psychoses, autism and alcoholism (though according to one study the last cure only occurs "in 50% of cases" since only one out of the two alcoholics treated actually improved, p.124); we can perceive colour with our finger tips when we are not using them for curing cancer by electrical emanations; and we can of course learn effortlessly either by eating "respected scholars" or by having linguaphone records played to us whilst we are asleep.

The language in which the book is written suggests that the authoress may herself have been in ASC (altered state of consciousness) throughout its preparation. Scientists are alternatively "stunned" and "baffled"; discoveries are "astounding", "amazing", "incredible" or "one of the biggest breakthroughs of our times". Her style speaks for itself: "Into the whirlpool of eddying, oscillating, hormones of a human female toss a contraceptive pill. The vigilant brain, taking astonished note of the suddenly escalated progesterone and oestrogen, behaves as if pregnancy has occurred" (p. 219).

Even when she deals with well established phenomena, such as size constancy, the limits of the visible spectrum, or the after-effects of seen movement, Marilyn Ferguson can do no more than invite us to gawp at them: no attempt is made to provide the reader with an understanding or an explanation, and mysteries are conjured up where none exist. In spite of reservations about the way she presents her material, one cannot but admire her industry: there is a 23 page bibliography in which the citations range from *Science*, through *Esquire* to the *Psychedelic Review*.

Although this book cannot be taken seriously, it may be worth asking whether it matters that so much effort is devoted to making specious discoveries and publicising nonsensical theories: after all, the brain may work in ways that are at variance with existing scientific paradigms, and unless someone produces and tests unlikely hypotheses, we would never know. It may even be that some of the unusual findings reported in this book will eventually be validated. Moreover, in the long run science will catch up and false hypotheses and observations will be discarded. In the meantime, it is only the gullible, those in search of a mystery or a sensation, who will give credence to this kind of work: the rest of us either suspend judgement or hear on the grapevine about all the negative results that do not get into the journals.

Sensation mongering research often does, however, have bad effects. First, much of it, particularly in Russia and the United States is funded from public money which might be better spent elsewhere. Second, scientists may feel a duty to investigate claims made by others, and if the original research is bad this may waste a great deal of time and effort: proving that an effect does not exist is notoriously difficult. It is said that a Nobel prize winner spent three years attempting to replicate some of the experiments on cannibalism in *planaria* without success. Third, current trends to mysticism are given a scientific prop. Not all mysticism is bad but mysticism based on bad science is likely to be bad mysticism. Fourth, and most important, when the 'discoveries' are in the brain sciences, they often fall into the hands of medical practitioners, the most gullible of professional people; and when applied to human patients such discoveries can cause a great deal of suffering. Leeches and calomel have now been abandoned, prefrontal leucotomies and insulin-induced coma are on the decline, but psychoanalytic therapy still thrives in the face of the evidence, and there is an increasing fashion for amygdaloid lesions and for maintaining children with that mysterious syndrome "minimal brain damage" on large doses of amphetamine.

Ernst Mach (sporting a splendid moustache) lying on his back and sketching the outside world as it presents itself to his left eye. *From Logic, Labels, and Flesh.* By Stefan Themerrson. Pp. 202. (Gaberbocchus: London, July 1974.) £3.60 boards; £2.40 paper.

Perhaps the research councils should establish teams of sceptical but tolerant scientists prepared to move to trouble spots and investigate, in collaboration with the original discoverers, any seemingly outrageous claims that might be of importance either for science or human life. No doubt, on most occasions, they would merely put out the flames expeditiously, but occasionally a really important discovery might be rescued from scepticism, and at least we might have firm answers to such questions as whether acupuncture works by some process other than blind faith, or whether learning can be transferred from one animal to another by injecting a homogenised brain extract. It does seem extraordinary that no definitive answer to this last question can be given 15 years after it was first raised. **N. S. Sutherland**

Neuroteleology

Logic of the Living Brain. By Gerd Sommerhoff. Pp. ix+413. (Wiley: London and New York, 1974.) £5.75.

In 1950 Sommerhoff published a book entitled *Analytical Biology*: it deserves to be more widely read than it has been since it is one of the best philosophical analyses of teleological terms. He argued that a system may be said to be goal directed when its outputs correlate with variations in the states of the environment in such a way that for a wide range of environmental states the same end condition is achieved. He named this concept 'directive correlation' and tried to formalise the idea. His new book attempts a grandiose synthesis of brain and behaviour, and had it too been published 24 years ago, it would doubtless have met with the measure of critical acclaim that in that distant age greeted other *pot-pourris* of the kind, such as Hebbs' *Organisation of Behaviour*. Like such books, it would also have been forgotten by now.

In the first section of his new book, Sommerhoff argues that biologists and psychologists have been unable to grapple with the real complexity of the brain because they have not had a set of objective scientific concepts appropriate for the description of a system that is goal directed and that forms and uses models of the outside world. He alleges that brain scientists, by avoiding all teleological language, either oversimplify the problem of how the brain controls behaviour or else they use teleological language in a confused and non-objective way and therefore produce muddled theories. Unfortunately, no instances are given of the muddles that arise and one can only speculate about who all these confused theorists are.

Sommerhoff's solution to this problem is two-fold: first, to make use of his earlier idea of directive correlation; and second, to construct nerve nets with classificatory functions that can change through learning. In the second half of the book, he looks at various behavioural phenomena and tries to show how they can be explained in terms of these two ideas.

The book has several serious faults.