can Church we hear a new story about what happened to a man who said that talk about witches, curses, and peyote is old superstition, that what matters nowadays is how to fix a television set.

The compilers achieve their goal of aiding the general reader in understanding Indian religion and mythologies and the philosophies embodied in the narratives. The book is a tour de force, and one can understand why they have been appointed "artists in residence" at a college.

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The Study of Plants

Textbook of Theoretical Botany. Vol. 3. R. C. MCLEAN and W. R. IVIMEY-COOK. With a section on genetics by Kenneth Lewis. Wiley, New York, 1967. x + 1108 pp., illus. $19.25.

This is the third volume of an advanced text intended to cover "the study of the plant from every point of view" (volumes 1 and 2 were published in 1951 and 1956). Perhaps botany students in Britain will buy a 3000-page text, but whether their counterparts in America will do so is open to doubt, particularly in these days of paperbacks and Annual Reviews. Furthermore, although this third volume is certainly written in good style, it is neither up to date nor documented.

There are three sections: Paleobotany (400 pp.), Genetics (200 pp.), and Physiology (480 pp.). Let it be said at once that there is nothing particularly "theoretical" about the book. It is as full of description and experiments as any other biological textbook; evidently the term "theoretical" is being used in the opposite sense to "applied." The section on paleobotany is indeed fully descriptive, and very well illustrated with both photographs and diagrams. Some of these are original, and it is obvious that the authors have personal knowledge of their subject. However, although the text is very readable, no concession is made to beginners, a rather intimate knowledge of plant anatomy being assummed. The Cordaitales, for instance, are described as "plants the stems of which had a distinctively coniferous type of anatomy, with little or no centripetal xylem and a broad zone of close-grained, secondary centrifugal wood with multiseriate tracheidal pitting like that of the living *Araucaria*." How many readers of this journal, I wonder, will form an immediate visual picture from this description? How many, indeed, have ever looked at sections of *Araucaria*, living or dead? Perhaps, in any case, it is time that paleobotanists gave up their traditional preoccupation with anatomy and devoted more attention to what we can deduce as to the conditions of life of ancient plants. The authors discuss world climates occasionally, especially in Pliocene and Quarternary times, but one misses any attempt to correlate form with environment. Stomata, for instance, which would be interesting in this connection, are mentioned (and figured) but once, although leaves and fronds constitute the bulk of the remains described. The exclusion of fossil algae, though no doubt necessary for the great sweep of coverage in time, space, and forms of the land plants, does make it harder to obtain an overall view of the process of plant evolution.

The section Genetics, contributed by K. R. Lewis of Oxford, is a rather complete account of the genetics and chromosomes of higher plants. Emphasis is on the "classical." A bow is made to modern biochemical genetics with a ten-page section on gene action, treating nutritional mutants in *Neurospora* and hemoglobin mutants in man, and with a comparable section on nucleic acids, giving the structure and mode of replication of DNA. But to say that "Indeed, considerable progress has been made towards determining which triplets code which amino acids" is to give a rather lackadaisical picture of the breakneck rate of discovery in this field. Cytoplasmic inheritance is treated briefly, but, as might be expected, since much of the material appears to have been written a good many years ago, the presence and role of DNA in plastids and mitochondria are not mentioned.

Unfortunately, the authors did not follow the lead of the second section and invite a plant physiologist to write the physiology; they chose to do it themselves. The result can be imagined; the "renaissance man" has no easier a time in botany than in any other science. McLean says in the preface, "Some may consider it rash for one who is not a professed physiologist to attempt to write on plant physiology." He is right. For one thing, approximately ten years seem to have elapsed between the writing of most of the text and publication. This means, for example, the exclusion of ferredoxin and the second photochemical reaction from the treatment of photosynthesis, and the ascription of ATP production in photosynthesis to oxidative phosphorylation in one paragraph and to true photophosphorylation in another. It limits the treatment of cytokinins to a paragraph, excludes all the work with C^{14}-labeling of auxins, and of course excludes too the now actively investigated question of the role of RNA in hormone action. Among other things, we learn, oddly, that the red-far-red reversibility of phytochrome "is only shown in presence of auxin"; that alcoholic fermentation differs from simple hydrolysis "only in degree, not in kind"; that the yellow *and red* colors of autumn leaves are due to lutein and carotene; and that among growth stimulants "pentaoxyanthraquinone is seven times more active than auxin." In addition to such quirks, important fields like the physiology of leaf abscission, fruit ripening, and the rooting of cuttings are totally omitted, yet space is found for a detailed treatment of Moewus' sex-substances in *Chlamydomonas*, now discredited. Unfortunately for the student, the statements made cannot be queried or verified, for although the genetics section does at least mention a dozen books, the physiology section includes not a single reference to a book or journal.

Perhaps the volume is worth while for its treatment of paleobotany.

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Problems in Atomic Physics

The Physics of Electronic and Atomic Collisions. Invited papers from the Fifth International Conference, Leningrad, July 1967. LEWIS M. BRANSCOMB, Ed. Published for the Conference General Committee by the Joint Institute for Laboratory Astrophysics, Boulder, Colo., 1968. xvi + 200 pp., illus. Paper, $7.

The original development of quantum mechanics was stimulated by unsolved problems in the field of atomic physics. When the principles of quantum theory were found to be applicable to nuclear phenomena, research in physics tended to become concentrated at the forefront of knowledge, which at that time was nuclear physics. Left behind in atomic physics were a host of difficult and challenging problems which could be characterized as many-body problems of inhomogeneous systems with a Coulomb interaction among the compo-