biographically, even by the French. A two-volume study by Alfred Rouxeau early in this century had the virtue of reproducing a good deal of the Laennec family correspondence, but Rouxeau sanitized Laennec's sometimes difficult personality (and awkward family) and seemed vaguely embarrassed by his final medical statement, the unpublished lectures he delivered at the Collège de France from the early 1820s. These show Laennec the polemicist at his starkest; they also contain his final thoughts on vitalism, ideas which were counter to the dominant organicism of his contemporaries. Jacalyn Duffin speculates in *To See with a Better Eye* that Laennec's nephew and executor did not edit the lectures for publication for fear that they might be seen as unworthy of the great clinician and pathologist, an aberration consequent on his Roman Catholicism.

To her great credit, Duffin takes on the whole Laennec. Her elegant biography wonderfully exploits the surviving Laennec archives and offers a rounded portrait of this complex and highly talented doctor. That he was socially, politically and religiously conservative does not make his contribution to medicine any the less revolutionary. Duffin guides us expertly through the 1819 and 1826 editions of Laennec's *De l'auscultation médiate*, historically dissecting many of the cases on which Laennec based his new technique of stethoscopy. More generally, her analysis of the vibrant medical scene in Paris provides ample evidence of why students flocked there.

"I live among the dead and the dying," Laennec wrote to his cousin in 1810. On the bodies of those dead and dying were laid the foundations of modern clinical medicine. These two fine monographs complement each other, and allow us to appreciate exactly why the *clinique* left such a powerful imprint on the nineteenth-century medical mind. □

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Attention!

A paperback on attention has just been published that unfortunately arrived too late for inclusion in Stuart Sutherland's review on this page.

In *Attention*, Harold Pashler, the author of one of the books assessed by Sutherland, gathers together essays by 12 leading international researchers examining different facets of contemporary research in the subject. The volume is divided into two sections, one dealing with psychological research such as visual search, dual-task interference and attentional bottlenecks, and the other with modern approaches to neural-network modelling and the effects of brain damage on attention. The tutorial-style chapters make the book ideal for students. Psychology Press, £14.95.

Feature selection

The Psychology of Attention
by Harold E. Pashler
MIT Press: 1997. Pp. 471. $45, £38.50

The Psychology of Attention
by Elizabeth A. Styles
Psychology Press: 1997. Pp. 259. $64.95, £44.95 (hbk); $37.95, 14.95 (pbk)

Stuart Sutherland

Over the past 50 years, the sheer ingenuity displayed by psychologists working on attention rivals if it does not not exceed that of cosmologists studying black holes. Indeed, there is a similarity in their results — after many thousands of experiments, we know only marginally more about attention than about the interior of a black hole. As Harold Pashler ruefully remarks of one set of experiments, "these results create a rather unappetising stalemate".

As in a Punch and Judy show, as soon as one investigator conclusively proves a thesis, another pops up and knocks him down. Donald Broadbent found that if a subject repeated a string of words presented to one ear, he heard none of a string simultaneously presented to the other ear. He concluded that there are peripheral filters that prevent an unattended message being centrally processed, whereupon Judy, in the shape of Neville Moray, promptly clobbered him by showing that if the subject's own name was presented on the unattended ear, it was heard on about a third of occasions.

There is much further evidence that messages can be unconsciously processed centrally before being rejected. A digit is more readily found in an array of letters than in an array of digits. In a clever experiment, it was shown that this was not because digits differ systematically in shape from letters. If subjects are asked to find the letter 'O' among distracting digits, they are faster than if asked to find the number zero in the same array of digits. Attentional selection of one of two messages is occurring at a central semantic level.

Much of the work on attention attempts to discover which processes go on in parallel and which serially. Common sense will probably tell you that at least some processing must be sequential since you cannot for the most part do two things at once. But you can. Subjects can be taught to read while writing to dictation. After much practice they do both tasks together as efficiently as either on its own.

Pashler claims there is a bottleneck through which the processing of both tasks must pass, but that with practice it is possible to program in advance a string of responses (although he does not make the comparison, this corresponds to 'chunking' in sensory domains). Hence, by devoting less processing time to selecting each response it is possible to interweave the processor between the two tasks. The automation of a task is a fascinating topic. There would certainly appear to be a bottleneck in consciousness: practised motorists may drive for miles while chatting animatedly without any awareness of their driving.

Anne Treisman discovered recently that when a simple form (for example, a bar) differs from an array of distracting forms in only one elementary feature (such as orientation) it 'pops out' at the observer. It is located immediately, while in other circumstances all the shapes have to be searched serially to find a specified target. This result excited considerable interest among neurophysiologists, as the features for which the effect held seemed to correspond to those firing 'feature detectors' in the early stages of visual processing.

But this conclusion was quickly refuted by another cunning experiment in which it was found that a systematic difference in *perceived* size could cause the pop-out effect even when the retinal size of the distractors was varied because they were at different distances.

Both Pashler and Elizabeth Styles make valiant and on the whole successful attempts to clarify the literature on attention, as is attested by the fact that material found in one quite frequently does not appear in the other. Pashler's is slightly the better book. It is broader, covering central mechanisms of attention more thoroughly; sometimes, though too seldom, it asks why a given mechanism should exist; and it is more thoughtful, making some attempt to connect scientific findings with the demands of everyday life.

