BOOK REVIEWS

Space Science

Space Physics and Space Astronomy. By Michael D. Papagiannis. Pp. xiv + 293. (Gordon and Breach Science: New York, Paris and London, 1972.) £7.70.

LATE in 1957 the Russians astonished the world by creating the first artificial satellite of our Earth and by following it almost immediately by the incarceration of a dog in an orbiting death cell large enough for the world to view. Everyone will remember the successive disappointments suffered at that time by the Vanguard project and, compared with the weight of the first three Sputniks, the pathetic little Explorer I launched at last on January 31, 1958. Yet this tiny satellite with its Geiger counter payload rather than the living passenger of Sputnik II provided both a pointer to the main road to be taken by space science and the most important single discovery of the space age. By its unexpected detection of the trapped radiation, to which Singer and Christophilos had been giving theoretical consideration, this payload started the satellite study of the Earth's environment and its relationship to the Sun which has been the first great contribution of spacecraft techniques to our understanding of our world. Cosmic X-ray astronomy grew out of solar X-ray studies which were themselves part of the field of solar-terrestrial relations. To this branch of astronomy I would assign the next place in the great achievements of space science. None of this is to underrate in any way the important science coming out of manned and unmanned lunar expeditions and the instrumented flights to Venus and Mars. These, however, have not had the tremendous integrating effect which solar-terrestrial studies have had on our picture of the Earth's atmosphere, ionosphere, magnetosphere and polar phenomena in relation to the Sun, its activity, radiation, wind and high energy particle emissions. Nor do they appear to have the potential significance of our introduction to new, energetic and sometimes transient celestial phenomena through the X-ray window on the Universe. The unexpected array of cosmologically sig-

nificant phenomena from black holes to intergalactic matter and from supernova remnants to interacting binaries is comparable only to the prospects opened a decade or so earlier by the sister branch of radio astronomy.

Merely to mention radio astronomy, X-ray astronomy and so on is to remind oneself that space astronomy, space physics and indeed the whole of space science are not disciplines of science but branches of scientific disciplines marked out by the highly sophisticated technology involved. *Space Physics and Space Astronomy* sets out to introduce the graduate considering a career in space science or the professional scientist interested in it to the field as a whole. In doing so it, perhaps of necessity, largely ignores the technological basis and often even the experimental basis of the subject and reviews with readability and skill the basic geophysics, solar physics, planetary physics and astrophysics which have been the hunting ground of space research. In spite of some charming infelicities of expression betraying perhaps the Greek background of the author and some less excusable faults in proof reading the book remains one of the best introductions to the subject I have seen. Papagiannis is, himself, a notable worker in many of the areas he describes so well. Personally I could wish for a little more discussion of the experimental procedures which entitle the subject to the adjective *space* and it is noticeable that the mathematical analyses cluster round the author's own areas. Some errors of fact are obviously mistakes of expression, but I wonder if anyone still believes Cygnus-A to be a colliding system. *Space Research* is a book intended for engineers. It would have been far better to use the translator's effort in providing Papagiannis' book for Russian engineers. Part 1 is so full of errors as to be useless, even if the engineers did need to know so much geophysics and astrophysics to design spacecraft. Part 2 is concerned with the effects of space environment on materials. Like Part 1, on the whole it lists empirical data without engendering understanding. No doubt this matters less in designer's reference material but there is the somewhat unfortunate disclaimer on page 3 "The data presented

here should not be used as a standard, and they will as a rule only give rough evaluations".

R. L. F. BOYD

Biochemistry of Ataxia

The Pharmacology of Extrapyrarnidal Movement Disorders. By H. I. Klawans, Jr. Pp. vi + 137. (S. Karger: Basel, London and New York, 1973.) 49 Sw. francs; £5.75; \$13.75.

BASIC biochemical and pharmacological discoveries led to the prediction that levodopa would help patients with Parkinson's disease, a prediction that has been amply fulfilled in clinical practice. A side-effect of levodopa treatment is the production of abnormal movements reminiscent of those seen in diseases characterized by chorea and torsion dystonia. Naturally clinicians and basic scientists have seized on this observation as a clue to the pathogenesis of such disorders and in recent years many studies on the clinical and animal pharmacology of extrapyramidal movement disorders have been published. Dr Klawans's monograph is timely, for it draws together much of the presently available information on this topic.

The central theme of the book is the disorder of dopaminergic and cholinergic mechanisms that underlies Parkinson's disease. This is described at length from the viewpoint of a clinician who starts with observations in the clinic, and then attempts to explain them on the basis of what is known about dopamine and acetylcholine in the brain. The reasons why levodopa works (or doesn't in some patients) and the causes of the side-effects it produces are discussed at length. The value and mechanism of action of other antiparkinsonian agents are also reviewed, as is the value of levodopa in other akinetic-rigid syndromes, such as olivo-ponto-cerebellar degeneration, progressive supranuclear palsy, manganese poisoning and Wilson's disease.

Dr Klawans then turns to abnormal movement disorders such as the tardive dyskinesias produced by neuroleptics, Huntington's chorea and other choreiform states, and torsion dystonia. Building on the framework of the pharmaco-