

<<稳态、神经网络与神经行为学>>

图书基本信息

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作者：斯奎尔 编

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### 前言

20世纪中叶以来，关于神经系统的研究从以往生物与心理学研究的边缘地位跃升，成为神经科学这一交叉学科。

这一新学科将生物化学、细胞生物学、解剖学、生理学、心理学、神经病学、精神病学等具有不同背景的科学家与临床医生们联系起来，研究令人激动的脑的秘密。

他们专注于探索神经元的功能机制，澄清行为与认知的神经基础，了解神经系统疾病。

1969年神经科学学会的创建大大促进了该学科的发展，如今该学会已经拥有近37000名会员。

第一个针对神经科学的学术培训项目建立于医学院（1965年加州大学圣迭戈分校建立神经科学系，1966年哈佛大学建立神经生物学系）。

第一个本科生培训项目于1972年建立于Amherst学院和Oberlin学院，后者培养了诺贝尔奖获得者Rogel Sperr、，和三位神经科学学会会长。

时至今日，全世界已经有超过300个神经科学系或相应的培养项目。

《神经科学百科全书》旨在将本学科丰富多元的内容条理化并仔细介绍，从而推动不同学术分支之间的沟通，提供权威的信息来源。

该书面向较为广泛的读者群体，既包括初入神经科学研究的学生，也包括寻求特定专题知识的普通读者。

无论是神经科学家，还是正在学习神经科学的本科生和研究生，或生命科学领域的教师、科普作家，都会从该参考书中获益。

《神经科学百科全书》的第一版，也是该学科的第一本详尽的参考书，于1987年在George Adelman卓有成效的领导下出版；该版本分为两卷，共。

700多个条目。

本书的第二版由George Adelman和Barry Smith主编，包括超过800个条目，于1999年分两卷出版，同时配发了光盘版。

2004年的第三版仅以电子版本发行。

本次出版的版本包括近1500个条目，全书在Science. Direct网站上发行，读者可以注册登录WWW.SCiencedirect.com阅读。

主编小组在神经科学中划分出46个主要领域，并邀请各个领域的专家担任副主编，由他们组织该领域的内容。

每位副主编再邀请30~40位作者准备各个专题条目，这些专题将努力涵盖该领域的所有内容。

许多专题作者都是该领域享有盛誉的领导者。

这使得该书成为当今神经科学学科的汇编，其中囊括了最重要的研究、最有力的研究工具、最有潜力的应用。

许多条目本身就是一篇自成一体的独立综述。

同时，在结论部分又有大量的交叉引用，它们可以将读者引入其他相关的条目。

此书主体上以字母顺序组织所有条目。

此外，详尽的主题分类又可以帮助读者找到相关的专题，以了解本学科的结构。

虽然没有一本神经科学的参考书能够囊括大脑研究每一个值得注意的想法和成果，主编们仍希望本书能够成为一本既翔实又具指导意义的、反映当代神经科学研究的汇编。

神经科学还在不断发展向前，如果本书能够在征服神经系统疾病，和了解脑、思维及我们自身的征程中发挥作用，它就获得了成功。

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### 内容概要

《神经科学百科全书》原书篇幅巨大，为所有神经科学百科全书之首。

由来自世界各地的2400多位专家撰稿人合力打造，覆盖了神经科学全部主要领域。

每个词条在收入书中之前均经过顾问委员会的同行评议，词条中均含有词汇表、引言、参考文献和丰富的交叉参考内容。

主编为著名神经科学家、美国神经科学学会前主席Larry R. Squire。

内容平易，本科生即可读懂。

深度和广度独一无二，足可满足专家学者的需要。

导读版精选原书中的部分主题，按内容重新编排，更适合国内读者购买和阅读。

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作者简介

编者：（美国）斯奎尔（Larry R.Squire）

## 书籍目录

计算神经行为学与神经网络 Active Perception Attention:Models Attractor Network Models Auditory Cortex:Models Axonal Pathfinding Bayesian Cortical Models Bayesian Models of Motor Control Birdsong Learning Brain Scaling Laws Brain-Computer Interface Circadian Rhythm Models Computational Approaches to Motor Control Computational Methods Computational Neuroethology Connectionist Models Connectionist Models of Language Processing Consciousness:Theoretical and Computational Neuroscience Consciousness:Theories and Models Electrophysiology:EEG and ERP Analysis Emotion:Computational Modeling Executive Function and Higher-Order Cognition:Computational Models Gain Modulation Hippocampus:Computational Models Hodgkin-Huxley Model Homeostasis at Multiple Spatial and Temporal Scales Ideal Observer Theory Information Coding Learning,Action,Inference and Neuromodulation Memory:Computational Models Neural Integrator Models Neural Oscillators and Dynamical Systems Models Neuromorphic Systems Neuroplasticity:Computational Approaches Olfactory Coding Population Codes:Theoretic Aspects Retinal Models Self-Organizing Maps Sensorimotor Integration:Models Sleep Oscillations Spike-Timing-Dependent Plasticity Models Spiking Neuron Models Statistical Analysis of Visual Perception Statistical Learning of Language Statistical Tests and Inferences Stomatogastric Ganglion Models Swim Oscillator Networks Synaptic Transmission:Models Synfire Chains Visual Cortical Models of Orientation Tuning Visual Motion Models 稳态：概述 Hypothalamic Structure-Function Relationships Magnocellular Neurosecretory System:Organization,Plasticity, Model Peptidergic Neurons Neuron-Glia pH Regulation 稳态：能量平衡 Activity-Dependent Metabolism in Glia and Neurons Activity-Dependent Regulation of Glucose Transporter Brain Glucose Metabolism:Age,Alzheimer's Disease,and ApoE Allele Effects Calcium Homeostasis in Glia Energy Homeostasis:Adiposity Signals Energy Homeostasis:Endocannabinoid System Energy Homeostasis:Hypothalamic