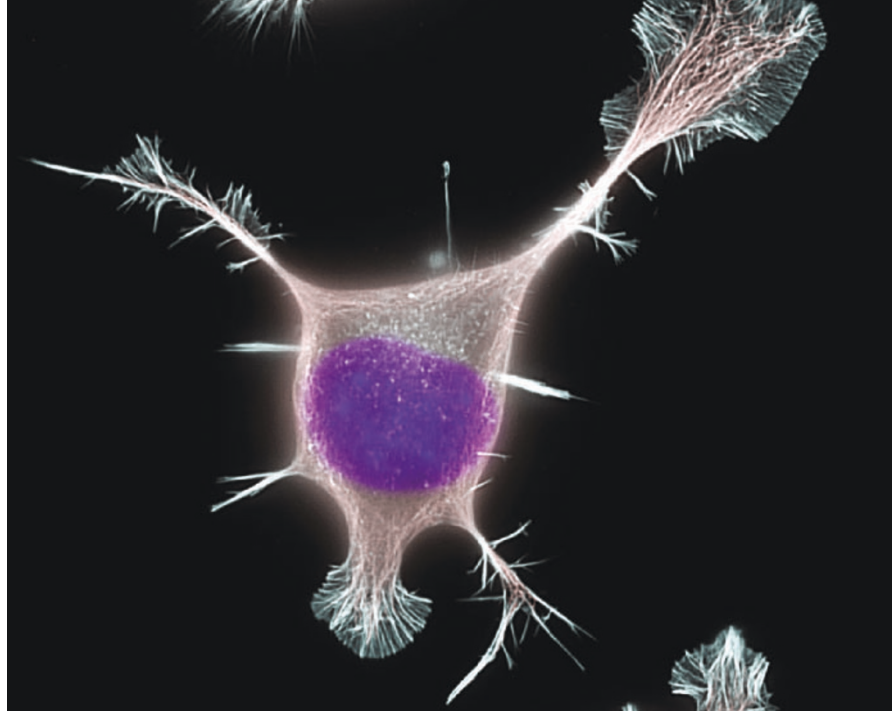
Cell Growth: Control of Cell Size

edited by Michael N. Hall, Martin Raff & George Thomas
Cold Spring Harbor Laboratory Press: 2004.
652 pp. \$135, £95

Brendan D. Manning and Lewis C. Cantley

The terms 'cell growth' and 'cell proliferation' are often used synonymously to mean an increase in cell number. Strictly, though, cell growth refers to an increase in cell size or mass, whereas cell proliferation is an increase in cell number due to cell division. The two processes together determine the ultimate size of cells, tissues, organs, even organisms. Cell proliferation is almost always accompanied by cell growth, except, for example, in the early stages of embryogenesis. But cell growth often occurs without cell division, for instance in terminally differentiated cells such as myocytes and neurons.

Cell growth underpins many critical cellular and developmental processes, yet studies on its regulation and mechanisms have lagged behind those on cell proliferation and cell-cycle progression. However, a flurry of genetic, cell biological and biochemical studies over the past ten years have made great strides towards discovering the signalling pathways and mechanisms that drive cell growth. *Cell Growth*, edited by three investigators at the forefront of this research, Michael Hall, Martin Raff and



Growth factor: neurons can increase their size dramatically by extending axons and dendrites.

George Thomas, details our current knowledge of this field.

The all-star cast of authors assembled for this work gives a clue to the book's likely impact. In the foreword, Paul Nurse sets the stage by defining perhaps the most perplexing question in the field: how does a proliferating cell double its mass and contents once per cell division, with near-perfect precision? Central to this question is whether or not a cell has the capacity to monitor its own size, and several chapters revisit this problem. Nurse's discussion of the growth patterns used to achieve a constant cell size is complemented by Patrick O'Farrell's opening chapter on the evolution of body size in metazoans. O'Farrell brilliantly delineates the constraints that all higher organisms face in

reaching their final size, and the enormous variety of developmental patterns used to overcome these constraints.

