NEUROSCIENCE

Recreating the Brain Online

Richard Frackowiak

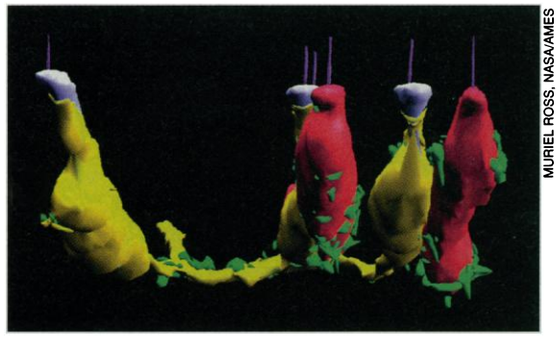
Neuroinformatics. An Overview of the Human Brain Project. STEPHEN H. KOSLOW and MICHAEL F. HUERTA, Eds. Erlbaum, Mahwah, NJ, 1997. xii, 376 pp., illus., + plates. $79.95 or £60.95. ISBN 0-8058-2099-x. Progress in Neuroinformatics Research.

Neuroinformatics is a science of the moment. Its aims are first to integrate the burgeoning data of neuroscience, taking advantage of the power of computers to produce three-dimensional maps and models of the structures and functional processes of the brain, and then to make the results widely available via computer networks. Because of the growing need for an understanding of the relations among anatomy, neurochemistry, neurophysiology, and behavior, the increasing capabilities of computer technology, and the overall importance of determining how the brain works, the field of neuroinformatics is attracting substantial funding—venture capital, as it were. The Human Brain Project, sponsored by the National Institute of Mental Health and other U.S. agencies, is one such venture, and similar initiatives are being taken by the European Union and European Science Foundation.

What is neuroinformatics? A clear definition of its scope and aims is timely and important, and *Neuroinformatics. An Overview of the Human Brain Project* succeeds admirably in this task. This book is the first in a series titled *Progress in Neuroinformatics Research*, and it concentrates on the integrative methods needed to inform the way to the future. Each of the editors has been at the forefront of the science and funding of this program. Although the quality of the chapters is not uniform, the enforcement of a more homogeneous style would no doubt have taken away from the immediacy and originality of the contributions.

Among the more interesting chapters is the description by Shepherd *et al.* of the SenseLab project, which aims to develop a comprehensive model of the olfactory system, as a pilot project in the modeling of sensory information processing in general. The authors describe the various types of data that were integrated to create computer models of different components of the olfactory system and the software analysis tools used. Moreover, they emphasize the necessity of ongoing collaboration among many labs through shared databases, and they provide details of their system of network-based communication and coordination.

Also of interest is the discussion of the methodology for construction of a human brain atlas that will provide access to information at all levels from molecule to neural system, and hence to behavior. With chapters detailing information management software in the study of the normal brain and the diseased brain, this topic occupies about half the book and encompasses a "goal-directed approach" to magnetic resonance microimaging, issues of morphometrics, the development of a structural information framework for mapping based on cortical stimulation data, and software for quantitative neuroimaging. Whereas some chapters will be of more interest to basic scientists, others are more clinically oriented. Not least of the many practical problems that need to be addressed in producing such an atlas is the collection of standardized sets of data with sufficient resolution and precision to permit analysis at any level from histochemistry to gross anatomy. It is not a trivial task to dissect a human brain into thin slices without distortion and then to reconstruct it in both physical and digital format—moreover, with the result being representative of the population. However, the anatomic and digital standardization of such data, allowing efficient access through a standard neuroanatomical coordinate system, will provide a resource that will promote further biological research.



MURIEL ROSS, NASA/AMES

Hair cells from space. The database NeuronDB links to three-dimensional reconstructions of vestibular hair cells of animals from the space shuttle.

In contrast, the computational side of neuroinformatics is less well represented in this volume. The abstraction of computational principles and their implementation on microchips, for the purpose of constructing new types of computers or models of the human brain that can be perturbed and tested, are equally enthralling and imaginative aims of neuroinformatics of which the reader should be aware.

Nevertheless, the book is a must for all those interested in the interface between brain and machine, and it effectively whets the appetite for more. It sets the scene and indicates how neuroscientific data need to be organized into accessible forms, so that the more applied and fascinating projects can be given the opportunity for success. It is to be hoped that the book's successors will address such topics as the manufacture of "intelligent" robots, and, in particular, the theories and implementation that underlie such ambitious projects. The book is also a testament to the originality and ambition of forward-looking research administrators. The empowerment of modern "big science" research with adequate facilities and funds is not a trivial problem in itself. Scientists and administrators interested in the area of neuroinformatics have found a way, and a seemingly productive one, to achieve such funding.

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BROWSINGS

Natural Eloquence. Women Reinscribe Science. Barbara T. Gates and Ann B. Shteir, Eds. University of Wisconsin Press, Madison, 1997. xiv, 280 pp., illus. $45, ISBN 0-299-15480-7; paper, $17.95, ISBN 0-299-15484-x. Science and Literature.

Fourteen essays exploring the work of women "as productive literary and artistic agents within science culture and focus[ing] on science written in the vernacular," from Jane Marcet's *Conversations on Chemistry* of 1806 and Agnes Clerke's turn-of-the-century astronomical writings to the work of more recent figues such as Charlotte Haldane, Naomi Michison, and Dian Fossey.

Science on the Texas Frontier. Observations of Dr. Gideon Lincecum. Jerry Bryan Lincecum, Edward Hake Phillips, and Peggy A. Redshaw, Eds. Texas A&M University Press, College Station, 1997. xiv, 211 pp., illus. $35, ISBN 0-89096-768-7; paper, $17.95, ISBN 0-89096-790-3.

A companion volume to the colorful explorer's memoirs, *Frontier Naturalist* (see *Science* **267**, 395 [1995]).