many authors have argued that thalamic and callosal mechanisms can provide rapid cortical generalisation of discharges originating at a cortical level. The importance of the brain stem and midbrain in seizures is shown by the possibility of evoking generalised motor seizures (by chemical or electrical means) in rodents after supracollicular section or total cortical ablation. The importance of the corpus callosum in seizure generalisation is shown by the protection callosotomy provides against the generalisation of focal cortical seizures. Pathology shows that generalised seizures are rarely a consequence of brain stem lesions but may be associated with cortical lesions. Electroencephalographic studies with depth electrodes in generalised seizures have predominantly revealed paroxysmal activity originating in the cortex rather than deep structures.

This volume provides a slightly polemical account of the reticular core of the brain and its role in experimental seizures. There are in total 11 chapters (contributed by the editors and seven other authors). An historical introduction is followed by an anatomical summary and four chapters based principally on experimental studies in rodents that described seizures induced electrically or chemically at the level of the brain stem or spinal cord. Fromm and Terrence review their studies of the effects of antiepileptic drugs on the trigeminal complex. These provide interesting differentiations of anti-absence drugs from phenytoin and carbamazepine in terms of their actions on descending excitation and inhibition. Ronald Browning describes the effects of reticular cerebellar or nigral lesions on seizures in rats and cats. A chapter by Jinnai and Mukawa describes clinical observations in man and the use of Forel-H-tomy. This is based on 40 years of clinical experience, aided by the classical experiments of Jinnai and Hayashi on spread of seizure activity from cortex to motor output in dogs and monkeys. This contribution appears somewhat out of context but provides a corrective to the focus of the rest of the earlier chapters. It emphasises the classical methods for studying functional pathways and the therapeutic potential of such knowledge, but is not concerned with the reticular core.

Two final chapters attempt a synthesis. Burnham and Browning reformulate a reticular core hypothesis based substantially on rodent experiments. Fromm in his overall summary accepts that seizure initiation in man is most probably a cortical phenomenon but seeks to retain a role for the brain stem in seizure hemispheric generalisa-

tion (which is debatable) and in motor expression of generalised seizures (which is incontrovertible).

This volume provides a valuable summary of current research on the brain stem for those researching mechanisms of seizure spread and initiation. Progress in understanding the patho-anatomy of epilepsy is going to depend on study of cellular mechanisms and the interaction of all the systems of the brain, notable among which are the limbic system and the basal ganglia. This volume successfully illuminates the space around one lamppost.

BRIAN MELDRUM

Neurocardiology. Edited by H Kulbertus, G Franck. (Pp 364; \$59.50.) New York: Futura, 1988.

The inspiration for this book, based on a symposium held in Belgium in 1987, came from Natelson's review article (1985) describing a new interdisciplinary area which he named "neurocardiology". It is the study of the interaction between the cardiovascular and autonomic nervous systems in pathological states. Hence the subject matter is not that of a previous book of the same name which is mainly concerned with cardiac causes of cerebrovascular disease.

The first section deals with neuroanatomy. The ultrastructure of the AV and SA nodes of the mouse is described and the consequences of left and right sided autonomic stimulation of the canine heart are contrasted. Histopathological studies of intrinsic myocardial nerves are presented and the possible importance of endoneural mast cell degranulation triggering coronary spasm discussed.

The second section deals with neurophysiology. It is dominated by studies of sympathetic and parasympathetic stimulation in animal models looking at their effects on cardiac inotropy, chronotropy, automaticity and vulnerability to ischaemic arrhythmias. From these results it is clear that the two limbs of the autonomic nervous system do not have a simple agonist/antagonist relationship. There are also chapters discussing mechanisms of vagal stimulation of SA periodicity, reflexes controlling coronary tone, reflexes triggered by myocardial ischaemia (including the significance of region), the importance of the α -adrenergic system in ischaemia and the value of chronic vagal stimulation in protection from ischaemia arrhythmias. Unfortunately, the

effects of cerebrovascular lesions on the heart, in terms of arrhythmia and myocardial necrosis, are dealt with only briefly.

