puzzles, and his unfailing grace in explaining the (usually classical) origins of terms.

However, the *Incredible Voyage* approach has its limitations, most evident in the biochemical parts of the books. Very few people really enjoy biochemistry, probably because of its rather abstract nature. It's a subject that's fun to *do*, but not so much fun to read about. de Duve adopts two "outlandish terms" (sic) the "Janus Intermediate" and the "Oxphos Unit". The Janus Intermediate "arises from a nucleophilic attack by an oxygen containing building block (X-OH or X-O) on

exploring at greater length, precisely because it seems to cause such trouble. de Duve includes some appendices dealing with biochemistry and bioenergetics which would have been helpful in the body of the text, but they are at the end of the second volume so consulting them is not encouraged. Probably you either have to grasp the nettle and give the full treatment, or leave it out altogether.

In the nucleus we are for the most part in conceptual country which de Duve understands very well, but doesn't know like he knows his organelles. de Duve is not alone in speaking of "the nucleus" as stan-

Stopped in time — rows of cilia on the surface of *Paramecium tetraurelia* arrested in the middle of their synchronous beat.

ATP or some related energy-rich molecule, which we will designate provisionally as A-B, in order to avoid going into complex chemistry"; later we learn that "Janus...is Mercury and Aquarius all in one". You see? The excellent colour graphics make it more palatable, but whereas other parts of the book repeatedly opened my eyes, I found the biochemistry and bioenergetics not only unilluminating but even baffling in places. I never really did get the Oxphos unit.

In his introduction, de Duve is apologetic about his approach to biochemistry, as if he knew he was taking a bit of a risk and hadn't quite got it the way he would have liked. It would be interesting to know how a non-biochemical reader would fare. It is very difficult to know how to deal with biochemistry in a modern account of the cell. Whether you are a strict cell biologist or a full-blooded clone-and-sequence molecular man, enzymes and the reactions they catalyse keep on creeping into consciousness both as tools (don't forget to add the ATP to your ligations) and as the very objects of study; what does the recently discovered "homeoprotein" actually *do*? Yet we shy from the gory biochemical details. Why should this be so? Is it because of a lingering distaste for the blood and guts origin of the subject? Or because our algebra stopped short of the Michaelis-Menten equation, which we were led to think lay at the heart of the subject? Or because the chemical formulae were too big to remember, and the pathways too complex to comprehend except by rote the night before the exam? Or because explanations too often stopped before they really made sense? This is a topic that needs

ding for almost all of molecular biology; this is common parlance among cell biologists. Yet molecular biology as I understand it has very little to do with the nucleus as such. It stands for a much more highly conceptualized scheme of things that transcends (for the time being) its cellular location. Actually, we don't even understand clearly why there is such a thing as a nucleus; bacteria get along without it and *Saccharomyces cerevisiae* commits mitosis without ever losing its nuclear membrane. Curiously, this kind of issue is not considered here. There is discussion of what the nuclear membrane lets in and out, of nuclear pores and how little we understand of how they work, of how the membrane vesiculates prior to mitosis (we have to wait for this to happen to get out!), but not of why it's there in the first place. (Alberts *et al.* in *Molecular Biology of the Cell* suggest that it's to keep protein synthesis out, thus allowing splicing to occur.) I was disappointed by de Duve's silence on the matter, for elsewhere he almost always has something interesting to say.

These two volumes are an extravagant buy for the individual, but they must go into my college library and I would advise intending biologists who have not done the subject at school to try and get hold of them before they go up to university. For, despite their deficiencies, the books are a splendid introduction to cell biology, and the first hundred pages could and probably should be read with profit and enjoyment by every biologist. □

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Nature magnified

Peter Evennett

Single Lens: The Story of the Simple Microscope.

By Brian J. Ford.

Heinemann/Harper & Row: 1985.

Pp. 182. £10.95, \$14.95.

