Book Reviews

Gaseous Nebulae. vol. 3. International Astrophysics Series. L. H. Aller. Wiley, New York, 1956. 322 pp. Illus. $11.

This book is the third in the recently started International Astrophysics Series edited by Ellison and Lovell. It also happens to be the third monograph written by L. H. Aller to be published within a few years. Therefore the indication volume 3 on the back of the book is rather misleading because, if I understand it correctly, the volume 3 refers to the International Astrophysics Series and not to the series of books by Aller, as one might gather from the back of the book.

One has to be grateful to Aller for providing us with another volume containing a wealth of material, both observational and theoretical, presented in a clear and concise manner. After a brief introduction, the second chapter discusses in great detail various observational techniques for observing diffuse nebulae as well as planetary nebulae. The third chapter discusses distances, dimensions, and spectra of gaseous nebulae, and one is once again struck by the fact that the theoretical astrophysicist must have a much more elaborate *working* knowledge of atomic physics (and also of other branches of physics) than the ordinary theoretical physicist who can often get away with specializing in a rather narrow field.

The fourth chapter discusses physical processes in gaseous nebulae. The author restricts himself mainly to the discussion of a model of a planetary nebula which is a homogeneous spherical shell of hydrogen gas surrounding a very hot star, assuming a steady state to have been attained. As is well known from similar astrophysical problems, the situation is a good deal more complicated in such a state where there does not exist true thermodynamic equilibrium than in the usual situations discussed in statistical thermodynamics.

In Chapter 5 the author discusses the problem of forbidden lines. A slight point of criticism is that I feel that he might have said a few words illustrating why magnetic dipole, quadrupole, and higher order lines are usually not observed. Chapter 6 discusses the stars that illuminate the gaseous nebulae, and Chapter 7 describes the structure and internal motions of planetary nebulae. It may be added here that the main subject of the monograph is planetary nebulae, the diffuse nebulae being discussed very briefly, since they can be considered to be part of the interstellar medium, which will be discussed by Spitzer in another volume of the International Astrophysics Series. In the last chapter the author discusses some aspects of the diffuse nebulae.

"The aim of the International Astrophysics Series is to provide a collection of authoritative volumes dealing with the main branches of astrophysics. . . . The books will be suitable for both specialists and students. Some of the titles may have a wider and more popular appeal but this will be secondary to the main purpose, which is to assist in the teaching of astrophysics and radio astronomy and in the advancement of these subjects themselves." The present monograph falls beautifully into the category which the editors have had in mind, and it should provide one of the standard textbooks on the subject for some time to come. It seems, however, to me that it will be impossible for the general reader to get much benefit from this volume, unless he has a sound working knowledge of astrophysics.

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Encouraging Scientific Talent. A study of America's able students who are lost to college and ways of attracting them to college and science careers. Charles C. Cole, Jr. College Entrance Examination Board, New York, 1956. 259 pp. $3.50.

Those of us who were completing our formal education and were looking for academic or industrial posts in the early 1930's find it hard to believe our eyes and ears today. We probably would have labeled as insane anyone who had then suggested that, within 25 years, several pages of the Sunday *New York Times* would be devoted weekly to advertising for scientists and engineers, or that a manufacturer would dedicate his commercial time during a national telecast of a football game in order to suggest that persons in these fields make phone calls or send telegrams to his personnel officers. Yet the current shortage of scientific and technical people is so acute that these things are happening, and beginning salaries for men fresh from their A.B., B.S., or Ph.D. degrees are increasing year by year. If the trend continues, we may even expect that the average salaries of mature and experienced scientists will approximate those of other professions—in which case we shall really believe that the shortage is real and not a result of the necessity of hiring degree holders for work on cost plus contracts.

Encouraging Scientific Talent is the most recent book-length contribution to the growing literature on the shortage of scientists. After devoting three chapters to a discussion of the nature of science, the characteristics of the scientist, and the present manpower situation in science and engineering, Charles Cole devotes the rest of his book to one specific study. What are the reasons that a high-school student of high aptitude does or does not enter college? To what extent do teaching, the influence of parents, social pressures, and economic status determine his or her decision? What can be done to see that every student with ability wants to enter college and has the opportunity to do so? Most of the chapters are thoroughly documented by references to statistical studies, including a special survey of more than 32,000 students in 478 schools throughout the country. To the extent that questionnaires, tests, and psychological studies can give the answers to important questions, this book should form the basis of future discussions and planning on the part of colleges, universities, federal and state governments, and educational foundations.

The book will be provocative, if not completely satisfying, even to those who are not convinced that answers to all questions can grow from statistical studies. For example, the author shows that the percentage of college-age youths who actually attend college in each state correlates very well with the per capita income of the state, the annual state expenditures for public schools, and the percentage of workers who are engaged in professions within the state. One state, however, fails to fit the pattern. Utah stands head and shoulders above all others in sending students to college, although it is in the middle group according to the other measures. If the unusual happening is what offers challenge to a scientist, some of us should devote our energies to finding out what it is in the intellectual climate of Utah that produces this remarkable result.

Although it is never explicitly indicated, there seems to underlie Cole's treatment an assumption that education

to the limit of the student's capacity has ceased to be a privilege and has, instead, become a duty. This may well be in keeping with the problems and the temper of the times, yet it raises a question whose wide political and moral implications should be considered very carefully.

