Book Reviews

British Bridge

Science Survey. vols. 1 and 2. A. W. Haslett and John St. John, Eds. vol. 1, 1960, 360 pp., $5.75; vol. 2, 1961, 372 pp., $7.50. Macmillan, New York. Illus. + plates.

It has been said of Baron von Humboldt that he was the last man who encompassed, within his ken, all of science as it then existed. In the century since his death the frontiers of knowledge have expanded like the gas cloud of a supernova. Today even the well-educated layman no longer comprehends problems that, despite their complexity, affect his life deeply. This has led to the concept of "two cultures" set forth by C. P. Snow.

Among the more valiant attempts to bridge the gap was the publication, last year, of Isaac Asimov's *Intelligent Man's Guide to Science* [reviewed in *Science* **132**, 1830 (1960)]. This two-volume work covered so broad an area that no one man could be fully informed of developments in all of the fields concerned. Hence there were some inaccuracies, but they detracted little from the total impact of that highly readable book.

Now we have another approach to the problem in the series of annuals, inaugurated last year, entitled *Science Survey*, prepared with the cooperation of the British Association for the Advancement of Science. In contrast to Asimov's work, each subject is dealt with by a specialist in the field. The two volumes that have appeared to date were edited by A. W. Haslett and John St. John.

A number of the chapters are based on papers or lectures presented to meetings of the British Association. In some cases they are reminiscent of the lead articles that appear in *Science* or in *Scientific American*. However the definition of "science" is extended to include such technological subjects as synthetic textile fibers and the degrees of annoyance caused in residential areas by jet planes taking off from New York International Airport. At the other extreme are chapters on relativity, stellar evolution, and the fundamental particles.

The subject matter, in some cases, has clearly not been chosen for its scientific importance, but rather for its appeal. In his foreward to the 1960 volume Sir George Thomson, then president of the British Association, notes that one of the association's paramount goals is "popularisation at all levels." Likewise, in the preface to the 1961 volume, Sir Wilfrid Le Gros Clark, who succeeded Sir George as president, cites the scientific education of young people as a special objective.

Because fallout and radiation dangers confront laymen with decisions that are particularly troublesome, three chapters of the first volume are devoted to this subject, calling to mind efforts by the American Association for the Advancement of Science to educate the public in this area.

Among the most interesting chapters are those on subjects that might be described as off-beat. These include one on animal courtships and another on the reasoning used to deduce the migration habits of eels and salmon. Progress in many fields is so rapid that some of the material already is dated. The second volume contains a postscript to the first, attempting to rectify this, but this can be done only to a limited degree. While contemporaneity is an asset, this series is chiefly valuable as an authoritative and at times highly entertaining exposition of the manner in which the scientific method is being applied to problems of our time.

WALTER SULLIVAN

New York Times

SMSG

New Mathematical Library. vol. 1, *Numbers: Rational and Irrational*. Ivan Niven. viii + 136 pp. vol. 2, *What Is Calculus About?* W. W. Sawyer. viii + 118 pp. vol. 3, *An Introduction to Inequalities*. Edwin Beckenbach and Richard Bellman. x + 133 pp. vol. 4, *Geometric Inequalities*. Nicholas D. Kazarinoff. x + 132 pp. vol. 5, *The Contest Problem Book*. Charles T. Salkind. vi + 154 pp. vol. 6, *The Lore of Large Numbers*. Philip J. Davis. x + 165 pp. School Mathematics Study Group, New Haven, Conn.; Random House, New York, 1961. Paper, $1.95. (Clothbound volumes available from Library Publishers, Chicago, Ill. $2.95)

These are the first six titles of a new series, the New Mathematical Library, produced under the direction of the School Mathematics Study Group (SMSG). In the spring of 1958, after consulting with the presidents of the National Council of Teachers of Mathematics and the Mathematical Association of America, the president of the American Mathematical Society appointed a small committee of educators and university mathematicians to organize a study group whose objective would be to improve the teaching of mathematics in the schools. Edward G. Begle was appointed director of the group, which was called the School Mathematics Study Group, with headquarters at Yale University.

It is expected that eventually the New Mathematical Library will consist of more than 30 single-topic books that will be useful as supplementary reading material for high school students, teachers, and the interested lay public. These books are to be written by outstanding mathematicians. The SMSG *Newsletter* (No. 8, May 1961) states the three primary objectives of the monographs: (i) to disseminate good mathematics at the secondary school level which will supplement the usual high school curriculum, (ii) to awaken interest among gifted students, and (iii) to present mathematics as a satisfying, meaningful human activity. These first six books taken as a set certainly achieve these objectives for many students in grades 7 through 12. In general, the monographs are written so that the beginning sections can be understood by most stu-

dents taking high school mathematics. The author of each book has indicated the background needed by the reader to be able to benefit from reading the book.