Both authors have a staggering mastery of the field, but neither book conveys all the important information on attention. The complexity of the theories and experiments and of the relation between the two is such that the books are not easy. Do not attempt to read them while taking dictation — they require your undivided attention. □

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After Simpson

Classification of Mammals: Above the Species Level
by Malcolm C. McKenna and Susan K. Bell
Columbia University Press: 1997. Pp. 631. $175, £140

Jean-Louis Hartenberger

In 1662 and 1663, John Ray, the founder of natural history in England, made a journey to the main European universities. I like to imagine that the stop he made in my city, Montpellier — where he met Niels Stensen (also known as Nicolaus Steno) and Martin Lister, with whom he dissected various animals — had some influence on his subsequent writing of *Synopsis methodica animalium quadrupedum et serpentini generis* (1693), one of the

Chilling out: polar bears relaxing, from *Polar Dance: Born of the North Wind* (Images of Nature, $65) with photography by Thomas D. Mangelsen and text by Fred Bruemmer.

great landmarks of vertebrate zoology.

After the elaboration of a hierarchical method of biological classification, and mainly on the basis of Ray's work, Carl Linnaeus gave birth in 1758 to the concept of Mammalia in which *Homo* is considered to be a member of Primates. From that time we have been more concerned with classifying and systematizing mammals than we have other living organisms.

Following Georges Cuvier, numerous tentative schemes for classifying mammals have been made in which fossils ("*les espèces perdues*") were considered along with extant species. Of all the pre-Darwinian classifications, my preference goes to that of Ducrotay De Blainville (1834), for two main reasons: he gave less weight to adaptative characters for defining higher taxonomic levels, emphasizing instead 'deep' or 'fundamental' ones; and he arranged some fossil genera in linear series to form some kind of 'natural transition' for filling the gaps among living animals. In addition, the rodents, in which I have a particular interest, are very well grouped by de Blainville.

After Darwin, palaeomammalogists generally recognize that the most comprehensive and documented proposals in the field of mammalian systematics came from the American Museum of Natural History in New York. At the beginning of the century, William King Gregory (1908) offered a brilliant and still valuable synthesis of mammalian relationships. In the 1940s, George Gaylord Simpson worked on the task for many years, before and after the publication in 1945 of his classification of mammals. In many ways, more recent authors consider that their own systematic work expands on that of Simpson. We can therefore speculate that the new classification of Malcolm C. McKenna and Susan K. Bell, an extensive revision of Simpson's classic work, will be in use for the next 50 years.

This new work embraces no less than 5,000 genera (of which 79% are extinct), distributed in 425 families (70% are extinct) and 46 orders (22 are extinct). In Simpson's classification, 'only' 2,864 genera (932 were living) were distributed in 257 families, of which 'only' 54% were extinct. So in the past 50 years there have been as many new fossil discoveries as there were in the time from Cuvier to Simpson. If we consider Primates, favourites of (too) many colleagues, the point is even more striking: to the 82 genera of 1945, 135 more have been added.

So when faced with these numbers and keeping in mind how 'bushy' is the plethora of taxa and nomenclature proposed in thousands of papers, one can understand the attitude of many investigators who were asked to give advice about the aims of our colleagues at the American Museum of Natural History: most of us thought this venture was some sort of Sisyphean task. But computers have helped to handle this enormous database, and McKenna, Bell and their colleagues were convinced of the need for a new classification. They make a great attempt to communicate in words their depiction of a phylogenetic branching and descent with modification of the class Mammalia. To accomplish this, they organize the classification using 25 taxonomic hierachical levels, ten more than Simpson used. For this, they consider that phylogenetic analyses (cladistics) are more of a tool than a subject of study.

The results in many cases are provocative, and no doubt many modifications will be suggested in the future. In my opinion, the book delivers two messages that are invitations for future research. The first (reading between the lines) is that characters are not black and white, and we need to do more than looking at previous papers and compiling lists of characters for cladistic analyses. What we need is an understanding of characters and their biological significance; undoubtedly we need new neontological studies, particularly in the developmental field, at all available levels. The second message addresses young palaeontologists: if they want to shake the tree of mammals, as depicted in the McKenna and Bell classification, the best way to do this is to search in the field for new species and genera. In the next 50 years they have to find at least 2,000 more genera, such that about 90% of known families will be extinct, for constituting the skeletal framework of future mammalian classifications.

In the meantime, the classification of extant and fossil mammals by McKenna and Bell will be the classic reference work for all investigators interested in mammalian evolutionary biology. □

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Jargon and icons

Oxford Dictionary of Biochemistry and Molecular Biology
edited by A. D. Smith, S. P. Datta, G. Howard Smith, P. N. Campbell, H. A. McKenzie and R. Bentley
Oxford University Press: 1997. Pp. 740. £34.95, $60

Christopher Surridge

One of the most daunting aspects of modern biology is the vast amount of jargon shrouding it. There is an ever-expanding vocabulary, and hardly a week passes without the coining of a name or acronym in *Nature* alone. The *Oxford Dictionary of Biochemistry and Molecular Biology* attempts to provide a guide in this linguistic jungle for novice and experienced traveller, indeed for anyone who wants to know the difference between IGF, IgG and IGT (insulin-like growth factor, immunoglobulin G and impaired glucose tolerance).