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# Book Reviews

***The Brain's Sense of Movement.*** *By Alain Berthoz (Translated by Giselle Weiss). Cambridge, Massachusetts: Harvard University Press; 2000, 352 pp. $22.80.*

Ever wonder how certain people catch or bat a baseball hurled at blurring speeds? If you have, find yourself in a group whose intended or accidental success maybe a machine that pitches and throws like a ballplayer. Once this group of researchers articulates an accurate set of principles behind movement, deft engineering, persistence, and luck may converge to emulate nature. Although Berthoz's *The Brain's Sense of Movement,* does not offer a science-fiction glimpse of agile androids that populate Asimov's novels, it provides an organized and fascinating way of thinking about movement.

Berthoz takes the reader on a whirlwind tour of cognitive neuroscience topics: perception, coherence, memory, prediction, and adaptation. By examining these topics and using choice examples, Berthoz builds a persuasive case supporting his thesis that the brain is an anticipation machine. Even before delving into the intricacies of each of these topics, Berthoz's claim seems reasonable in light of evolution. In fact, Berthoz explains how evolution and improved neural systems that guide movement influence and drive each other:

"The species that passed the test of natural selection are those that figured out how to save a few milliseconds in capturing prey and anticipating the actions of predators, those whose brains were able to simulate the elements of the environment and choose the best way home, those able to memorize great quantities of information from past experience and use them in the heat of action."

This cat and mouse games has honed the brain to take advantage of its parallel architecture, bypassing computing each trajectory in a Newtonian sense, and arriving at a solution by using heuristics developed over evolution. Heuristics play an important role in examples where a target exceeds physical limits of detection. For example, a baseball may move too quickly for the fovea to focus, however, the brain, and skeletal-muscular system use computational shortcuts to simulate, predict, adapt, and control the body in response to a changing environment.

The first choice example that Berthoz highlights as a key computational shortcut is the derivative. Signals from receptors enable anticipation of future position of the head owing to their sensitivity to derivatives such as jerk, acceleration, and velocity. Another mathematical concept that Berthoz explores as a predictive tool is tensors. From what I learned, a tensor is a group of mathematical operators called matrices that carry out transformations among vectors. Between derivatives and vectors, Berthoz devotes several chapters to explaining how otoliths and semicircular canals use derivatives for linear and angular accelerations to predict while tensors receive perfunctory treatment. A balance between these two topics may better satisfy some readers.

Certainly, derivatives and tensors alone cannot account for movement. Just as a calculator or computer derives its usefulness in a network, mathematical shortcuts for movement need to occur in the context of a circuit. Reading Berthoz's

treatment of the circuitry that allows for complex calculations like ocular pursuits is fascinating. Somehow the brain's circuitry decomposes information into constituents (for example, vision into color, movement, contrast, and texture), then reassembles salient information, and miraculously produces a coherent experience. From this explanation, one question arose: although sound travels slower than light, the fusion of sensory information from the ear and eye feels seamless. Berthoz explains that sight and sound jibe because the brain introduces a delay in visual stimuli processing.

An interesting example to illustrate how a coherent experience gets disrupted is in somatoparaphrenia. Specifically, caloric vestibular stimulation by injecting warm water into the ear of a patient causes denial of his own limbs. For example, one patient denied that her left arm was her own. She said: "This is my mother's arm."

It is this combination of choice examples that illustrate important concepts underlying our current understanding of movement that makes this book a thought-provoking read. Short of describing each topic in overbearing detail, the summary is that the brain not only formulates hypotheses and tests them using the sensory receptors, but evolution made the brain a machine for predicting. In sum to learn more about movement, read this book.

James Park
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***Digital Histology: An Interactive CD Atlas with Review Text.*** *By Alice S. Pakurar and John W. Bigbee. Hoboken, New Jersey: Wiley; 2004, 226 pp. $69.95.*

Most students of the health professions will not end up routinely evaluating tissue sections (as do pathologists, histologists, or anatomists) as professionals. However, it has long been recognized that students' knowledge of the basic anatomy and histology of a given organ system is essential to their understanding of both the normal functioning of that organ as well as the spectrum of physiologic and pathologic derangements that potentially may arise from it. Thus, the curricula of most medical and dental schools include a basic histology course, in which students are typically assigned a light microscope and a box of hematoxylin and eosin-stained tissue sections depicting the normal light-microscopic appearances of the various organs. This cumbersome arrangement has become increasingly impractical due to constraints related to physical space, laboratory time, and microscope expense. *Digital Histology: an Interactive CD Atlas with Review Text* purports to offer "a realistic adjunct or alternative" to these traditional histology laboratories.

