

Book Reviews

Brodmann's 'Localisation in the Cerebral Cortex'.

Translated and edited by LAURENCE J. GAREY.
(Pp. xviii + 300; illustrated; £28 hardback; ISBN
1 86094 176 1.) London: Imperial College Press.
1999.

Brodmann's now classic 1909 book on the cerebral cortex provides a fascinating view of how major subdivisions of the cortex were established early in this century, and its recent translation by Lawrence Garey is welcome. Brodmann dealt with much more than the cytoarchitectonic areas of cortex. He considered the functional role of individual nerve cells, the nature and presumed identity of cortical layers as biological entities, the possible functional significance of the areas that he defined, and he provided a detailed comparative overview. In addition he presented quite extensive information about cortical thicknesses, cell sizes and cell numbers; these led to no clear conclusions and are still hard to interpret today.

One can ask who is likely to benefit from reading this book. Is the fact that many of today's textbooks use Brodmann's original maps a good reason for reading what Brodmann had to say? Or should just those who are currently defining functional subdivisions of the cortex with newer imaging techniques or molecular markers concern themselves with how the areas definable by these methods relate to Brodmann's classical numbering system? Oddly, it seems that contemporary studies of the frontal, motor and sensory cortex often use the Brodmann scheme, whereas studies of the visual pathways generally avoid them. Could a student of the brain not simply look at the overall scheme that the textbooks reproduce and perhaps look for more detail when a problem about defining a cortical area arises?

Although this translation will help those who have to identify particular cortical areas, reading the book offers very much more. In the first place, it helps us to focus on the features that Brodmann studied, so that by metaphorically looking over his shoulder as he describes cortical characteristics, we are given a fine tutorial in the cytoarchitectonic method. For this the book is extraordinarily useful, although perhaps the serious student should look at an original edition. I was unable to locate one, but would imagine that the 1909 figures must have been finer than those in this translation. Secondly, and perhaps more intriguingly, by following his extremely focused, almost monomaniacal approach to the cortex, we can recognise issues that still matter today and that are still not all resolved. Thirdly, as we consider Brodmann's arguments, they will probably make us want to become historians and discover what lay behind his approach. There are already too many older neuroscientists who think they are historians, so I will not try to join their ranks. However, it is worth considering some of the issues, and hoping that at some time a professional historian will be able to examine them and ask what Brodmann's motivation really was, why he did not extend his approach beyond the Nissl method and, most importantly, why, in spite of this limitation, his account has been so widely used.

The way that Brodmann deliberately limited his approach to the Nissl method is surprising when we bear in mind that he interacted closely with those who were using myeloarchitectonic methods at the time and that he knew and referred to Cajal's studies of Golgi material. Although

he cites studies that defined the motor cortex by stimulation experiments and the visual cortex by the effects of lesions, these studies are cited at the end of the book and used as a justification of the analysis, not as an initial stimulus; in the early parts of the book he considers the motor cortex largely in terms of the distribution of Betz cells. His actual analysis was to a large extent based on his clearly stated argument that nerve cells (strictly speaking perikarya) having distinct appearances must have distinct functions. This has a strikingly modern ring. Today we can readily believe that a distinctive Nissl structure relates to the production of particular proteins and peptides and that the function of a nerve cell relates as much to its membrane channels, receptors, transmitters, and second messenger systems, as it does to its connections. Brodmann, without knowing any of this, argued against the view, prevalent then and later, that nerve cells were equivalent except for their connections. Perhaps that view had its first clear come-uppance in the 1960s, when we thought we knew all there was to be known about the connectivity of the cerebellum, but had no idea what it did (see Eccles et al. book *The Cerebellum as a Neuronal Machine*; Berlin and New York: Springer, 1967). Brodmann might have savoured that. However, when he was writing, there was a clear possibility that the Nissl picture of a cell related mainly to the dendritic or the axonal architecture of that cell. Brodmann made a forceful argument for ascribing 'different functions to specific, different cortical cells' seen in Nissl sections, and he considered these functions as beyond those imposed by the connections of the cells. This argument must have seemed weak to his contemporaries and, as he phrased it, still looks weak today.