Pioneering studies on cell growth control by Nurse and Lee Hartwell in yeast, and by Anders Zetterberg and others in mammalian cells, have focused on the nature of the relationship between cell size and cell-cycle progression. Many proteins and pathways involved in cross-talk between these two processes have since been characterized in yeast, flies and mammals, and these are detailed in the early chapters. The main theme that emerges is the wide range of distinct mechanisms to coordinate growth and division that exist between different systems, even in different developmental stages of the same organism. The wiring of networks

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by Chris Calladine, Horace Drew, Ben Luisi & Andrew Travers
Elsevier, 334 pp. £29.95, \$45

Animal Physiology

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Sinauer, 776 pp. \$104.95, £37.99

Gastrulation: From Cells to Embryos

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Cold Spring Harbor Laboratory Press, 731 pp.
\$150, £100

Introduction to Protein Science: Architecture, Function, and Genomics

by Arthur M. Lesk
Oxford University Press, 310 pp. £26.99, \$51.95

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Churchill Livingstone, £39.99

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by Roger Lewin
Blackwell, 277 pp. \$44.95, £19.99

Science in culture



Class action

Werner Tübke's huge wall-painting will grace a new building at the University of Leipzig.

Alison Abbott

Part of the extraordinary legacy of Werner Tübke, one of the former East Germany's most renowned artists, who died in May, is this vast wall painting in the rectory of the University of Leipzig.

The story of the painting is at least as interesting as the multifaceted story it tells. The university, founded in 1409 by Pope Alexander V, is among the oldest in Europe. Its beautiful central buildings were extensively damaged by bombing raids in the Second World War, however, and the new Communist-style administration building was an ugly concrete block. To inaugurate the building, the government opened up a competition in 1970 for an artwork to reflect the theme: "The working class and intellectuals are inseparably bound in socialism under the leadership of the Marxist-Leninist Party." Tübke won.

His *Arbeiterklasse und Intelligenz* ("Working Class and Intellectuals"), completed in 1973, is a wall painting of immense, floor-to-ceiling proportions, some 13 metres wide. It was



Painted with oils and tempura on wood, and it depicts a series of discourses laden with social commentary. Some of the figures are recognizable portraits of contemporary local dignitaries. The immense detail and Renaissance references are typical of Tübke, whose most well known work is a monumental panorama depicting the struggle between peasants and the bourgeoisie in the sixteenth century and includes more than 3,000 figures.

Tübke, who has been referred to as "the last court artist", was never apologetic about accepting contracts from the East German state—and his works have never been simple political endorsements. *Arbeiterklasse und Intelligenz* is so valued that when the university opened a competition last year to design a building to replace the concrete block, one of the criteria was that any design should be able to display this grand work appropriately. The painting's new home is due to be completed in time for the 600th anniversary of the university in 2009.

controlling cell growth is dependent on the cell context, but the pathways that make up these networks are generally shared. Nine of the chapters discuss pathways, such as the 'target of rapamycin' pathway, and processes, such as protein synthesis, that are at the heart of all cell growth. Finally, the book closes with several chapters discussing the specific growth-control mechanisms in specialized cells, such as lymphocytes, myocytes and neurons, which vary in size from one another by many orders of magnitude.

In compiling this book, the editors have successfully overcome many obstacles. For instance, it is clear that cell growth control mechanisms often vary significantly between commonly studied systems. Rather than discount this fact, the editors have put together a complementary collection of chapters that address this problem and search for

common themes. Furthermore, with each chapter representing a separate review, one might expect a high degree of redundancy. Although there is some overlap, the authors of each chapter do a remarkable job of staying focused on their area of expertise yet still manage to tie their subject into the wider context.

Our knowledge of the pathways that control cell growth is increasing rapidly, making it difficult to publish an up-to-date book on the intricacies of this field. However, the overall balance achieved between detailing our current understanding of the molecular control of cell growth and outlining the fundamental research challenges that remain, make this book indispensable to those with new, or renewed, interest in this topic.

Collectively, the different chapters cover a

wide range of topics that will be of particular interest to cell, developmental and evolutionary biologists alike. Some of the mechanistic details described, however, although necessary, may be difficult for a general audience to follow. But the book's multidisciplinary nature will make it an excellent reference for many scientists. *Cell Growth*, like many titles from the Cold Spring Harbor monograph series, should stand the test of time and serve as a solid foundation for this ever-expanding field.

Brendan D. Manning is in the Department of Genetics and Complex Diseases, Harvard School of Public Health, Boston, Massachusetts 02115, USA. Lewis C. Cantley is in the Division of Signal Transduction, Beth Israel Deaconess Medical Center, and the Department of Systems Biology, Harvard Medical School, Boston, Massachusetts 02115, USA.