As it's name suggests, this publication consists of two complementary components — a 225-page review text, and an accompanying CD Atlas containing over 750 digitized images. The text was aimed at the student of histology and as such is appropriately concise (with a bulletin format emphasizing the most salient points of each topic) and complete without dwelling on the esoteric. In a 23-chapter outline, the text covers all the organ systems and provides basic information on cell structures, tissue preparation, and microscopy as well as general concepts such as the differences between the stroma and the parenchyma of an organ. A major strength of the text is the cartoon illustrations which occasionally more clearly depict a concept than images of actual tissue. For example, due to its oblique configuration, it is extremely difficult on a gross coronal section to appreciate the components of the heart; their figure 10.2 is just one of many examples of how effective a cartoon illustration may be in this context. The accompanying CD is an interactive, easy-to-navigate treasure that is recommend to be used in concert with the text. In this CD, more than 750

high-quality histologic/ultrastructural images and illustrations are arranged into three broad groups: “Cells”, “Tissues” and “Organs & Systems”. Each is then subcategorized into several topics, with an overall outline that facilitates ease of navigation between each topic in a linear or nonlinear fashion. Each image is accompanied by optional short educational notes as well as a list of notable features on that image. Clicking on the feature unveils an arrow pointing to the relevant part of the image. For review purposes, there is a randomization function so that only images from a user’s desired set of topics are brought up randomly. A quiz also accompanies each section.

The authors state in their preface that digital histology has replaced traditional laboratories in the health professional schools at their institution. Whether this format will become a trend in other institutions remains to be seen. However, I would highly recommend this educational tool as I have very little doubt that it will, at the very least, greatly facilitate the learning of basic histology.

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***Functional Neuroanatomy: An Interactive Text and Manual.*** *By Jeffrey T. Joseph and David L. Cardozo. Hoboken, New Jersey: Wiley-Liss; 2004, 575 pp. $64.50.*

This book is an excellent guide for medical students and those training in occupational, physical, and speech therapy. It’s a pity that this book was not available when we trained since it utilizes a much more accessible approach than those previously employed to teach a very complex field. The interactive style of the book makes learning and retention easier.

The introductory chapters cover external and internal anatomy, histology and a basic primer to neuroimaging. Later sections focus on each sensory system (somatosensory, vision, etc), the neuromuscular system, and each part of the brain and spinal cord in the context of its function. The book is rounded up with a review of neuroembryology and the effects of various traumatic injuries to the brain. The book is well populated with labeled anatomical and histology slides as well as radiological images of high quality, in addition to standard anatomical illustrations. Lastly, a short yet succinct imaging section, in addition to the liberal use of radiological imaging throughout the text, provides a primer to students in the understanding of radiological anatomy which is, after all, how most practitioners will see the neurological system after leaving the lab.

The only flaw in the book is the short atlas section in the appendix. While the images are comprehensive and of good quality, portions of the images in the atlas are unlabelled in contrast to the detailed labels that accompany images throughout the text. Also, the relevance of adding a trauma section to an anatomical text can be questioned.

This is a guide book not an atlas or a reference text. And as a guide book, it does a superb job. It is not meant as a quick reference, as hard facts are embedded with practical and case-study information. That makes it difficult to use if one is looking up a fast fact or a quick reference. However, knowing how well worn these aids become to students, those who use it for their training will become very familiar with its contents and can use it for years afterwards.

Functional neuroanatomy is a complex field and its teaching is difficult. The authors have deployed their years of experience in writing a manual which we would highly recommend to anyone needing to learn functional neuroanatomy for use in a clinical or laboratory setting.

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Lynne Safriel, M.A. O.T.R./L.

***The History of Tropical Neurology: Nutritional Disorders.*** *By George W. Bruyn and Charles M. Poser. Canton, Massachusetts: Science History Publications, 2003, 144 pp.* $24.95.

