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Reading About . . .

Neuroscience

Neuroscience, encouraged by the advent of approaches at the molecular level, is finally beginning to play an important part in the theoretical basis of psychiatry. Although its immediate effect on clinical practice remains limited, this too is likely to change within the near future. Psychiatrists, and Membership candidates in particular, are now expected to be *au fait* with everything from conduction of the nerve impulse to second messengers and linkage analysis. Unfortunately, the complexity and breadth of the underlying science is expanding at an ever-increasing rate, making it difficult to keep up to date with advances. The following are offered as readable overviews of the neuroscientific areas especially relevant to psychiatry, with an emphasis on publications or editions produced within the past three years, since the rate of progress renders most texts rapidly redundant. The broader question of how all this neuroscience is going to alter psychiatry – for better or worse – has also attracted considerable debate, if few conclusions (e.g. Pardes, 1986; Detre, 1987).

The traditional neurosciences

A grounding in the traditional neurosciences, notably neurodevelopment, neuroanatomy, neurophysiology, neurochemistry and neuropharmacology, remains important, and has in no way been made redundant by the molecular approaches discussed below (although the latter are undoubtedly more fashionable). By way of an introduction, the first of two volumes edited by Dinan (1990) has valuable chapters covering the major relevant areas of neuroscience in somewhat more detail than that found in psychiatry textbooks (e.g. Kendell & Zealley, 1988; Appleby & Forshaw, 1990). Other general texts cover the neurosciences without any particular orientation towards clinicians. The volume produced by *Scientific American* (1979), although dated, remains an eminently readable introduction to all aspects of the organisation of the brain, free of jargon and uncluttered by references. A more recent and extensive overview of neurobiology (aimed at undergraduates) is provided by Shepherd (1988).

The next group of books comprises those which provide reviews of a specific neuroscientific field and which therefore cover their topic in more detail. The development and plasticity of the brain are of increasing interest for psychiatry, since aberrations in these processes are probably of pathogenetic significance for several disorders. However, I am unaware of suitable texts, i.e. those focusing on the later stages of neurodevelopment or on the disruption of this process; thus, the book by Lund (1978) and chapter by Ebels (1980) remain useful, together with some recent reviews (Nowakowski, 1987; Carlson *et al*, 1988; Kalil, 1989; Kolb & Whishaw, 1989).

There is more choice in neuroanatomical reading. A straightforward summary is given in Barr & Kiernan (1988), while those interested in the small print will enjoy Paxinos (1990), which is destined to become the standard text of its kind. One of its merits, apart from the number of illustrations, is that it concentrates on the human brain, rather than on experimental animal data. This consideration becomes important as differences between species become apparent, for example in individual neurotransmitter pathways, and especially when attempts are made to relate neuroanatomical structures and connections to uniquely human disorders.

Turning to neurophysiology, it is increasingly possible and in vogue to link this approach both to microanatomy and to neurochemistry; the book edited by Shepherd (1990) exemplifies this synthesis, and is a clear account of the functional properties of neurons and their circuitry. For the related fields of neurochemistry, neuropharmacology and neuroendocrinology, there are several valuable texts. The standard introduction to the biochemistry is Cooper *et al* (1988), while the recent text by Riederer *et al* (1990) emphasises clinical and pharmacological aspects. For a more detailed neurochemical text, the deceptively titled volume by Siegel *et al* (1989) is quite comprehensive.

Molecular genetics and molecular biology

The one area not covered in detail in the above texts is anything prefixed by 'molecular', notably molecular

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genetics and molecular biology; this is because of the speed with which these disciplines have evolved and because they remain partially autonomous with regard to other research approaches. For those unsure of the (somewhat arbitrary) distinctions between the various 'moleculologies', 'molecular genetics' is the thriving field in which genes are located on chromosomes, sequenced and characterised, and their roles in disease are established through linkage analysis and the identification of mutations; the discovery of a β-amyloid mutation causing some cases of Alzheimer's disease exemplifies the strategies and potential fruits of molecular genetics (Harrison, 1991). 'Molecular biology', although sometimes used to encompass molecular genetics too, may more usefully be taken to refer to all other aspects of cellular and genetic organisation at the molecular level, such as the mechanisms by which genes are expressed and thence exert their actions. 'Molecular neurobiology' is the same, only it is directed at aspects specific to the nervous system, while 'molecular neuropathology' addresses how a derangement in these processes, as a result either of a genetic mutation or alterations in the metabolism of gene products, gives rise to the phenotype of a disease.

Molecular genetics is covered superbly by Weatherall (1991), who manages to explain its principles and practice as applied to clinical medicine in such a way that it all seems almost simple. Even a brief dip into the book will reveal the purpose of cDNA libraries, gene maps and chromosome hops, and give confidence in distinguishing an RFLP from a PCR. However, it does not discuss these topics specifically with reference to psychiatric disorders; in this regard, McGuffin & Murray (1991) is a useful new source. Several recent articles have also reviewed the importance of molecular genetics and related topics for psychiatry (Baron & Rainer, 1988; Harrison & Pearson, 1989; Mullan & Murray, 1989; Pardes *et al*, 1989; Baron *et al*, 1990; Reiss *et al*, 1991). Molecular neurobiology lacks a single introductory text; McHugh & McKusick (1991) does not live up to its title, but has some valuable chapters, while three intimidatingly large but clearly written and profusely illustrated books cover the whole of molecular science (Alberts *et al*, 1989; Lewin, 1990; Darnell *et al*, 1990). The latter, in particular, is an ideal starting point for anyone contemplating research, or who wants to get a grasp of the current state of knowledge and techniques at the molecular level. Finally, molecular neuropathology is the subject of a new text (Roberts & Polak, 1991) which links neuroscience to the pathology of neuropsychiatric disease. More books of this kind can be expected over the next few years, as further progress results from the application of molecular methods of all kinds to psychiatric disorders.

The sheer volume of neuroscience research has led to a large number of increasingly specialised and esoteric journals, catering for specific topics (e.g. *Neurobiology of Aging*), conceptual levels (e.g. *Molecular Brain Research, Journal of Neurocytology*) or methodological issues (e.g. *Journal of Neuroscience Methods*). Of more value than the primary literature may be the review journals, which are the only practical way to keep abreast of the latest developments in neuroscience without being swamped. *Trends in the Neurosciences*, and its *Pharmacological* and *Biochemical Sciences* siblings, often contain useful and brief articles. The *Current Opinion* journals systematically review progress in a given field – *Current Opinion in Neurobiology* promises to be an especially valuable source, while selected issues of *Current Opinion in Psychiatry* and *Current Opinion in Neurology and Neurosurgery* provide authoritative and up-to-date reviews of neuroscientific advances in the clinical domain. They also contain extensive, if not exhaustive, bibliographies of articles published during the previous year relating to each discussion topic, forming a useful starting point for literature searches.

It would be easy to become overawed by the expanding amount of neuroscientific knowledge which is expected of psychiatrists, and a Luddite attitude, especially towards molecular biology, may at times be appealing. However, it seems inevitable that recent trends will continue, and the neurosciences will form an increasing part of the psychiatric curriculum. It is therefore to be hoped that succinct updates on appropriate scientific topics, aimed at psychiatrists, become a regular feature of the literature.

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