The section on neurochemistry considers opioids and arrhythmia, tyrosine and blood pressure, and a clear but basic chapter outlining the importance of platelet aggregates, serotonin, thromboplastins and EDRF (endothelium-derived relaxing factor) on vascular smooth muscle. The section on behavioural stress includes an interesting chapter discussing the mechanism of delayed ischaemia induced by anger in dogs. The section on sleep includes chapters on haemodynamic changes and conventional function tests in sleep apnoea.

This multiauthor work contains minimal repetition and the editorial style is succinct. Given the breadth of neurocardiology the reader cannot hope to be familiar with more than a fraction of the experimental techniques referred to in the text, and it is unfortunate that there is often little reference to basic methodology. I wonder whether sleep apnoea, narcolepsy and the effect of emotion on baboon haemodynamics are beyond the scope of the title and that the space devoted to these might have been better spent expanding the core chapters which were excellent. Overall this book was a pleasure to read, providing a much needed introduction to an exciting new field.

GABRIELLE HORNE

Magnetic Resonance Imaging: Atlas of Head, Neck and Spine. By Catherine Mills, Jack Groot, Jonathan P Posin. (Pp 295; £67.75.). Beckenham: Lea & Febiger, 1988.

This is an extensively illustrated atlas of head and spine anatomy as displayed by magnetic resonance imaging (MRI). The major part of the text comprises three chapters on head imaging: the longest one examines images in the axial plane and the shorter ones display anatomy in the coronal and sagittal planes. Cadaver sections taken at approximately the same level are present for different levels and planes. Unfortunately, many of the MRI slices are not exactly the same as the anatomical specimen which on many occasions is a significant disadvantage. Very many more anatomical landmarks are present on the cadaver sections than can actually be identified on the appropriate MRI slice. This is partly due to the rather fuzzy image produced by one of the imaging sequences (TR = 500 ms TE = ms) which

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does little to distinguish grey matter from white, although it clearly defines CSF. Almost a third of the illustrations use this sequencing and it detracts from the information that could have been available. Brief anatomical notes accompany the diagrams many of which are very basic but serve as timely reminders of half forgotten and sometimes misconstrued anatomical facts and relationships.

The next chapter concerns the orbit but unfortunately this would do little to encourage the radiologist to use MRI for the investigation of orbital pathology. Most of the anatomy is obscured by the high signal from the orbital fat and no surface coils have been used. This chapter especially is not representative of current orbital imaging.

The section on functional systems covers the principal pathways and the MRI illustrations in this section have been performed using an unspecified sequence but one which clearly defines grey and white matter but to a lesser extent CSF. Within this section multiplanar imaging is used to illustrate the functional pathways: for example the extrapyramidal system, cerebellar tracts and functions, the sensory pathways, the olfactory and limbic system and the speech area and connections. Interestingly, within the acoustic system there are no illustrations of the internal auditory canal, its contents or their attachment to the brain stem. Similarly the only cranial nerves to be considered are 1, 2 and 5.

Three chapters now follow concerning the face, neck and cervical spine in the axial, coronal and sagittal planes, and although there is a section on the foramen magnum and nasopharynx the cranial nerves are not illustrated. This section contains more extensive anatomical notes many of which relate to the soft tissues of the pharynx and neck, and there are many illustrations of the neck muscles. Similar problems afflict the chapters on the thoracic and lumbar spine where there is paucity of information relating to the cord and nerve roots in their immediate surroundings and much concerning the paraspinal muscles.

With the exception of the cranial nerves and blood vessels the atlas covers well the head and spine. As the authors admit, while the images were acquired on a "state of the art" imager this quality could well have been improved upon by the time the text came to press. Unfortunately this has not been the case, particularly in relation to the orbit and spine. Notwithstanding the multiplanar display, the anatomy is in general well laid out and easy to read, and I particularly like the section on functional systems. The section on

the spine suffers, like the orbit, from being overtaken by significantly improved imaging sequencing and the use of surface coils; and, therefore the image quality lacks much of the detail present in current "state of the art" examinations. At a cost of under £70 I am sure this atlas will be of value in all units where head and spinal MRI is carried out and the details of the soft tissues of the neck, nasopharynx and muscles of the spine will be of interest to specialists outwith the neurosciences. Despite some of the technical limitations already discussed, this book would be a welcome addition, not to the library, but to the imaging or reporting room for daily reference.