The authors state in the preface that tropical neurological disorders are not diseases of particular latitudes, but of particular deprivations. These diseases occur in the tropics because war, famine, poverty and oppression occur in the tropics. They point out that neurological diseases common in the tropics today were once common everywhere. However, this opening view does not serve as a platform for an incisive political history of nutritional disorders. This slim book is not overtly political, nor does it even take an historical approach. Rather, the prefatory remark seems intended to justify the book's unfortunate eclecticism. The text reads more like a series of brief biographical sketches of physician-scientists, interspersed with asides from the authors. These asides vary from their opinions on whether Eijkman ought to have won the 1929 Nobel Prize to possible etiologies for poorly understood conditions to flickering insights into the intellectual history of these diseases. This mélange is collected around six neurological disorders related to improper nutrition: beriberi, burning feet, endemic cretinism, tropical ataxic neuropathy, neurolathyrism, and pellagra.

Readers searching for coherent narratives or explanatory frameworks will remain frustrated. Paragraphs leap between centuries and continents. The story the authors are most interested in telling is the elucidation of the etiologies of these diseases by the Western world in the late 19th and early 20th centuries. However, detours into contemporary Japanese medicine are not uncommon, nor are glimpses of ancient China, India, and Greece, World War Two POW camps, and a host of other times and places.

Sustaining the jetlagged reader is the substantial science. The excellent bibliographies attest to the enormous amounts of research the authors conducted on the scientific histories of these diseases. While some familiarity with these diseases is a prerequisite, the authors provide thorough summaries of research findings. Their chapters function best as comprehensive review articles. They also highlight where questions remain, indicating further areas where more research is needed.

Unfortunately, the well-researched scientific history is presented in a disorganized fashion, obscuring the development of the scientific ideas. When turning from description to explanation, the historical analysis is largely empty; occasional sentences merely suggest the fertile possibilities of a history of tropical neurology. The authors assert, in various chapters (albeit somewhat inconsistently), that the dominance of the Koch-Pasteur germ theory substantially delayed the discovery of the vitamin theory. While plausible, much more could, and should, be said about the particulars of this problem. Similarly, the authors briefly note the importance of the military interests in investigating these diseases. Again, much more could be said. The true fruits of their historical research are some of their anecdotes. For example, a pivotal moment in discovering the dietary link to beriberi was when Eijkman's military cook refused to serve polished military rice to 'civilian hens'.

A review of this book would not be complete without noting the ubiquitous portraits gracing almost every page. The authors' respect for the physician-scientist is best seen not from the text but from the hundreds of photo and drawings they included. The book resembles a Who's Who of Scientists of Nutritional Disorders, from Paracelsus to Ben Osuntokun (whose work was important in linking the cassava plant to tropical ataxic neuropathy).

Credit must be given, though, for merely writing the book, since it is in an area of research where little is known and very little is written. Given this book's weaknesses as a scholarly work, this book still would serve well as light reading for physicians interested in knowing a bit more about neurological diseases in the tropics, or, with its wide pages and numerous illustrations, as a nice coffee table book, as well as a starting point for a more complete historical study.

Paul Kalanithi
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***Lab Math: A Handbook of Measurements, Calculations, and Other Quantitative Skills for Use at the Bench.*** *By Dany Spencer Adams. Cold Spring Harbor, New York: Cold Spring Harbor Laboratory Press; 2003, 275 pp. $49.00.*

Like other manuals in the Cold Spring Harbor Laboratory (CSHL) series, notably *At the Bench: A Laboratory Navigator*, *Lab Math* by Dany Spencer Adams continues the tradition of excellence in presentation and organization.

Presentation-wise, I love the spiral binding: it makes flipping through pages casual and easy to reference with post-its. On a bookshelf, its mid-range size makes the text easy to store and spot. Hopefully forthcoming books in the CSHL series will follow this presentation design because it's well thought out and user friendly.

In terms of organization, Adams starts by assuming the reader has no or little research experience. Adams begins with a numbingly detailed chapter, "Measuring, Counting, and Otherwise Quantifying," that explains how to use a balance, pipette, and hemocytometer. Perhaps this chapter would be better used as a supplement to a quick demonstration given by a fellow lab member. Thereafter, the the material gets more interesting. What's remarkable about Adams' writing is that, despite the plug-and-chug nature of some of the equations listed, the author does a splendid job of explaining the physical consequence of each term in equations such as the Beer-Lambert law. He explains how the terms matter in an experiment without going into physical chemical minutiae.

Adams covers the mathematical equations concerning the trinity of DNA, RNA, and Protein, with lean explanations. From estimating DNA melting temperature to determining molecular weight using gel filtration chromatography, Adams provides a thorough review for the molecular biologist. And for the techniques that I don't regularly use such as FRET for proteins, I came away with a greater appreciation.