A second issue, where Brodmann's study laid the foundations for, and which is still in accord with, much modern thought, concerns the identification of six cortical layers. Oddly, however, neither Brodmann nor our contemporaries seem to have any solid foundation in experiment or logic. Cajal had many more layers and Brodmann's review showed how much opinions about this differed at the time. Why then did he decide on six? And why is the six-layered terminology so widely accepted now? Brodmann based himself on a remarkably weak developmental argument. He found that early in development all cortical areas go through a stage showing three cell sparse and three cell rich 'tectogenetic' layers. Apart from the I/II boundary there are no sharp boundaries, and Brodmann's derivation of six apparently separate entities from this early configuration depends more on the use of long words like 'tectogenetic' than on any basic biological principles. However, today we still find it useful to give each of the layers a degree of independence that is not always justified even by the much more extensive evidence available now. For example, the cells in layer V do differ from those in layer VI, but then there are subpopulations in each of these layers that make one want to split the layers further. Confusions about layer III/IV boundaries have caused a great deal of trouble, and one can reasonably ask whether there is any known functional significance to the difference between thalamocortical terminals that end in layer III as opposed to layer IV. Is it reasonable to treat the layers as entities when so many cells extend processes through several, occasionally all, of the layers?

The creation of entities that extend well beyond what can be seen is also illustrated by Brodmann's thoughts about the

comparative anatomy of cortical areas. In the hedgehog he found that 'caudal to the precentral region there follows a homogeneously structured zone (5+7) that cannot be further divided into individual areas and must wholly represent these two regions'; he concludes that within this region must lie 'the combined areas 1 to 3, 5 and 7 of other mammals, undifferentiated or regressed'. This creation of conceptual structures that are not there at all is worrying. From this point of view, the book raises some profound questions about how neuroscience is done. These are perhaps not questions about science in general, or some idealistic concept of 'science', but they are important questions if we are to understand the criteria that can serve to make a particular contribution influential and (more importantly) useful to neuroscientists for the best part of a century.

The translation has taken care to leave some of the difficult Germanic constructions intact, and has added some useful notes. Perhaps only the original can show just how far the presentation and the development of the ideas depends upon the complex use of the language to dress up conceptual structures to look like biological facts.

R. W. GUILLERY

E. B. Jamieson—Anatomist and Shetlander. By JENNY and MARTIN EASTWOOD. (Pp. x+80; 12 pp. colour and black & white photographs; £9.99 paperback; 1 898852 45 6.) Shetland: Shetland Times. 1999.

Several years ago the *Dundee Courier* had a short article about someone who had bought a porcelain statuette of a Dr E. B. Jamieson at a car boot sale and wondered if any reader knew who he was. When I phoned the newspaper the following day I was told that I was too late and that they had never had such a large number of replies to any query that they had published as they had to the one about E. B. Jamieson. I was therefore delighted to have an opportunity to review a biography of this legendary anatomist.

Unfortunately only 18 out of the 65 pages refer to E. B. Jamieson. The first part (19 pages) deals with the history and folklore of Shetland; the second part (20 pages) covers the Jamieson family tree. The third part does deal with E. B. himself but most of the anecdotes are well-known, at least by those who have ever worked with fellow anatomists or doctors taught by Jamieson.

There are also two appendices; one is a folk tale in the Shetland dialect, which seems to have no relevance to the rest of the book and the other is the Jamieson family tree.

All in all I found this a disappointing book enlivened only by E. B. Jamieson's advice to failed medical students, 'You need to do better. Go home, find a hammer and nail your scrotum to a chair.'