THE simple microscope, one whose optical system consists of a single lens, operating in the manner of a magnifying glass, has a distinguished place in history and quite remarkable capabilities, little known to the general scientist. The origins of its use are obscure, but by far the best known early work is that of Antony van Leeuwenhoek of Delft, communicated in the form of a series of letters to the Royal Society from 1673 until shortly before his death in 1723. One third of Brian Ford's book is devoted to Leeuwenhoek, his microscopes and specimens.

Using single-lens microscopes, Leeuwenhoek was the first to observe Protozoa, bacteria and spermatozoa: truly microscopic objects. In contrast Robert Hooke, Leeuwenhoek's contemporary working in London who published *Micrographia* in 1665, used a compound microscope (consisting of two lenses, objective and eyepiece). Both men's observations were excellent within their own limits, but while Hooke's work — on relatively large objects such as the flea or the sting of the nettle, for example — extended existing knowledge only slightly (though illustrating it most beautifully), Leeuwenhoek broke entirely new ground. The reason for this was principally his choice of microscope: lens design was then in its infancy and, to put it crudely, one poor lens gave better results than two poor lenses.

In addition to his letters, Leeuwenhoek also sent specimens, in small paper packets pasted to the letters; many of these survive in the archives of the Royal Society. In researching this book, Ford took some of the specimens to Utrecht and photographed them with an original microscope, demonstrating to those of us unlikely ever to lay hands on one the nature and quality of the image of a Leeuwenhoek microscope. A study of the surviving instruments shows that they were capable of resolving features as small as one micrometre, with a magnification of several hundred times — a performance as good as that of many school microscopes of today; indeed, for 300 years single-lens microscopes have been

New in paperback

● The ninth edition of *Henderson's Dictionary of Biological Terms*, revised by Sandra Holmes. Publisher is Longman, price £4.50.

● *The Ecology of Animal Movement*, edited by Ian R. Swingland and Paul J. Greenwood. Publisher is Oxford University Press, price £12.50.

capable of revealing most of the significant structures that can be resolved by a modern light microscope.

After Hooke and Leeuwenhoek, the compound microscope increased in popularity as a "drawing-room" instrument, presumably because of its impressive appearance and greater ease of use; Ford describes the progress of the simple microscope in the form of the cheap flea-glass, the more versatile compass microscope, and the screw-barrel and later designs. A simple microscope is little more

Art of the instrument-maker — an elaborately decorated simple microscope produced in Paris, c. 1720.

than a device to hold a specimen and a lens in suitable relationship one to the other, its design naturally influenced by the nature of the specimen to be examined. Around the middle of the eighteenth century the "aquatic" microscope was designed, arranged to stand on a table, with a movable lens to enable it to scan sensitive creatures such as *Hydra* without disturbance. Linnaeus owned one of these, and a similar though superior example was used by the Scottish botanist Robert Brown in 1827 when he discovered "active molecules" (now known as Brownian movement), and a few years later when he described the nucleus and cytoplasmic streaming in the plant cell. Darwin took a microscope of this kind on the *Beagle* expedition in 1831, on Brown's advice, and wrote of his purchase of another in 1848. An essentially similar instrument is still available as a "dissecting microscope".

The simple microscope has not been well documented previously. Brian Ford's book is a clearly written non-technical account of the instruments, the lenses, their performance and use, illustrated with historical anecdotes, quotations and drawings, and with a useful bibliography. It will interest anyone who uses a microscope and many others besides. □

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Psychiatry: beyond analysis

Anthony W. Clare

The Broken Brain: The Biological Revolution in Psychiatry.

By Nancy C. Andreasen.

Harper & Row: 1985. Pp.278. \$16.95, £12.95.

A COMMONLY expressed dictum, usually by psychiatrists, is that there has been a revolution in psychiatry. Back in 1966, the late Sir Aubrey Lewis of the Maudsley Hospital wryly noted the common and invigorating habit of psychiatrists to rejoice "that they live in an age of rapid and impressive advance". Advances there have surely been but whether any of them warrants the description "revolutionary" is highly questionable.

