give a consistent treatment of both bulk and surface properties at the same time. The singularities corresponding to bulk phase transitions appear in both the bulk and the surface free energies, but the surface free energy has singularities of its own in addition, corresponding to surface phase transitions.

In a contribution on rigorous studies of critical behavior, M. Aizenman announces results that show that in a large class of models there is a unique critical temperature above which correlations decay exponentially and below which there is a positive spontaneous magnetization. This was an expected result, but the problem of proving it from first principles had been open for a long time. In addition to reviewing other recently obtained rigorous results, Aizenman outlines a treatment of the intersection of Brownian paths that enables one to put the discussion of the well-known β function on a rigorous footing.

J. Fröhlich surveys the statistical mechanics of random surfaces and its application in condensed matter physics and quantum field theory. This is a rich and subtle subject that appears to be fundamental in a number of important physical problems. One has only to mention a few key phrases to evoke the wealth of phenomena in the subject: surface roughening, topological complexity, crumpling, collapse to treelike surfaces.

I hope this review has made clear that the book describes many exciting results in theoretical physics and an even larger number of opportunities for future work.

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Nociceptive Transmission

The Pain System. The Neural Basis of Nociceptive Transmission in the Mammalian Nervous System. W. D. WILLIS, JR. Karger, Basel, 1985. x, 346 pp., illus. $86.25. Pain and Headache, vol. 8.

In the two decades since the publication in this journal of Melzack and Wall's classic article, "Pain mechanisms: a new theory," there has been an explosion in our understanding of the mechanisms of pain perception. However, despite the publication of numerous books and reviews on the subject, there has been no concise contemporary report published that contains enough detail and accuracy to inform workers in the field while retaining the perspective, structure, and coherence to be accessible to those outside the field. Willis has succeeded in producing such a volume.

Though its coverage is broad, the work is not so much a detailed compendium as it is a readable summary of research on transmission of the nociceptive message, from the obscure transduction event in somatic tissue through complex peripheral and central neural networks to an even more obscure perceptual event. On the way, a wealth of anatomical and physiological detail is described, beginning with the extensively studied nociceptive primary afferents and ending with recent work characterizing nociceptive cortical neurons. One comes away from this fairly brief, profusely illustrated book with the feeling that one has the basic story under one's belt and enough recent key references to gain access to an extensive literature.

Of particular interest are the descriptions of recent experiments recording from single nociceptors and stimulating small bundles of fibers to produce sensation in awake humans. There are also excellent reviews of the anatomy of the superficial layers of the spinal dorsal horn and of the anatomy and physiology of thalamic and cortical areas that respond to nociceptive stimuli. Most of this material is new, and the treatment of it is both complete and concise. Not surprisingly there is extensive coverage of the spinothalamic tract, Willis's major research interest.

Willis tends not to dwell on theory in this book. He has been parsimonious with his own interpretations, preferring to state the observations and let the reader draw his or her own conclusions. Although some of the previous theories of pain sensation are mentioned (those based on specificity, pattern, gate control, and diffuse noxious inhibitory control) they are only briefly described.

The book is profusely illustrated; however, most of the illustrations are borrowed directly from previously published work. On balance this is fine, but it leads to a lack of uniformity, captions in which many symbols are unexplained, and figures that are occasionally confusing.

The book is primarily focused on basic anatomy and physiology. It contains only the briefest coverage of an extensive literature in pharmacology and immunocytochemistry. Interesting and important clinical observations concerning pain following peripheral or central nervous system injury are not mentioned. Although these subjects are important, omitting them helps to preserve the cohesiveness of the book and thus its accessibility to neuroscientists not familiar with pain research.

One important subject that the book does not cover is the descending control of nociceptive transmission, which Willis has dealt with in another recent book (*Control of Nociceptive Transmission in the Spinal Cord*, Springer-Verlag, 1982).

Despite these omissions (or perhaps because of them) this is a cohesive, timely, and well-written book that should be on the shelf for quick reference by all clinicians and neuroscientists interested in pain.

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A Reef System

Corals and Coral Reefs of the Galápagos Islands. PETER W. GLYNN and GERARD M. WELLINGTON. With an annotated list of the scleractinian corals by John W. Wells. University of California Press, Berkeley, 1984. xvi, 330 pp., illus. $45.

The 19th-century natural historians who described coral reefs often did so on the basis of observations of the many reefs they encountered during lengthy scientific expeditions. In contrast, present-day studies of coral reefs have tended to center on a relatively few, easily accessible localities. This has the advantage of providing detailed documentation for a few reefs but entails the risk that these few may become generally perceived as "typical." For this reason, descriptions of previously unstudied reef systems are valuable.

Despite the region's history as a site for biological discovery, the reefs of the Galápagos Islands have remained largely unexplored and undescribed. Yet several accidents of geography combine to make the Galápagos an unusual and particularly interesting location for studying reef corals. The archipelago is an isolated oceanic outpost, and, owing to the prevailing westerly moving currents, its biogeographical affinity is with the faunally depauperate reefs of Central and South America. In places, seawater temperatures seasonally approach the lower limits for the growth of reef-building corals, creating a marginal habitat for reef development. Finally, the convergence of several major currents on the Galápagos results in pronounced regional differ-