the circle, or to trisect the angle. These articles, along with many items gathered from his varied and extensive reading, were included in his "Budget of Paradoxes", a book which, as reprinted by his widow in 1872, is one of those books still beloved by readers who are interested not only in the highways but also in the by-ways of literature. The book is a marvellous combination of versatility and accuracy.

These thoughts about De Morgan, the mathematician of a century ago, came unbidden to the mind of the reviewer as he slowly turned the pages of Osborne, the physiologist of the present day. Parenthetically, it may be remarked that Dr. Osborne was born in Ireland and received his early education there, and later at University College, London, and at Tübingen. For some time he taught physiology in London, but he became professor of physiology at the University of Melbourne in 1902, and dean of the Faculty of Medicine during 1929–38, and is now emeritus. Just to call him a physiologist, however, is as inadequate as it would have been to call De Morgan a mathematician. Osborne's interests are astoundingly wide and varied, including highly original and often amusing comments on Shakespeare's language, a detailed description of the price-fixing and wage-fixing edict of Diocletian in A.D. 301 (conveying a lesson to us from the past), and the true place of science in education. The publishers of the book are justified in saying that the outstanding qualities of these essays is originality based on accurate scholarship, and the reviewer feels justified in calling the book "A Budget of Erudition".

Some of the most entertaining instances of Osborne's erudition occur in the essay on "Scientific Errors in Literature and Art". Here he shows himself no hair-splitting pedant. He disapproves of the mathematician who rebuked Tennyson for stating "Every moment dies a man, every moment one is born", and who suggested the correction "one and a sixteenth is born". He pounces only upon real 'howlers'. Rider Haggard in "King Solomon's Mines" has an eclipse of the sun lasting over an hour, whereas the maximum time is seven minutes. Wordsworth in his poem on the green linnet makes that bird "pour forth his song in gushes", but, alas! the green linnet is a songless bird. In Lever's "Charles O'Malley" a horse crashes badly and breaks a collar-bone, but a horse has not got a collar-bone; and when Browning in "How We Brought the Good News" makes a rider in full gallop shake off his jack-boots to lighten the load, one wonders, says Osborne, if Browning ever wore jack-boots or ever rode a horse.

The reviewer is compelled to pick and choose from the contents of this book. Time and space would fail him to enlarge on such attractive themes as "The Magic of Monosyllables", the sort of dial that Shakespeare had in his mind's eye when he wrote that Touchstone "drew a dial from his poke", the Voices of the Great—with its stories of Dickens and Gladstone and Spurgeon, whose Tabernacle was attended by an educated visitor to London because of "the incomparable melody" of the speaker's voice. The short essay on "Old Age Then and Now" is a sharp reminder of demographic facts and their economic significance. "Old John of Gaunt, time-honoured Lancaster" died at fifty-nine. Columbus, according to Walt Whitman, "a battered wrecked old man", died at fifty-six. Thackeray, who described himself in one of his poems as a "grizzled grim old fogy", died at fifty-two. History does, of course, adds Osborne, give us examples of illustrious men dying at great ages, but they are regarded as prodigies surpassing Nature's law. Now they are no longer so, the span of life in all classes of the community has increased, and at the other end infant mortality is no longer regarded as philosophically as it was a generation ago. The essay on "Science in Education", being an address delivered at an All-Australian Education Conference, is a most careful and illuminating piece of work. The essayist is equally clear and plain-spoken as to what science can do, and what it cannot do, for the young learner; and, as may be abundantly gathered from his other essays, he is far too good a humanist to be a one-sided advocate of science in education. He denounces bad teaching, whether of science or of literature, with equal clearness and emphasis wherever he sees it. He impeaches the grammarians of destroying the appreciation of literature. A play of Shakespeare is prescribed and an examination is held, and most of the children "thus affected and afflicted acquire an abiding aversion to this drama and sometimes to its great author just because a work of art has been put to a use to which no work of art should ever be applied" Thus does Dr. Osborne again prove himself to be much more than an eminent physiologist.

T. RAYMONT

ATOMIC PHYSICS

Introduction to Atomic Physics

By Dr. Henry Semat. Revised and enlarged edition. Pp. xi+412. (New York: Rinehart and Co., Inc., 1946.) 4.50 dollars.

THERE is a real need for text-books covering a self-contained lecture course on atomic physics. By departing drastically from the historical order of development, a very wide ground may be covered even with students at a comparatively early stage. It is possible to make such a course relatively simple to follow and yet to include most of the important features of modern atomic, including nuclear, physics. The developments associated with atomic energy have raised the educational requirements for this branch of physics, so the demand for appropriate text-books should be considerable.

Dr. Semat's book is of this type and includes a well-balanced choice of subject-matter. The mathematics introduced is never difficult, requiring little more than a knowledge of elementary calculus. Part 1 deals with the foundations, Part 2 with the extra-nuclear structure of the atom and Part 3 with the nucleus. It is written in an easy, but not hearty, style, is well illustrated and is quite up to date. Thus it includes a discussion of the betatron and of nuclear fission. In fact, discussion of the nucleus is very thorough and would provide an excellent introduction to the subject.

At the end of each chapter useful references to other texts are given, together with another valuable feature—the provision of problems on the subject-matter of the chapter. These are well chosen and likely to assist the student to clarify his mind.

Tables of atomic weights, isotopic masses and stable isotopes are included among other appendixes.

The form and style of the book are pleasing, and it should be of much value to teachers of atomic physics in Britain.

H. S. W. MASSEY