Axon Growth and Guidance (Advances in Experimental Medicine and Biology)

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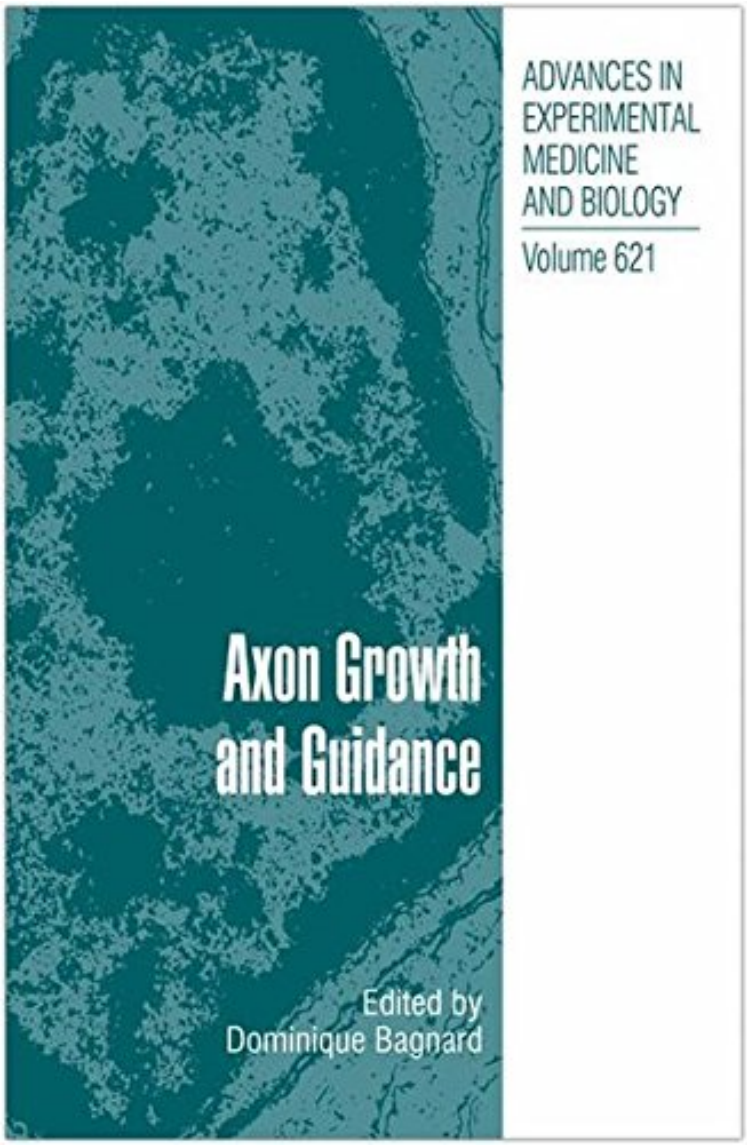

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From Springer : Axon Growth and Guidance (Advances in Experimental Medicine and Biology) before purchasing it in order to gage whether or not it would be worth my time, and all praised Axon Growth and Guidance (Advances in Experimental Medicine and Biology):

2 of 2 people found the following review helpful. A guide for researchers in neuronal development and regeneration

