Book Reviews

A First Course in Analytic Geometry. Two and three dimensions treated simultaneously. H. Glenn Ayre and Rothwell Stephens. Van Nostrand, New York, 1956. 224 pp. Illus. $3.85.

This publication is a college mathematics textbook which presents plane and solid analytic geometry as a fused course. As the title suggests, it is intended for use in beginning courses. The authors offer the conventional topics that are found in most plane and solid analytic geometry textbooks, but the order of presentation and the approach to the topics are frequently quite different. To illustrate these differences, we find among chapter titles the following: "Directed lines," "The circle, sphere, cylinder, and cone," "The ellipse and the ellipsoid," "Other coordinate systems," "Functions and their graphs," "Empirical equations," and "Vectors and their applications in geometry."

The fusion of plane and solid analytic geometry is first accomplished through the sequence of directed lines, direction cosines, and direction numbers. Whenever plausible, proofs for the line and for the plane cases are followed by proofs in space. For example, the treatment of the distance between two points in one dimension is followed by the development of the formula for the distance between two points in two dimensions, and the proof is extended, in turn, to three dimensions. The study of the equation of a line in a plane precedes the consideration of the equation of a line in space. Both proofs follow a sequence in which direction numbers are used. One proof is the logical extension of the other. This pattern is evident throughout the book.

Since direction cosines are extensively used, the student observes an application of the trigonometric functions to coordinate geometry. The formula for the angle between two lines is developed by use of the unit circle and direction numbers. A short table of the trigonometric functions would be a worth-while addition to the appendix. There are enough exercises which require the use of such a table to warrant its inclusion.

This introductory textbook provides frequent groups of exercises and an adequate number of exercises in each group. Each set is accompanied by examples. The illustrative figures are carefully drawn, clearly labeled, and easy to relate to the explanations. Features such as these make this a very satisfactory textbook for classroom use.

The authors present a refreshing approach to analytic geometry for beginning college or superior high-school mathematics students. The terms are carefully defined and the sequence is logically organized. Perhaps the most praiseworthy feature of the book is the sound presentation of coordinate geometry in one, two, and three dimensions, each in reasonable and logical relationship with the other.

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The Great Chain of Life. Joseph Wood Krutch. Houghton Mifflin, Boston, 1957. 227 pp. Illus. $3.75.

Joseph Wood Krutch has written a thoughtful and thought-provoking book, in which he presents the reactions of a humanist to biology and to biologists. In the preface, he states that it is his purpose to examine the meaning of the statement that "man is like an animal." He addresses himself to that task by discussing certain aspects of the biology of a selected array of species. He begins with an extensive consideration of *Volvox,* which he discusses especially in relation to the origin of sexual reproduction and of natural death, in contrast to the potential physical immortality of unicellular animals. Social insects, especially the agricultural ants, are studied as examples of complex and efficient societies operating by automatic, instinctive mechanisms which permit neither understanding nor modification by the individual insect. Metamorphosis receives special attention in relation to the restriction of learning potential. The "barbarian mammal," exemplified by the mountain sheep, is described as being culturally far inferior to the social insects but as possessing some of our own psychological attributes. A salamander is discussed in connection with the very dim beginnings of that awareness which is the basis for the possibility of mental and emotional life.

Having made this survey, Krutch asks: "Have we been trying to understand the meaning of evolution by beginning at the wrong end?" Throughout, he is concerned primarily with evaluation in terms of human culture (but this is not crude anthropomorphism; rather, it is a conscientious and competent attempt to expose the crude mechanomorphism which, Krutch believes, is a common source of error for biologists). Thus he asks: "Why is a bungling mammal higher than an efficient wasp?" He believes that a biologist would feel obliged to treat the mammal as higher on morphological and other purely biological grounds (although I and many others would regard the mammal and the wasp as relatively high members of two lines of descent which are parallel rather than sequential; this would seem to make the question meaningless). Krutch believes that any answer to the question in terms of the usual sort of biological data must be irrelevant even if correct. In short, he maintains that we consider the mammal higher because we see in it some adumbration of our own mental life and of our own emotions and, possibly, even more than our own capacity to feel the joy of life, while in the insect we see none of these qualities. He believes that the emergence of such attributes in the "higher" animals requires a reexamination and, possibly, a revision of our ideas on evolution.

Krutch's data are not always good. His understanding of mitosis is largely erroneous; he puts the heyday of the ancient Amphibia in the Mesozoic rather than in the Paleozoic; nor has he always understood the objectives of biologists. For example, in decrying our lack of reverence for life, he says that "the more trivial the question . . . the more lives it is likely to cost . . . an earnest student shoots hundreds of birds . . . [in] proving that . . . some item in the pattern . . . is a millimeter greater in one geographical area than in another." Without claiming that collecting is never overdone, it may be mentioned that the purpose of such a study is not usually the demonstration of minute differences but the investigation of the mechanics of evolution, which is by no means trivial.

Such shortcomings, however, do no damage to the main argument of the book. It is obvious that Krutch has read much, observed much, and reflected deeply in the field of biology. His book deserves the thoughtful consideration of biologists generally.

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