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<<神经系统发育>>

图书基本信息

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内容概要

《神经系统发育(原著第3版)(导读版?英文版)》由三位知名学者主笔，以现在和既往的重要实验与观察结果为例，对业已建立的和正在演变的神经发育原理进行广泛和基础的讨论。

《神经系统发育(原著第3版)(导读版?英文版)》按照个体发生的顺序组织内容。
从出现神经原基开始，随后每一章节按神经发育事件出现的顺序组织：神经系统的模式建成和生长，神经元命运决定，轴突导向和靶点寻找，神经元存活与死亡，突触形成与发育的可塑性。
在结构部分基本完成后，最后一章讨论了行为的出现。

新版的《神经系统发育》反映了通过新的分子遗传学和细胞生物学方法的应用取得的最新成果。丰富的彩色照片和原始绘图，辅以简明的叙述，使《神经系统发育(原著第3版)(导读版?英文版)》非常适合这一有趣领域的初涉者，包括高年级本科生、研究生和研究人员。

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章节摘录

版权页：插图：The human brain is made up of approximately 100 billionneurons and even more glial cells. The sources of all theseneurons and glia are the cells of the neural tube, describedin the previous chapters. Neurogenesis and gliogenesis, thegeneration ofneurons and glia during development, is collectively also called histogenesis. Once the neurons and glia aregenerated by the progenitors during development, they almostalways migrate over some distance from their point of ori-gin to their final position. This chapter describes the cellularand molecular principles by which the appropriate numbersof neurons and glia are generated from the neural precursors,and gives an overview of some of the complex cellular migra-tion processes involved in the construction of the brain. Thenumber of cells generated in the developing nervous systemis likely regulated at several levels. In some cases, the pro-duction of neurons or glia may be regulated by an intrinsiclimit in the number of progenitor cell divisions. The level ofproliferation and ultimately the number of cells generated canalso be controlled by extracellular signals, acting as mitogens,promoting progenitor cells to reenter the cell cycle or alterna-tively as mitotic inhibitors that induce progenitor cells to exitfrom the cell cycle. However, as we will see in Chapter 7, thenumber of neurons and glia in the mature nervous system is afunction not only of cell proliferation, but also of cell death. As we saw in Chapter V the nervous system of C. elegans（as well as the rest of the animal） is derived from a highly ste-reotyped pattem of cell divisions. Therefore, in these animals,the lineages of the cells directly predict their numbers. Theregulation of these cell divisions appears to depend less on inter-actions with surrounding cells than is the case in vertebrates.The lineages of the C. elegans progenitor cells also predict theparticular types ofneurons that are generated from a particularprecursor, and it appears that the information to define a giventype of cell resides largely in factors derived directly from theprecursors. The same is true for the neuroblasts that producethe Drosophila central nervous system: the production ofneu-rons from the neuroblasts is highly stereotypic. The neuroblasts of the insect CNS delaminate from the ventral-lateral ecto-derm neurogenic region in successive waves （see Chapter 1）.In Drosophila, about 25 neuroblasts delaminate in each seg-ment, and they are organized in four columns and six rows （Doeand Smouse, 1990）. Once the neuroblast segregates from theectoderm, it undergoes several asymmetric divisions, givingrise to approximately five smaller ganglion mother cells. Eachganglion mother cell then divides to generate a pair ofneurons.These neurons make up the segmental ganglia of the ventralnerve cord and have stereotypic numbers and types of neurons. In the vertebrate, the situation gets considerably more com-plex. The neural tube of most vertebrates is initially a singlelayer thick. As neurogenesis proceeds, the progenitor cellsundergo a large number of cell divisions to produce a muchthicker tube. A section through the developing spinal cord isshown in Figure 3.1A, and an example of a progenitor cell isshown as a schematic in Figure 3.1B and in the actual neu-ral tube in Figure 3.1C, labeled with a fluorescent protein tovisualize the cell as it progresses through a cell division. Atthis stage of development, almost all the cells in the neuraltube resemble those shown in Figure 3.1B,C, with a simplebipolar shape. They extend one process to the central canalof the neural tube （named the ventricular surface because it iscontinuous with the ventricles of the brain） and they extendtheir other process to the outer surface of the neural tube.If one were just to look at the nuclei of the neural tube atthis stage, there would appear to be many cell layers, and at1irst, the early neurohistologists thought this was the case.However, in the early 1900s it was recognized that the cells of the neural tube move their nuclei from the inside of the neu-ral tube to the outside during each cell cycle. This movement can be directly observed using time lapse recording of cellslabeled with fluorescent proteins （Figure 3.1C）. This constantnuclear movement is termed interkinetic nuclear migration.In this process, the nuclei move to the inner, ventricular sur-face moment just before mitosis, and divide into two daugh-ter cells; then the nuclei of these daughter cells move awayfrom this surface during S-phase; but wherever they are justbefore the next mitosis, they rapidly move back to the ven-tricular surface to complete division （Norden et al., 2009）.

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