The seventh chapter, "Statistics and Reports," covers rudimentary statistical concepts such as confidence limits and t-tests. By the chapter's end, I felt statistics in a book titled *Lab Math* had received a cursory treatment. The chapter needs beefing up, particularly in the areas of statistical applications and misuses. Finally, Chapter Eight is a romp through interesting factoids. Did you know that "yotta" is 10 to the 24th power and "yocto" is 10 to the -24th power?

In sum, "Lab Math" is a great reference tool that deserves a place in the bookshelf of the beginning molecular biologist.

James Park
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***Immunology: A Short Course, Fifth Edition****. By Richard Coico, Geoffrey Sunshine, and Eli Benjamin. Hoboken, New Jersey: Wiley-Liss; 2003, 361 pp. $49.95.*

When I picked up *Immunology: A Short Course*, I was a little skeptical. Not because the subject is immunology, a topic which I find fascinating, but because immunology is an incredibly complex, difficult subject to understand, let alone teach. As a student of immunology, I was

mildly offended that such a burgeoning, vast, complicated field could be summed up in "A Short Course." Moreover, having read Janeway et al.'s *Immunobiology: The Immune Sytem in Health and Disease* with zeal a few years back, I felt that no other text book could ever equal the clarity and extensiveness of Janeway's immunological bible. Having completed the fifth edition of *Immunology: A Short Course*, I still feel that the subject could benefit from a little less brevity, however, I am suitably impressed by the production.

The authors stress their motto of "less is more", including in the text only the topics that they believe are essential to those new to the field of immunology. The fact that the textbook numbers three hundred and sixty-one pages is testament to the complexity of the field. The book begins with a basic overview of the innate and adaptive immune systems, and follows with a discussion of immunogens and antigens, antibodies, B- and T-cells, antigen processing and presentation, cytokines, tolerance and autoimmunity, and complement. This section also includes a chapter entitled "Antigen-antibody interactions, immune assays, and experimental systems," which gives an overview of the many powerful applications of antibody-antigen interactions in biochemical and cell biological studies, and also succinctly describes the typical experimental systems and techniques used in immunological studies, such as hybridomas, knockout and transgenic mice, and adoptive transfer. This chapter is an excellent reference for the student who wishes to consult the primary literature, understands how the discoveries were made, and designs experiments to address immunological questions. The second half of the book covers the clinically relevant topics of hypersensitivity reactions, immunodeficiency, neoplasias of the lymphoid system, transplantation, tumor immunology, and resistance to immunization and infectious diseases. Each chapter is laid out in a straightforward, user-friendly manner, with simple diagrams, chapter summaries, references to recent reviews, and study questions and answers. The back of the book carries an extensive glossary and appendix containing a partial list of the CD antigens. While sometimes lacking fluidity, overall, the text is interesting, dynamic, and palatable, rendering the book an excellent beginner's guide.

My greatest criticism of the book is that despite its impressive breadth, there is a disappointing lack of depth on many current hot topics such as the activation and downstream signaling resulting from the ligation of toll-like receptors in the innate immune response, and cross-presentation of exogenous antigens on MHC Class I molecules. While the authors have made significant progress in updating chapters from the previous edition, some of the excitement stemming from recent findings will have to await the Sixth edition. Nonetheless, the authors have done a terrific job of providing an overview of the field, and a springboard from which to launch into the more intricate topics of immunology.

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***Plant Genomics and Proteomics.*** *By Christopher A. Cullis. Hoboken, New Jersey: John Wiley and Sons; 2004, 232 pp. $69.95 hardcover and digital download (Adobe reader).*

In a time of increasing specialization in biology and the growth in sheer volume of information, it is both refreshing and somewhat surprising that an author would tackle a subject as large as plant genomics in a 200-page book. In *Plant Genomics and Proteomics*, Christopher A. Cullis covers this weighty subject, explaining both fundamental strategies used in genomic research and how this work is

specifically applied to the unique challenges of studying plants. The book claims to assume no specialized knowledge of plant biology and indeed goes in some detail into necessary background information and terms. And herein lies the problem with this book. By being limited to so few pages, the book at times seems to pick and choose what to focus on, covering in excellent detail and clarity some areas, while giving short shrift to others.

The introduction of the book effectively lays out the plan for the book and most importantly to me, explains why there is value in writing a book specifically devoted to plant genomics. The author explains that some of the unique characteristics of plants, such as the large variability in genome size and the frequent occurrence of polyploidization, provide particular challenges to the application of genomic tools and research. Needless to say, with the growing body of research on plant biology facillitated by genomics, a book to summarize and impose some order on this field is useful. The author also points out the importance of research on crop plants and addresses some of the controversies surrounding genetic manipulation of plants.