EVELYN TEASDALE

Death: Beyond Whole-Brain Criteria. Edited by Richard M Zaner. (Pp 276; £44.00.) Dordrecht: D Reidel Publishing, 1988.

How much of the brain has to be dead before death can be diagnosed on neurological grounds? The issue is being heatedly argued in the USA and this little volume (No. 31 of the well established series on *Philosophy and Medicine*) records the proceedings of a symposium on the subject held some time ago at Vanderbilt University in Nashville, Tennessee.

The 14 essays are all entertaining. Several are challenging but too many are flawed to some degree by a general remoteness from clinical reality. There was no neurologist or neurosurgeon among the essayists (although there was a lone psychiatrist). The main contributors are philosophers, lawyers, historians and specialists in the growing field of "medical bioethics".

In a masterly review Martin Pernick (Professor of History at the University of Michigan) stresses how "the combined observations of surgeons, warriors, butchers and executioners led most ancient societies to conclude that an organism's body parts did not always die simultaneously". All Pernick's co-authors would subscribe, I am sure, to the general proposition that the death of the brain is the necessary and sufficient condition for the death of the individual. Twelve of them would go much further and this is the challenge of this book. They would argue that the notion of "whole brain death" (which in the USA currently provides the conceptual basis for the determination of death on neurological grounds) is too comprehensive. Patients in the persistent vegetative state (PVS) should, in their view, be deemed dead. As Roland Pucetti,

one of the essayists (and Professor of Philosophy at Dalhousie University, Halifax, Nova Scotia) quite explicitly puts it: "corpses are really of two kinds: the vast majority that cannot breath unaided, and a small minority that nevertheless can do this".

The proponents of this viewpoint argue that the vegetative state constitutes a loss of "personal identity" and therefore signifies "the death of the person". They counterpose this philosophical stance to what they berate as the "deliberately physiological" attitudes of current neurological thinking in the USA (and elsewhere), namely that death is the irreversible cessation of the physiological integration of the organism as a whole. Alexander Capron (Professor of Law at the University of Southern California) is the sole essayist to defend—and very elegantly—the "classical" thesis argued in *Defining Death* (the 1981 Report of the President's Commission for the Study of Ethical Problems in Biomedical and Behavioral Research).

A disturbing number of factual inaccuracies will annoy those prepared to listen, without prejudice, to the philosophical argument developed in this book. Patients in PVS are said to start breathing spontaneously because "the regulator functions of the brainstem and cerebellum continue" (p. 3). The ophthalmoscope is said to "make possible the examination of the retina and sclerotic, for lingering signs of circulation and early signs of decomposition" (p. 38). Mollaret and Goulon, who in 1959 coined the term "coma dépassé", are described as French "neurophysiologists" despite the fact that the main thrust of their observations was—and remains—quintessentially clinical.

More serious, however, is the still rampant confusion, among the essayists, concerning the differences between coma, PVS, the locked-in state and brain death. Thus individuals with "destruction of higher brain function" are described (p. 6) as being "irreversibly comatose". Modern experience is that few if any such patients remain permanently comatose. Within a month, if they survive, their eyes will open episodically and they will show sleep-wake sequences in their EEGs. Locked-in patients are erroneously described (p. 260) as incapable of "spontaneously regulating respiration, blood pressure or temperature". Again, clinical observation establishes that the average locked-in patient is neither apnoeic, hypotensive or poikilothermic.

Even wilder claims are made concerning the vegetative state. One essayist claims (p. 81) that there are "many cases" similar to the "apallic" patient described in 1978 by Ingvar