alikeBy Patricia L. MurphyThe breadth of information compiled in Axon Growth and Guidance is both comprehensive and representative of the developing field described therein. Although the growing pool knowledge of the mechanisms underlying axon outgrowth, and specifically the guidance of that outgrowth is no where near complete, this text provides an excellent compilation of much research into those molecules and cell signaling pathways which are suspected to be widely involved in these processes.PerspectiveAs an undergraduate researcher investigating Central Nervous System axon outgrowth and guidance after injury, this book provided a good overview of where the field is today. With three years of experience in this field, I found the book very easy to navigate and have, with the exception of two chapters, encountered research relevant to all topics discussed throughout the book in my study of this area. A very small fraction of the book, however, was review; the authors dive directly into the cutting-edge research, and a less experienced reader may have a difficult time reading through the book fluidly. The fact that I was at least vaguely familiar with each topic certainly helped in this regard. Also, a comment regarding the expertise of the authors is warranted. Even as an undergraduate researcher, I was familiar with all of the authors at American universities and those within the UK. Their work is very highly cited, and it can be said with confidence that this book truly was written by the experts in the field, although not necessarily, all inclusively.General Comments on Structure and Content The 12 chapters of the book are organized into relevant sections specific to each topic. Some chapters have an abstract, although in most cases, it seemed as though the abstract was a simplified introduction. In order to get to the real meat of the chapter, one should rather skim the conclusion.The nature of the chapters is mostly informative, as the authors seek to relay facts obtained through experimentation to the reader, rather than provide a detailed and burdensome discourse of experimental results. The reader who wishes to have a more detailed knowledge of a specific experiment mentioned in passing in a chapter can then turn, in many cases, to 3 or 4 relevant citations. In this way, the authors truly do accomplish their goal of providing an overview of the knowledge of the field because a reader can turn to this book for an explanation of current findings without having to wade through experimental methods.The figures included summarize the findings of many researchers and provide comprehensive visuals which aid the reader in understanding the processes at play in axon growth and guidance collectively, which is an incredible challenge when one considers the number of factors involved. The tables which the authors provide summarize the work of numerous authors in a clear and logical way, and as a student, I found them to be very helpful.Synopsis The reader's journey begins with a well structured discussion of the structure and function of the growth cone in Chapter 1. This is followed by a detailed review of knowledge of well-established specific guidance cues including the Netrins, Ehp/Ephrin ligands, Semaphorins, and Slits/Robos, and a few emerging/speculative guidance cues including neurotrophins, cell adhesion molecules, neurotransmitters, morphogens, and cylclic nucleotides. The text ends with an explanation of lipid rafts, which as is argued by the authors, could serve as "platforms for spatial and temporal control of guidance signaling by extracellular cues," which ties together many of the previous chapters. Finally, a discussion of glial cell involvement in axon guidance gives the text a sort of special relevance in that it takes into account other components of the nervous system.Overarching Themes The cohesiveness of the ideas presented in Axon Growth and Guidance provides a truly elegant picture of our current knowledge in the field. The introductory chapter, which provides an overview of basic growth cone structure and mechanics, introduces the reader to several recurring themes. It should be noted that the recurrence of these themes makes the text quite pleasant to read, even with the incredible breadth and depth of information included; for this, the editor deserves much praise.In chapter 1, Bonquet and Nothias note that "...most signaling cascades triggered by [guidance cues] converge on the cytoskeleton," which is recapitulated in almost every chapter.They also mention that the "Specific expression and intrinsic modification of cytoskeletal proteins also modulates neuronal response to extrinsic factors..." The idea that axon guidance is a two-way street becomes especially important in Chapter 12 concerning the role of glial cells in axon guidance, where these "reciprocal" interactions represent much of the discussion of the authors. Indeed, even the chapters that represent less well-known contributors to axon guidance, such as Chapter 9 (concerning morphogens) and Chapter 10 (concerning cyclic nucleotides), rely heavily on this assertion to relay their messages.A final theme, which could be regarded as more of a unified purpose, is evident in the fact that all of the authors incorporate some discussion of the implications of the research presented in their chapter in the development of specific therapies for neural regeneration. This provides a good example of how work in neuronal development could be extrapolated to provide a more detailed understanding of the processes underlying regeneration after injury and in disease.Criticisms Although a incredible depth of knowledge is presented in the text, the authors neglected to include a separate set of molecules which may have strong implications in axon growth and guidance. The chondroitin sulfate proteoglycans (CSPGs) have been gathering momentum since the 1990's as inhibitory axon guidance cues in injury models. The authors could have mentioned these in passing in the chapters dedicated to glial role in axon guidance (as CSPGs are concentrated around the glial scar after injury) or in the chapter dedicated to cell-adhesion (as these are extracellular matrix molecules). It could be argued that the focus of this text is not on regeneration in injury, but rather axon outgrowth and guidance in development, etc.; however, the authors do mention myelin as an inhibitory factor in passing. As such, it may have been appropriate to include some mention, if not an entire chapter, on CSPGs or CSPGs and other factors which inhibit axon outgrowth.

This book proposes an updated view of the current knowledge of the molecular and cellular mechanisms ensuring axon growth and guidance. The introductory chapter will remind the readers of all the features of a growth cone and the mechanisms controlling its growth. From there, one enters a fabulous journey with a growth cone, a Tom Thumb story filled with molecular encounters and complex interactions leading to one of the most fantastic developmental achievements: the nervous system wiring.