Chapter 1 gives a nice overview of the structure of plant genomes and provides an excellent introduction to both what makes plants unique and different from other frequently studied non-plant organisms. The following chapters take the reader on an informative tour of the field of genomics covering topics such as sequencing strategies, acquiring functional information, gene discovery, and the use of microarrays. There are some areas that read more like an introduction to genomics in general, with few references to plants in particular.

The last few chapters focus in more on plants in particular with a chapter on interactions with the external environment and a discussion of traits that are controlled by multiple genes. These chapters cover information on research quite relevant to plant research and provide lots of information clearly and concisely. The section on plant resistance is particularly noteworthy. The last chapters cover resources in bioinformatics that are available to researchers and a short section on some bioethical concerns that plant biotechnology has raised.

Overall, the author does an admirable job of summarizing a large and growing field. I also appreciate his attempts to explore the ways in which genomics are applied to plant research and some of the recent advances in this area. However, my greatest complaint is that the author seems to have been forced to pick and choose areas to focus on, rather than giving a more general summary. Perhaps less detail and a broader paintbrush would have been more successful. Also, dare I say, the book could have also benefitted from a few more pages.

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***The Science and Ethics of Engineering the Human Germ Line: Mendel's Maze.*** By Jon W. Gordon. Hoboken, New Jersey: Wiley-Liss, 2003, 286 pp. $49.95.

One can't usually judge a book by its cover, but this might be an exception. On the cover of *The Science and Ethics of Engineering the Human Germ Line*, the bright yellow word "Science" dwarfs the rest of the plain white words. The content of the book reflects this emphasis. Dr. Gordon is a professor of Geriatrics and Adult Development and of Obstetrics, Gynecology and Reproductive Medicine at Mount Sinai. He was also the first person to create a transgenic mouse. He wrote this book in order to integrate the relevant science, provide a sufficient scientific understanding for the public, develop a framework for thinking about ethics and biotechnology and, finally, shed some

light on some of biases against women in thinking about these areas.

On the whole, the book is a success. The first three-fifths of the book attempts to inform the reader of pertinent science in the fields of molecular biology, genetics, developmental biology, and reproductive biology. This is directed not only at the lay public, but also at other scientists who, in Gordon's opinion, can be rather misinformed about scientific fields outside their own specialties. He cites one example of a colleague arguing that because a man died of a brain tumor and his twin didn't, they could not be identical. Gordon's book provides enough information to prevent not only such blatant mistakes, but more subtle ones as well. Even for the scientifically trained, this book is instructive. Gordon's distillations are simple, effective, and have surprising depth. Unfortunately, a late publishing decision to not run the figures in black and white without correcting the text creates some confusing, but this is only a minor complaint. His impulse to involve every citizen is in the best tradition of American politics, and his skill in making this possible is remarkable.

Gordon's ethical analysis, however, is somewhat uneven. As for some of the strenghts, he emerges as a strong defender of women's welfare, and highlights the emotional trauma and compromised position of women in both sides of the debates on cloning, genetic engineering, and all of reproductive technology ethics. This is a very welcome addition to these weighty considerations. Restricting a woman's control over her own body certainly can cause suffering, but so can rushing forward with technologies that depend on surrogate mothers, egg donors, and all of the other roles that women will be expected to play — roles that typically involve invasive medical techniques and other emotionally trying experiences.

Additionally, Gordon uses his strong scientific insights to slice through some of the Gordian knots of reproductive ethics. He argues that many concerns are based on scientific impossibilities, or, at the very least, scientific longshots. Genetic engineering will only allow the control of traits to the degree that identical twins are similar. Any chaotic developmental process, like personality traits, will always be beyond the reach of genetic replacement. Moreover, by placing emerging technologies, including embryonic stem cells, in the context of extant therapies, and rating across safety, cost, efficacy and morbidity, he shows that it will almost always make the most sense to use natural conception, followed by standard genetic screening and possible abortion, than to involve complicated, invasive, expensive and often dangerous technologies.