Development Energy Homeostasis:Paraventricular Nucleus (PVN) System Energy Homeostasis:Visceral Control Exercise:Optimizing Function and Survival at the Cellular Level Gap Junctions:Metabolic Exchanges Gastrointestinal Signals:Satiety Gastrointestinal Signals:Stimulation Glial Energy Metabolism:A NMR Spectroscopy Perspective Glial Energy Metabolism:Overview Glial Glycogen Metabolism Glycogen Metabolism in CNS White Matter Hormonal Signaling to the Brain for the Control of Feeding/Energy Balance Motor Control of Feeding and Drinking Neuroendocrine Control of Energy Balance(Central Circuits/Mechanisms) Neuron-Glia Coupling in Glutathione Metabolism Nutrient Sensing:Carbohydrates Nutrient Sensing:Cellular Metabolism Nutrition 稳态：体液与矿物质平衡 Angiotensin II Atrial Natriuretic Peptide:Fluid/Mineral Balance Blood Pressure:Baroreceptors Circumventricular Organs Fluid and Electrolyte Homeostasis:Clinical Disease Neurohypophyseal System Osmoregulation Salt Appetite Thirst 稳态：食物摄入 Central Gustatory System and Ingestive Behavior Cortical Processing of the Reward Value of Food Exercise:Optimizing Function and Survival at the Cellular Level Food and Water Intake:Regulation Gastrointestinal Tract Role in Neural Control of Metabolism,Food Intake and Body Weight:A Summary Neuropeptides:Food Intake 稳态：体温调节 Autonomic Nervous System:Central Thermoregulatory Control Energy Homeostasis:Thermoregulation Thermoregulation during Sleep and Sleep Deprivation Thermoregulation:Autonomic,Age-Related Changes 神经行为学 Behavioral Hierarchies Development of Behavior Electrocommunication Extinction:Anatomy Hormones and Behavior Magnetic Sense in Animal Navigation Neuroendocrine Control:Maternal Behavior Neuroethological Perspective Neuromodulation Visually Guided Behavior 原书词条中英对照表

## 章节摘录

插图：However, over much longer periods ( several days ) , experimental work has demonstrated that growth cones can respond to gradients of 0.2% or less across their spatial extent. Furthermore, at sufficiently high and low concentrations, almost all or almost no receptors are bound: this leads to further reductions in sensitivity. Experimental and theoretical work has confirmed that the highest sensitivity is achieved when approximately half of the receptors are bound, which occurs when the concentration is equal to the dissociation constant for binding. Aside from these general constraints on gradient detection, models have also been developed which directly simulate the behavior of growth cones and axons in the presence of guidance cue gradients. Several models have focused on biochemical networks which are putatively responsible for growth cone motility and guidance. Such models are difficult to construct, partly due to the complexity of growth cone biochemistry and partly due to the lack of experimental data on important quantities such as reaction rate constants, concentrations, and interactions between molecular species. One model has focused on the Rho-GTPase signaling network, which is known to play an important role in actin-driven cell motility. Due to incomplete experimental data, the investigators took a qualitative approach, simulating the behavior of several plausible interaction networks and kinetic constants and using the results of these simulations to form hypotheses about the underlying mechanisms of growth cone motility. They found that the Rho-GTPase network undergoes a sharp transition in its dynamics when a threshold concentration of a particular signaling molecule is reached. The authors linked these two dynamic behaviors to different modes of growth cone motility, developing a model which could reproduce some experimentally observed phenomena.

编辑推荐

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