The cost of the book and the scholarly manner in which it is written and documented may prevent it from having the wide influence which this careful study deserves.

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Child Development and Personality. Paul H. Mussen and John J. Conger. Harper, New York, 1956. 569 pp. Illus. $6.

Since the turn of the century, child psychologists have been busily gathering a myriad of facts about their young subjects. Until recently, they have cataloged their findings in encyclopedic textbooks, stringing one fact after another rather precariously on the single strand of age development. The 3-year old does this, the 4-year old that. Child development progresses, apparently, with certain setbacks which at times impair the symmetry of the growth curves, but, in the past, textbooks have paid less attention to what may have preceded the setbacks than to the over-all (and by now reasonably dull) proposition that there is psychological growth with age. The fact is that, for most of the last half-century, child psychology has been purely descriptive, and the why's and wherefore's have been left to speculation.

In truth, it is difficult to escape the overpowering influence of the age factor in dealing with children. There is a certain regularity of development. On the other hand, there is an inescapable fact that many children of any one age have remarkably different personalities, and this fact, too, must be taken into the picture. Paul Mussen and John Conger have resolved this conflict between regularity (within very wide limits) and individual differences by examining the variations in children's experience. They have used a social learning interpretation of the researches at their disposal to analyze the many aspects of personality development. By this device, they have been able to avoid the purely descriptive approach and have been able to make a useful investigation of development in terms of antecedents and consequents. "The child's behavior, interests, attitudes and feelings are discussed from the points of view of: (1) factors in the child's background (biological, psychological, or social—and of course age is not neglected—) leading up to and influencing the development of these characteristics, and (2) the importance of these characteristics for the child's future development" (p. 7). What eventuates from this approach is a remarkably fruitful evaluation of the current state of our knowledge about the complicated process of personality development. This book will be welcomed, for this among other reasons, both by students of child psychology and by scholars in other fields—teachers, social workers, parents, pediatricians—whose work involves understanding of children's development.

Like most other contemporary child psychologists, Mussen and Conger attempt an evaluation of genetic factors in development before they examine the social learning factors in children's growth. It is in the latter area, however, that the most stimulating findings seem to have emerged recently. Some are at variance with one another, and many are imbued with that heat of controversy which inevitably seems to arise when a finding has some immediate social relevance. Mussen and Conger handle these controversial areas extremely well. The evidence for each relationship they examine is comprehensively reviewed, the possible effects of omissions in experimental controls are considered, and the reader is assisted to form an evaluation of a rather large area of work. All of this can lead to some better understanding of child psychology and of the nature of scientific method as well.

Unlike many other writers in this field, Mussen and Conger have not avoided those difficult areas that lead the student to evaluate evidence concerning the practical problems of bringing up children. Data are presented on such worrisome problems as the consequences of birth injury, premature birth, methods of infant feeding, "good mothering," and the like. It is my impression that many people who are presently, or potentially, anxious about these problems would do well to read the dispassionate but interesting accounts given here of the present state of our knowledge about these matters.

The book discusses development through the first 2 years, the preschool years, "middle childhood," and adolescence. There is a section on adjustment to school and another on adjustment to peers in the middle period. The adolescent section includes material on physical development and on adolescent adjustment in American culture. These sections, like others throughout the book, provide fresh material and a fresh type of thinking about old problems. In part, this is a function of cultural anthropological influence, which has recently had much impact on thinking in child development. Contrasts with the progress of child development in other cultures are instructive in helping the reader to assume some degree of cultural relativity in evaluating the process of growing up in this country.

Excellently documented, the text contains complete chapter references plus a name and a subject index. Names of investigators are sparingly used in the text itself. With a common-sense and lucid approach to the material, a set toward the promotion of "reasoning-about" phenomena rather than a recital of facts, and a suitable regard for the facts themselves, this book should do much toward making a number of people both more knowledgeable about child development and happier in their acquisition of that knowledge.

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The American Arbacia and Other Sea Urchins. Ethel Browne Harvey. Princeton University Press, Princeton, N.J., 1956. 298 pp. Illus. + plates. $6.

As a rule, in the literature of experimental biology the hero is some principle or method or even the experimenter himself. It is refreshing, therefore, to have a book in which the victim of the experiments is the hero. So, here is *Arbacia,* the "material" of countless experiments, treated in its own right.

The first section is a highly entertaining historical sketch of sea urchins through the ages and their natural history. The next is on the egg, the sperm, and development, and the last is on centrifuged eggs—a field which the author has made distinctively her own. The following third of the book consists of tables of work alphabetically arranged under subject headings. The bibliography contains more than 1500 items. These include all important publications on *Arbacia punctulata* and many references to work on other echinoids, although some important ones are omitted. Before the text, not numbered, are 16 pages of plates from photographs showing steps in the development of *Arbacia.* Although the plan is useful, some of the figures are too faint to convey meaning.

On page 198 there is an echo of the classic battle of the giants, in the inference that T. H. Morgan was the first to discover a physicochemical method of parthenogenesis. However, the fact is that Morgan, in his papers cited, describes only cytasters and cell division resulting in heaps of cells which soon perished, never becoming embryos. He emphatically denied the possibility of obtaining embryos by physicochemical activation of the egg. Astounded at Loeb's success in rearing apparently normal morulae, blastulae, gastrulae, and