Just after the Second World War, the new antipsychotic phenothiazines and the tricyclic antidepressants were hailed by psychiatrists such as William Sargant in Britain and Nathan Kline in the United States as the harbingers of a revolution in physical treatment which would empty the mental hospitals and re-establish psychiatry within the mainstream of general medicine. Even before the introduction of these drugs, however, the mental hospital population on both sides of the Atlantic had begun to fall and this trend too was acclaimed as reflecting a revolution in care. Much of its momentum derived from the realization that institutionalization of the chronic mentally ill could in many instances worsen the condition and add substantial secondary impairment. A vigorous new emphasis within psychiatry was born, social psychiatry, whose enthusiastic adherents emphasized the importance of energetic rehabilitation and rapid reintegration of the mentally ill within the general community. In the United States, the presidential involvement of John F. Kennedy gave the movement a particular momentum such that over a quarter of a century the mental hospital population has fallen by nearly 75 per cent (compared with the more pedestrian British decline of 25 per cent) and a whole chain of community mental health centres has been deployed across the continent.

The mid-1960s, a turbulent time within as well as outside psychiatry, witnessed the flowering and then the demise of arguably the most revolutionary idea of all, namely that mental illness does not actually exist but is a myth, a metaphor or merely an obfuscating and remarkably sticky label. The mentally ill were variously portrayed as outsiders, deviants and voyagers on a perilous journey of self-discovery and transcendentalism. Around the same time, the more prosaic yet more enduring advances in behavioural theory in turn yielded a series of promising techniques of be-

havioural treatment, including desensitization, operant conditioning and flooding, offering hope to sufferers of the most intractable of neurotic conditions such as phobic anxiety and obsessive compulsive disorder.

If one uses the term "revolution" in the sense of the undermining and overthrow of the established order, then none of these developments seriously threatened psychiatric orthodoxy. Psychotropic drugs, psychiatric rehabilitation, the development of community-based facilities, the application of behavioural techniques — each has been comfortably absorbed within the general mainstream of psychiatry. In the process, the original enthusiasm has been tempered by time and by bitter political experience. In the case of the much-vaunted community mental health centre programme, for example, professionals, politicians and the public appear deeply divided not about whether it was a good or a bad idea but about who precisely is responsible for the disaster that it has turned out to be. Its critics blame the haste, the ill-conceived design which has led to the warehousing of large numbers of chronically ill psychiatric patients in squalid and anti-therapeutic conditions within a community which clearly does not care, and the failure of its advocates to acknowledge the degree of disability manifested by those who are most seriously mentally ill. Its supporters attack the failure of Federal government to honour funding pledges made by its predecessors and the marked ideological shift in the way that Washington regards the concept of community welfare.

Unabashed, American psychiatrists are now acclaiming a new revolution. The author of *The Broken Brain*, a book revealingly subtitled *The Biological Revolution in Psychiatry*, is moved to declare with the enthusiasm of one who has witnessed the fall of some psychiatric Bastille, that "Psychiatry, like the prodigal son, has returned home to its place as a specialty within the field of medicine". For Nancy Andreasen, Professor of Psychiatry at Iowa College of Medicine, psychiatry is becoming increasingly scientific and biological in its orientation and medical science is now convinced that the serious forms of mental illness, such as schizophrenia and manic-depression, are due mainly to abnormalities in brain structure and chemistry.

British readers, familiar with the relatively close relationship between psychiatry and general medicine in this part of the world, may wonder what all the fuss is about and where the American prodigal son has been all these years. Yet the argument that in the United States at least there may indeed be a significant shift in psychiatric thinking, if not a revolution, does merit closer examination. There was a time, less than 25 years ago in fact, when it was difficult if not impossible to become the chairman of an American department of psychiatry unless one had undergone psychoanalytical train-