Book Reviews

Aldous Huxley on the Two Cultures

Literature and Science. Aldous Huxley. Harper and Row, New York, 1963. viii + 118 pp. $3.50.

As these words go to press, news comes of the death of Aldous Huxley. The event tempts one to reminiscent eulogy, for in his wide-ranging output he embodies a large part of the concerns of the quarter century from the end of the first world war to the end of the second. But this is not the place to detail his accomplishment. Rather, one can let his last-published essay, *Literature and Science*, serve as a résumé in miniature for a good part of what might be called Huxley's cultural philosophy.

To begin with, the essay is full of quotations from the poets and prose writers, and as usual with Huxley these verses and sentences are exquisitely chosen and placed. It is a delight to read a modern author—modern after Montaigne—who knows how to quote. Then, too, the essay springs from a current concern, in this instance the regrettable Snow-Leavis controversy and the too successful cliché about the two cultures. Huxley wants to be more concrete than the contestants and commentators and to arrive, not at a reconciliation between literature and science, but at a demonstration of their unity in diversity. In a word that unity lies in the subject matter: one world, observed with equal care by two types of intellect which travel in different directions. The literary dwells on private experience, the scientific strives on the contrary to translate all its observations into publicly acknowledged facts and forms.

This doctrine is engagingly developed thanks to a pellucid prose and fit quotations, as I have said, and most temperate readers will be glad that a fair mind has hewn for them a middle way through the jungle of conflicting partisan assertions. Yet even a temperate reader may feel a doubt, frequently repeated, about the possibility of staying on this comfortable path. The use, for example, of Mallarmé's poetry as a chief instance of what "literature" characteristically does, is out of scale with the idea that art takes the whole world as its province, like science, and delivers its own kind of truth about it. Mallarmé's use of language was very special, and it treated by deliberate rejection or refinement a gross reality which earlier poets had managed to take in. The result is that both the poetry and the experience are in the strict sense minute.

Huxley, it is true, deals with Dante and Donne, but he is unhappy about their use or misuse of the scientific knowledge of their day. He also chides Hopkins for using an "outworn imagery" that disregards what the 19th century found out about the universe, and he is contemptuous of Shaw for his views on Darwinism. In this encounter it is Huxley who is the faulty historian of science, not Shaw. And the clue to Huxley's increasing dissatisfaction with writers as the essay goes on is that he evidently expects them to adopt (or if need be, fashion) for their poems and fictions an imagery derived from science.

The more one thinks about this requirement in the light of the opening distinction the stranger it seems. The poet certainly can not be asked to study science so as to use its terms with precision. But if he is imprecise, say by using a popularized technicality, he is at once pretentious and false to the ideal of his craft, which is precision of expression par excellence. I am willing to suppose that Huxley did not really mean what he implied about this duty of the poet, but rather something else which is—alas—still worse. I refer to the explicit example of the nightingale, given toward the end of the essay. According to this, Keats is all wrong: the bird is not pouring forth its soul in ecstasy, for *now we know* that *all it is doing* is serving notice on its fellows that it claims a certain territory for worm-grubbing.

That Huxley should succumb to this old fallacy that the putative cause of an action is its sole motive and full representation makes one sad. On his showing about Philomel one could say with equal plausibility that man sings for his supper: Chopin at the house of the Comtesse d'Agoult played as he did because of her excellent dinners, just as poets write love poems because of a mounting pressure on certain glands. The astonishing thing is that Huxley skirts self-criticism in the same passage, when he writes: "Man is the measure of all things. How true—for us!" His failure is in not seeing that in literature (as against science) the assumption that there is another measure is quite false. We can study birds, necessarily from outside, till kingdom come, we shall never know *why* they sing. But as poets we know—none better—how their singing affects us. And as to this datum science has not a word to say; it can only listen too.

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Physical Chemistry

Magnetism and the Chemical Bond. John B. Goodenough. Interscience (Wiley), New York, 1963. xvi + 394 pp. Illus. $12.50.

This is a remarkable book, collecting as it does so many topics related to the electronic structure of solids and discussing their known electric and magnetic properties in terms of semiempirical quantum mechanical theories of electronic interactions. It will be of value to physical chemists and chemical physicists interested in the solid state. In the early pages, the author succinctly reviews the theoretical framework that is later used. This may be the most difficult part for chemists, but it is amply supplied with references to the original literature as is the rest of the volume. Very little background knowledge is required, for all the material is developed or summarized for the nonexpert who is willing to make some effort.

After introducing the free atom, the author discusses the consequences of

interacting electrons in solids, treating the band model, magnetic properties associated with collective electrons, and ligand field effects on localized electrons. He then thoroughly covers the theoretical models and physical properties of magnetically ordered phases, dealing with ferromagnetism, antiferromagnetism, ferrimagnetism, and parasitic ferromagnetism.