In general each volume starts in with elementary material that can be understood by many students in grades 7 through 12 and proceeds to develop the topic so that several sections at the end of each book require more mathematical maturity. These books are meant to be read with pencil in hand and time taken out to do some pencil work filling in steps left out in proofs and in solving many of the problems that are an integral part of the books. Teachers will find the volumes very valuable for supplementing their knowledge of the topics discussed.

In the "Note to the reader" at the beginning of each book the reader is told that he will need little technical knowledge to understand most of these books, but he will have to make an intellectual effort. I quote a section from a note to the reader that needs to be emphasized: "If the reader has so far encountered mathematics only in classroom work, he should keep in mind that a book on mathematics cannot be read quickly. Nor must he expect to understand all parts of the book on first reading. He should feel free to skip complicated parts and return to them later; often an argument will be clarified by a subsequent remark. On the other hand, sections containing thoroughly familiar material may be read very quickly. The best way to learn mathematics is to *do* mathematics, and each book includes problems, some of which may require considerable thought. The reader is urged to acquire the habit of reading with paper and pencil in hand; in this way mathematics will become increasingly meaningful to him."

Few of the topics discussed in these volumes are included in the so-called traditional courses in secondary mathematics. On the other hand, the newer mathematics programs used in many of the better schools contain at least the elementary aspects of the topics discussed.

Students who have studied the SMSG texts, the University of Illinois Committee on School Mathematics texts, materials developed at Ball State Teachers College, or comparable "modern" texts will find these books easier to understand than will most traditionally trained students.

Numbers: Rational and Irrational is a very well paced book, in that 7th graders can read and understand much of chapter 1 on natural numbers and integers and chapter 2 on rational numbers. Geometry and algebra are needed for chapters 3 and 4 on real and irrational numbers. Chapters 5, 6, and 7 require the background of a junior or senior. There is plenty here to challenge the gifted, and many sections of chapters 5, 6, and 7 are within the reach of average juniors and seniors.

What Is Calculus About? is sure to delight many students at the end of grade 9 and during the 10th grade. They should be able to do the first six chapters which end with simple maximum and minimum problems. Calculus is approached through the study of speed, velocity, and acceleration. Second-year algebra students have plenty of background for all of the material in this book.

An Introduction to Inequalities is a book that all seniors capable of college work should know quite a lot about. This is material not found in most "traditional" programs, but found in all of the newer mathematics programs.

Chapter 1, "Fundamentals," chapter 2, "Tools," and chapter 3, "Absolute value," which gives the axiomatic aspect of inequalities, should be read from grade 9 through 12. Chapter 4, "The classical inequalities," requires junior and senior sophistication in mathematics. Chapter 5, "Maximization and minimization problems," and chapter 6, "Properties of distance," are interesting and will require the algebraic facility of the better students. This book should challenge the student during all of his high school years.

Geometric Inequalities, a book that I recommend studying after or concurrently with *An Introduction to Inequalities,* is definitely for high school juniors and seniors and probably requires greater sophistication in mathematical knowledge and ability than any of the other five. This is a fascinating book, but not one that should be read in a hurry.

The Contest Problem Book contains the problems from the annual high school contests of the Mathematical Association of America as well as the keys and solutions to all problems. Problems for the last 10 years have been included, and a classified index helps to locate particular types of problems. Arithmetic as well as geometric and algebraic problems are in the book, and some are within the scope of a 9th grader, while others will challenge the best senior. Math clubs may find that many of these problems will start very stimulating discussions in their meetings.

The Lore of Large Numbers is a book that will fascinate all from grade 7 through 12. Elementary algebra is needed very quickly, so only the gifted 7th grader will go very far, and he will skip much of the book. The first sentence at the top of page 29 is confusing because the word "between" is not defined. Sections 15 and 16, are a bit confusing; very careful reading and interpretation of the symbolism and the way it is used there is necessary.

These books should be available in all school libraries. Teachers should read and study them, and they should encourage their students to buy the ones they find most appealing, to work on them during the years of high school, and to see how nearly they can master the books by the end of their senior year.

Trade editions are being published for the regular book trade by Random House and are available at book stores and at many paperback outlets. SMSG is making the books available to secondary school students and teachers at a reduced price of 95¢ each by agreement with Random House.

Teachers may order these books from School Mathematics Study Group, Box 2029, Yale Station, New Haven, Conn.

W. EUGENE FERGUSON
Department of Mathematics, Newton High School, Newtonville, Massachusetts

Cosmochemistry

The Abundance of the Elements. Lawrence H. Aller. Interscience, New York, 1961. xi + 283 pp. Illus. $10.

The theory and practice of deriving elemental abundances from terrestrial materials, meteorites, cosmic rays, interstellar material, normal stars, and nonnormal stars is outlined for each topic in separate chapters. The treatment of the first three topics is more or less descriptive. The treatment of the last three occupies half the book, is more analytical, and is useful to the active investigator in the fields of cosmology and geochemistry, who may be