tive–historical. The author gives a description of the remarkable period 1970–76, when the foundations were laid of the Standard Model of fundamental particles and their interaction, and weaves this around a first-person account of the early part of his own career. Because his work was central to much of the progress at the time, this approach is not unnatural, and on occasion offers a unique perspective. In particular, 't Hooft's account of his encounters with his adviser and collaborator Martinus Veltman, and with Ben Lee, which led up to his historic proof of the renormalizability of non-abelian gauge theories, is a fresh and interesting contribution to intellectual history.

But there is danger in such a personalized approach, regarded as history, when the author attempts to assess his own contributions. For example, I believe, from my own experience as a participant, that he seriously understates the conceptual and technical achievements of others in discovering and recognizing the significance of asymptotic freedom, and in using it to construct a specific and testable theory of the strong interaction. It was quite a bold step, in my opinion, to propose a theory whose building-blocks were entirely unobserved at the time; and it was credible only in the light of difficult, specific calculations that offered an explanation of surprising experimental facts (Bjorken scaling, observed at the Stanford Linear Accelerator Center in California). The achievement of the modern theory of the strong interaction belongs to those who made these discoveries and took these steps.

Similarly, it is more than a little jarring, for anyone who lived through the period, to find the main concepts of charmonium theory expounded in reconstructed dialogues between the author and bystanders, with no mention of Appelquist and Politzer's fundamental paper, or of the earlier work of Lee, Gaillard and Rosner.

The third part of the book, in which 't Hooft discusses attempts by himself and others to go beyond the Standard Model, provides the most fun. He loosens his pen and gives his frank opinions on what are still very much live issues. He expresses some of his reservations about string theory in a memorable image: "Actually, I would not even be prepared to call string theory a 'theory' but rather a 'model', or not even that: just a hunch.... Imagine that I give you a chair while explaining that the legs are still missing, and that the seat, back, and armrest will perhaps be delivered soon; whatever I did give you, can I still call it a chair?"

In a more serious vein, he expresses his conviction that string theory may provide valuable insight, but that a truly fundamental theory of physics will ultimately be based on entirely different concepts. Physicists may be startled to learn that 't Hooft, like Einstein, de Broglie and several other heroes of quantum physics, expresses considerable sympathy for the idea that quantum mechanics will eventually be supplanted by some form of 'hidden variables' theory. He is also fascinated by the vision of Wheeler, Fredkin and others that the ultimate laws might be of some elementary logical-combinatorial form, along the lines of a universal (in both senses!) cellular automaton.

Despite its serious flaws, one finds on virtually every page of this book sharp statements and novel formulations that show the workings of a first-rate, confident and original mind. It deserves attention. □

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At a glance

Excellent ★★★★ Good ★★★ Fair ★★ Poor ★

Brain Mapping: The Methods

by Arthur W. Toga and John C. Mazziotta
Academic: 1996
Pp. 471. $145

Investigation of the functional architecture of the human brain using modern noninvasive imaging techniques is a rapidly expanding area of research. A proper knowledge of methodology is needed to appreciate the burgeoning literature in the field.

Now we have an excellent catalogue of the main techniques. The editors have assembled an impressive group of experts, all widely known in their field, who contribute an outstanding set of chapters.

The editorial hand has been firm and judicious, placing each contribution in context so that the book develops logically. Coverage ranges from recording intrinsic optical signals, through tomographical mapping techniques and electrically and magnetically based measurements, to issues of experimental design and statistics relevant to image analysis.

I cannot recommend this volume highly enough for both experts and those starting out in the field. It is also beautifully illustrated and produced.

R. S. J. Frackowiak *Institute of Neurology, London, UK.*

Range	★★★★
Depth	★★★★
Accuracy	★★★★
Up-to-dateness	★★★★
Accessibility	★★★★
Style	★★★★

Triple-Helical Nucleic Acids

by Valery N. Soyfer and Vladimier N. Potaman
Springer: 1996. Pp. 360.
$79, £60

A thriving new area of research in nucleic acids focuses on triple helical structures in DNA. These structures can be thought of as generated by adding a third strand to duplex DNA through the formation of new base-specific interactions in the major groove. The potential application of triplex structures as targeted therapeutic agents now attracts academic and commercial interest.

The authors review what we know about most aspects of these novel structures, covering structural, molecular recognition and physico-chemical aspects in detail. They also describe the methodology used, although I was surprised at the lack of nuclear-magnetic-resonance evidence throughout. But perhaps my greatest reservation, both about the book and the field, came on reading the penultimate chapter on *in vivo* significance. The authors state in the preface that the "importance [of triplex structures] in many key processes of life is now obvious"; well, not to me it isn't. Read the book to learn the structural aspects of triplexes, but take the biology with caution.

David Lilley *Department of Biochemistry, University of Dundee, UK.*

Range	★★★
Depth	★★
Accuracy	★★
Up-to-dateness	★★
Accessibility	★★★★
Style	★★★

Ion Channels: Molecules in Action

by David J. Aidley and Peter R. Stanfield
Cambridge University Press: 1996. Pp. 307.
£50, $74.95 (hbk); £17.95, $29.95 (pbk)

The title of this textbook conveys the sense not only of the active switching of these macromolecular machines, but also of the extraordinarily dynamic nature of the field of ion-channel studies.

Since channel proteins were first cloned 15 years ago, there has been a barrage of new molecular and functional information about ion channels, and in the 1990s more and more channels have been linked to inherited human diseases.

Here two eminent physiologists review basic principles and historical studies, as well as emphasizing the latest molecular advances. They begin at a basic level suited to undergraduate biologists with little background in physics, but work towards a fairly sophisticated understanding of current research.

The survey of newly cloned channels, many of which are outside the historical neuronal channel families, should give newcomers a feeling for how much remains to be explored.

Gary Yellen *Department of Neurobiology, Massachusetts General Hospital and Harvard Medical School, USA.*

Range	★★★★
Depth	★★★
Accuracy	★★★
Up-to-dateness	★★★★
Accessibility	★★★
Style	★★★