R. R. STURROCK

Human Sectional Anatomy. Atlas of Body Sections, CT and MRI Images, 2nd edn. By HAROLD ELLIS, BARI M. LOGAN and ADRIAN K. DIXON. (Pp. x+245; fully illustrated in colour; £65 hardback; ISBN 0 7506 3367 0.) Oxford: Butterworth Heinemann. 1999.

The publication of the second edition of *Human Sectional Anatomy* could not be more timely. Imaging technology has moved on in leaps and bounds since the first edition came to

press in 1991 and there is a genuine need to correlate gross anatomy with cross-sectional anatomy by modern CT and MRI. The three co-authors of this tome are all international experts in their disciplines of anatomy, surgery and radiology and they have combined their collective experience to produce an atlas that is both instructive and relevant to the practice of modern medicine.

A short but informative preface details the history of the study of sectional anatomy from Leonardo da Vinci to the early decades of this century and is a salutary reminder that if we can see more it is because we stand on the shoulders of giants. The Introduction provides a fascinating insight into the technique of 'bandsaw tomography' for those unfamiliar with it and the notes on CT and MRI are salient and informative without being exhaustive. Each subsequent chapter presents various sections of the cadaver with corresponding radiological images, either CT or MRI or both. In addition, line drawings and section levels are provided for ease of orientation, and brief notes accompanying each section highlight key applied anatomical and radiological features. There are 120 cadaver cross-sections in all with 154 CT and MRI images for correlation. The larger number of MRI slices used in this edition bears testament to the increasing importance of this imaging technique in clinical practice and the authors have done it justice. There are few omissions but CT and MRI high-resolution thin section slices of the petrous temporal bone and CT thin sections of the lung parenchyma are not included.

Keenly priced, the combination of high quality cadaver sections, state of the art CT and MRI images and attractive layout makes this an essential desktop book for radiologists and anatomists alike. It will also prove extremely useful for medical students and for those doctors in the surgical and medical subspecialties for which an ever-increasing knowledge of radiological anatomy is required.

BRIAN HOLLOWAY

Atlas of Peripheral Nerve Pathology. By ROSALIND KING. (Pp. xii + 217; fully illustrated in colour and black & white; \$155 hardback; ISBN 0 340 58666 4.) New York: Oxford University Press. 1999.

For a morphologist involved in the study of peripheral nerve disorders at the light and electron microscopic level, the *Atlas of Peripheral Nerve Pathology* by R. H. M. King with a foreword by Professor P. K. Thomas came as a real event representing the achievements of these techniques through the last 30 years. There are 449 images which are of exceptionally high quality, reproduced large enough to recognise details. This is remarkable at a time when reproductions of images in clinical or molecular genetic journals tend to be reduced to such a small size that one needs a magnifying glass which then leads to recognition of the low resolution power of the printing media. Therefore it is to be appreciated that the publishing company took over the risk of publishing this large collection of illustrations in a field which may look 'peripheral' to those engaged in studying the 'central' nervous system. Yet the peripheral nervous system offers a wealth of insights into basic pathomechanisms of the nervous system in general. There are a surprisingly large number of structural changes of myelinated and unmyelinated nerve fibres with their covering cellular and extracellular elements.

The illustrations are accompanied by legends with profound comments on the specificity of changes. There are

introductory and explanatory text passages covering less than approximately 5% of the volume. These incorporate 570 selected references alphabetically listed on 16 pages together with an exhaustive index at the end of this volume. The number of errors therein is really negligible (e.g. oxytalan instead of oxytalan).

Compared with the *Ultrastructural Study of the Human Diseased Peripheral Nerve* by Claude Vital and Jean-Michel Vallat (2nd edn, 1987), the present atlas comprises—in addition to numerous electron micrographs—representative light micrographs, usually of semithin sections in colour, covering a large spectrum of diseases of the peripheral nervous system. However, not all changes and diseases of the peripheral nervous system can be included on 217 pages (e.g. neuroaxonal dystrophy, B₆ hypervitaminosis, EGR2-gene associated neuropathies, and others). Nevertheless, the emphasis is on disorders of the human peripheral nervous system (excluding tumours) and not on experimental results. A number of recent molecular genetic findings on hereditary peripheral neuropathies are included (some references up to 1997).