In his final chapters, however, his pragmatism does a disservice. His disdain for ethics surfaces in his use of quotation marks for: "ethics," "morals," "deep" philosophy. This kind of thinking, he writes, is "fun" and requires "a license to be silly." The intensely clear thinking stops here. Instead the reader receives superficial — it is my turn to employ ironic quotes — "legal" analysis, as well as rare moments of confused logic: "We can distinguish 'elective' from 'therapeutic' gene transfer …[because] none of the great geniuses in history, from Leonardo da Vinci to Goethe to Einstein, was produced by genetic engineering." His legal argument essentially maintains that unless objective fact or social consensus exists, no prohibitive law is warranted. Laws based on moral values are to be avoided. These standards would have prevented laws against incest as well as most of our civil rights legislation. It would have been impossible to assert the inalienable rights of minorities or women as a fact, especially at a time where denial of access to resources made their achievements and status appear inferior to white males. And certainly no social consensus

existed at these pivotal and revolutionary parts of our history.

In his defense, Gordon believes all ethical discourse should wait until the technology arrives, as the debate will turn on real details, not speculations. Other inconsistencies and difficulties plague these last chapters, but to dwell on them is to do an injustice to an otherwise wonderful and much needed contribution to the contemporary fears about biomedical science. Gordon's basic message, and the source of his antipathy to legal intervention, is that biotechnology, like every extension of human power over other humans, can obviously serve to promulgate the inequities of race, class, and sex, but it also can challenge society to live up to its ideals, and provide the impetus for progressive change. We cannot only invent new technologies, we must also reinvent society to be worthy of them. This powerful ethical message, combined with Gordon's scientific acumen, make for a simultaneously accessible and thoughtful book. This book, and others like it, will serve a vital role in enabling a democratic resolution of these contentious issues.

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***Signal Trandsuction and Human Disease. Toren Finkel and J. Silvio Gutkind, Editors.*** *Hoboken, New Jersey: John Wiley & Sons; 2003, 488 pp. $99.95*

In *Signal Transduction and Human Disease*, Drs. Finkel and Gutkind have attempted to produce the first text to their knowledge that "straddle[s] the productive interface between modern biology and modern medicine." It is an entirely worthy goal, and their note that this is but a first edition suggests that they are willing to grapple with the Sisyphean task of capturing the dynamic field of signal transduction in successive static snapshots. Their clear commitment to the inclusion of recent data is evident by endnotes in several of the chapters apparently added subsequent to the receipt of galley proofs.

In a nod to standard medical textbook practice, they have chosen to partition their text into chapters based on specific diseases and disease processes, fully cognizant that this scheme slights and fragments treatment of complex signal transduction pathways such as MAPK, JAK/STAT, NF-kB, and NO. The targeted areas include cardiology, oncology, endocrinology, infectious disease, rheumatology, neurology, and psychology. They elected to subdivide some of these areas further, such as in endocrinology, with a single chapter devoted to the molecular basis of diabetes, while the next focused on the endocrinological sequelae of dysregulated G-protein coupled receptor (GPCR) function.

Each chapter is structured much along the lines of a review article in a basic science journal, but augmented with clinical correlations. Individual authors have chosen to integrate their clinical correlates in a variety of fashions, with varying degrees of success. Unfortunately, a common approach was the rather pedestrian tactic of reserving clinical observations for the end of the chapter, and give the impression of adding clinical notes only for effect. Such an uninspired approach tends to subvert the unique opportunity that this text provides, leading to a mere juxtaposition of disciplines rather than a true integration of them.

This text otherwise suffers on several fronts, not least of which is poor proofreading coupled with the indiscriminate and overzealous use of automated spellchecking, most evident in the introductory pages. One of the more egregious examples would have us believe that Nobel laureates are really "Noble" laureates. The quality of the figures also varies immensely between authors and chapters, with

some so poorly executed (e.g., Figure 12.6) that they should have been redesigned prior to publication.

More serious is the acknowledged patchwork treatment of major signal transduction pathways. Several pathway-centric appendices outlining effects on various disease processes would have lent more balance to the text as well as given a more realistic impression of these pathways not being compartmentalized among discrete clinical entities. The largest obstacle to a facile integration with the clinical realm is perhaps the vast amount of extremely detailed knowledge regarding signal transduction pathways, as many of the correlates relate to incredibly specific perturbations requiring a commensurate level of detailed pathological diagnosis not yet readily available to the clinician.

Although this text has significant weaknesses as it stands and has a rather limited range of clinical utility, it might find a more receptive audience among basic scientists seeking to become more conversant with clinically-oriented concepts. Given the importance of this field as well as the authors' commitment to the exploration of this interface, I look forward to subsequent editions.

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