In the last half of the book Goodenough describes the interactions of atomic moments in general in the various types of crystal structures commonly encountered in inorganic crystals and minutely examines specific experimental examples from the point of view of the models. Listing a few of the topics that are considered—band structure, magnetic coupling, Jahn-Teller distortion, conductivity, and second order transitions—may give some idea of the theme that runs through the discussion of the different crystal structures.

Although this book is certainly not a textbook, I feel that it could be used as the basis for a very worthwhile course at the second-year graduate level in physical chemistry.

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Geological Oceanography

Submarine Geology. Francis P. Shepard, with chapters by D. L. Inman and E. D. Goldberg. Harper and Row, New York, ed. 2, 1963. xviii + 557 pp. Illus. $11.50.

This revised and enlarged edition of Shepard's *Submarine Geology* records the great progress made during the last 15 years. In material and organization the volume parallels the first edition. It will remain valuable as a textbook for introductory courses in geological oceanography and for single courses in other areas and as a reference source. Shepard has synthesized a vast amount of material excellently; there are 46 pages of references.

Two introductory chapters cover history, methods, and instrumentation. Three chapters cover waves, currents, the physical properties of sediments, and the mechanics of sedimentation.

The two new chapters by D. L. Inman, on sediments and the mechanics treated in 12 pages and the complex applications of modern fluid mechanics of sedimentation, were a necessary addition. Unfortunately, in these chapters Inman attempts too much. Textural properties of sediments, including the statistics of size distributions, are to sediment transport problems in only 32 pages. A student with an adequate background for understanding the remainder of this book will find Inman's presentation so difficult that he will skip this important material. It would have been better to cover fewer concepts in greater detail.

Logically the two chapters on shoreline classification and beaches and related processes should follow the introductory chapters. The material on nearshore processes and the mechanics of sedimentation, which was presented in the introductory chapters, could have been used to greater advantage in discussing shore and beach development.

Five chapters are devoted to the following topics: the description, origin, and sediment distribution of the continental shelves and slopes; submarine canyons and valleys; and coral and other organic reefs. Shepard's descriptions of the features and sediment distributions are more complete than those in any other single source. Discussion of the origin and history of such features must be highly speculative; the author can be complimented for his objective consideration of many hypotheses.

Three chapters cover deep ocean topography, deposits and stratigraphy (a particularly praiseworthy treatment), suboceanic layers, and the origin of basins. Shepard has completely recast, into a more usable form, the classification of marine sediments, and he lucidly presents the distribution of deep-sea sediments and deep-sea stratigraphy within this new classification.

E. D. Goldberg's chapter on the mineralogy and chemistry of marine sedimentation is a worthwhile addition. Goldberg maintains an excellent balance between discussion of the entire field and details. The problems of using our knowledge of present marine environments as a means of interpreting the origin of sedimentary rocks are discussed in another new chapter.

I recommend this book to anyone who is interested in submarine geology at any level. The second edition has a greater diversity of material presented at a higher technical level, but always in very readable style.

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Nuclear Reactions

Direct Interactions and Nuclear Reaction Mechanisms. Proceedings of a conference held at the University of Padua, 3–8 September 1962. E. Clementel and C. Villi, Eds. Gordon and Breach, New York, 1963. xlix + 1187 pp. Illus. $39.50.

Rapid technological advances in precision high voltage accelerators and solid state detectors have brought about a revolution in the field of nuclear reactions. The proceedings of the conference on direct interactions and nuclear reaction mechanisms, held at the University of Padua in September 1962, provides considerable evidence of the rapid progress in this field. More than 400 physicists, representing 28 countries, attended and 177 papers which were read at the conference are published in this volume.

No sensational breakthroughs are apparent. The meeting was characterized by a steady stream of interesting and competent research, which, in its entirety, results in a considerable advance in our knowledge about reaction processes and nuclear structure. The following are a few of the contributions that I find particularly interesting.

The (p, 2p) and (p, pd) experiments being performed at Orsay promise to provide us with a good deal of information about some rather complex problems such as the structure of the deeper shells in nuclei. Riou reported on the results of (p, pd) experiments on H^2 and Li^6. Comparison of the yield curves indicate that the probability of having quasi-free scattering of protons on deutrons in Li^6 is greater than 30 percent. Thus there is finally some direct experimental evidence on the old theoretical problem of the applicability of the cluster model to the structure of this lithium isotope.

A considerable amount of discussion is concerned with the use of electrons in probing nuclear level structure. This work combined with the usual large number of investigations with heavy particles provides a sizeable amount of new information about nuclear levels. Garvey's detection of collective states in C^{12} is perhaps one of the more interesting.

Theoretical contributions are by no means lacking. The dominant development here seems to be the distorted-wave Born approximation, and there are fine review papers by Macfarlane and Satchler. Other reviews on theories of