There is also an important chapter on artefacts and a useful appendix with processing schedules, providing a number of techniques for frozen and paraffin sections, immunohistochemical stains, and resin embedding.

Thus, this book should be on the shelves of everybody who is engaged in the diagnostic analysis of peripheral nerve biopsies; it will also be of interest to any neurologist and neurobiologist concerned with disorders of the peripheral nervous system.

J. MICHAEL SCHRÖDER

A Photographic Atlas of the Human Body, With Selected Cat, Sheep and Cow Dissections. By GERARD J. TORTORA. (Pp. v + 250; fully illustrated in colour; £18.99 paperback; ISBN 0 471 37487 3.) Chichester: Wiley. 1999.

This photographic atlas, as quoted in its preface, 'Is designed to accompany any textbook of anatomy or anatomy and physiology and may be used in conjunction with, or in lieu of, a laboratory manual'. Its author teaches at the Bergen Community College in New Jersey. Although not stated, it is obviously designed with the biology student at a fairly elementary level in mind, since there is an introductory table of directional terms, complete with phonetic pronunciation, which include the words 'Deep' (DEP) and 'Superficial' (SOO-per-FISH-al), which we hope our medical students will have mastered by the time they arrive in the Dissecting Room.

The atlas comprises a very nicely produced set of photographs. These include basic histology (here supplemented by coloured drawings); this is then followed by the

skeleton, joints, muscles and the remaining body systems, with further histology, followed by a rather disappointing section on surface anatomy. An interesting feature of the atlas is that the human material is supplemented by a number of plates of sheep and cow dissections and by a fairly complete dissection of the cat, apart from the cranial contents. A disconcerting feature of the book, at least in my copy, is that a large number of the pages have been printed upside down.

I have little doubt that this small, cheerful and friendly atlas, with its spiral binding which makes it easy to employ in the classroom and laboratory, will be of help to junior biology students. It will not compete, however, with the many excellent atlases that already are available for medical students and surgical trainees.

HAROLD ELLIS

Self-Assessment Colour Review of Clinical Anatomy. By E. J. EVANS, B. J. MOXHAM, R. L. M. NEWELL and R. M. SANTER. (Pp. 144; fully illustrated in colour; £9.95 paperback; ISBN 1 874545 76 6.) London: Manson. 1999.

In the 'bad old days', anatomy was taught to the medical student rather like the classics—Latin and Greek—to the unfortunate schoolboy, as something of an exercise in mental agility that was thought to be somehow good for him. What really was the value of knowing the 13 centres of ossification of the sphenoid bone in his subsequent medical career? Today the anatomy we teach is being attacked on all sides by so-called experts in education who do not bother to find out what we now teach, which is, in fact, the very language of clinical medicine. How can the student understand a neurological lesion unless he knows his neuroanatomy? How can he interpret an x-ray or a CT scan without anatomical knowledge?

This interesting pocket-book is a good example of 'modern' anatomy, which will be appreciated by medical students and candidates for the various parts of the new MRCS. It is written by 4 members of the staff of the department of anatomy in Cardiff and comprises excellent colour photographs of dissections and of clinical conditions, together with x-rays, MRIs and CT scans. To these are appended questions of varying degrees of difficulty and detailed answers. The clinical pictures are provided with the relevant scenarios in the text. Neuroanatomy is not included.

I have no doubt that this book will prove to become a deservedly popular student's aid. I certainly enjoyed testing myself, and confess to making some silly mistakes. My only criticism is that, being a pocket-book, some of the dissection photographs were beyond the power of my elderly vision; I doubt that younger users will find this to be so.

HAROLD ELLIS