slowed down the motion of the drop. Illuminating the drop from the opposite side definitely changed the direction of motion. The red and infrared radiation was then filtered out by a 2 cm layer of a solution[2] known to pass about 25 per cent. of the visible light. The motion stopped completely within 40 seconds and started again as soon as the filter was removed. When the total intensity of the beam was reduced to 25 per cent. by halving the diameter of a variable diaphragm, the motion slowed down, but did not stop.

From the above results, we can conclude (*a*) that a magnetic field is not necessary for the production of this particular "rotation," (*b*) that this effect is due to the heat radiation of the illuminating light which causes convection currents in the drop (the center being maintained at a higher temperature than the lateral surface, at which evaporation takes place).

No inferences should be drawn from these conclusions as to any other kind of rotation, either in liquids or gases. Further experimental work on these will be published later.

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WHY THE HALO AND THE CORONA DO NOT APPEAR IN THE SAME CLOUD

As explained in any work on atmospheric optics, the halo, of which the most common of its several forms is the rainbow-tinted circle of 22° radius (the full moon subtends half a degree) around the sun or moon, is caused by snow crystals in the air; and the corona, a rather brightly colored ring (sometimes, two —rarely three—concentric rings) usually of two to four degrees radius, about the sun or moon, by tiny water drops.

Both these phenomena, the large halo and the much smaller corona, are often seen in thin clouds (thick clouds scatter the light too much for the rings to remain conspicuous) but never both in the same cloud.

Clearly, then, an intermingling of water droplets, essential to the corona, and ice crystals, necesssary for a halo, can not persist in the air. And this, in turn, is owing to the fact that at every temperature below the freezing point the tendency of water droplets (undercooled, of course) to evaporate is greater than that of ice crystals at the same temperature. The ice crystals, therefore, in a cloud of crystals and droplets, if such a cloud could and did occur, would grow at the expense of the droplets, which quickly would disappear.

At temperatures above the freezing point, snow crystals obviously can not exist, nor, as above explained, can water droplets and snow crystals persist mingled together at temperatures below the freezing point, and even at the freezing point, when the vapor tension over a flat surface of pure water is the same as that over ice, the droplet, owing to an effect of surface tension, still evaporates over to the crystal. Hence, an intermingling of water droplets and ice crystals can not persist at any temperature. Hence, the halo and the corona never appear simultaneously in the same cloud.

In this connection it is interesting to note that, according to tables in Dorsey's "Properties of the Ordinary Water Substance," the difference between the vapor tension of water and that of ice at the same temperature has its maximum value, an amount sufficient to sustain a 0.2 mm column of mercury or equal to a pressure of five pounds per square yard, at around 10° F., a common temperature of the air at halo levels.

W. J. HUMPHREYS

SCIENTIFIC BOOKS

ALGEBRA AND TRIGONOMETRY

College Algebra and Trigonometry, A basic integrated course. xii + 324 pp. By FREDERIC H. MILLER. John Wiley and Sons. 1945. $3.00.

MANY colleges require a year of college algebra and trigonometry as preparation for subsequent study of analytic geometry and the calculus. Some of these colleges may prefer that this college algebra and this trigonometry be intimately merged in some significant way. If so, they will wish to give careful consideration to Mr. Miller's new book.

The reviewer has little interest in a merger of this sort; and, although convinced that much unhappiness in analytic geometry and the calculus is attributable to a poor grasp of algebra, he sees no reason to insist —as so many colleges do insist—that analytic geometry and the calculus shall be withheld until the student shall have acquired so wide an acquaintance with algebra or so rigorous a training in it as this book demands. Nevertheless, the reviewer does have an interest to see that every program, whether traditional or novel—and Mr. Miller's program is a mixture of both—shall have a fair chance to prove its worth; and no program can have this chance until embodied

[2] Handbuch der Physik, Vol. XIX, "Herstellung und Messung des Lichts." Berlin, Julius Springer, publisher, 1928.

in a good book. The reviewer considers this to be a truly excellent book of the sort that the author intends.

It is clear from the preface, and from the body of the book as well, that the student is expected to have had more than one year of algebra in the secondary school and to have studied in high school at least enough trigonometry to have met the various methods of solving oblique triangles.

The main theme of the book is algebraic. The author succeeds in merging the trigonometry in this algebraic pattern by emphasizing the analytic aspects of the trigonometry. Not until the fourteenth chapter does the student meet logarithmic computation and the logarithmic solution of triangles, and then somewhat as asides following upon the discussion of exponential and logarithmic functions and equations.

The final chapters of the book, the fifteenth and sixteenth, set forth the usual ideas concerning rational integral equations, permutations, combinations and probability. The discussion of Descartes's Rule includes complete exposition of the modification "or less by an even integer."

A listing of the contents of the earlier chapters will suffice to give the pattern the author is following. First, number systems, in order to motivate the adoption of the basic assumptions and definitions of algebra. Then, in Chapter 2, variable, functions, graphs. Chapter 3 begins with the general angle and radians, followed by right triangle and polar coordinates. (Remember, the student is supposed to have studied a bit of trigonometry in high school. If he hasn't, he is not likely to appreciate this book.) Chapter 4 considers algebraic identities, conditional equations; then trigonometric identities and equations. (Trigonometric equations appear again in Chapter 9, under equations in quadratic form, and in Chapter 12, under inverse functions.) Systems of linear equations and determinants—no trigonometry—make up Chapter 5. Chapter 6 treats the trigonometric functions of several angles. The remaining chapters, dealing with mathematical induction, complex numbers, progressions, inequalities and functional variation, tend to bear out the author's claim that this book is indeed an integrated course in algebra and analytic trigonometry.

Only one slight blemish: the reviewer does not agree that permuting the letters in the Law of Cosines, proved for the side opposite an acute angle, serves also to establish this law for the side opposite an obtuse angle. Nevertheless, he is glad to cite this text as a practically perfect example of book-making. The exposition throughout, the exercises and the practical aspects of the book all appear to be very fine indeed.

RALPH BEATLEY

ABNORMAL PSYCHOLOGY

Textbook of Abnormal Psychology. By R. M. DORCUS and G. W. SHAFFER. Third edition. Baltimore: The Williams and Wilkins Company. 1945. $4.00.

THIS revision of a text-book which is widely used in colleges and universities brings it up to date in respect to the materials presented, while preserving the virtues of the earlier editions. The authors do not present their topics from a single, selected point of view; but give the diverse views of various authors on points which are theoretical or controversial. While the fact that the reviewer disagrees with the authors on some points is immaterial, four items may be given critical attention in this brief review.

Although the text as a whole makes it evident that most theories in the field of abnormal psychology and psychiatry are devoid of experimental foundations, the popular theory adopted by the authors to the effect that in an epileptic seizure the patient is unconscious (p. 290) needs critical examination. In some cases it can be demonstrated experimentally that in the critical phase of a convulsive seizure, the epileptic is conscious, perceptually conscious at least, although his perceptual field may be restricted in scope; but after the seizure is over, he may have retrograde amnesia for the seizure-period.

The theory adopted in the text—that a psychoneurosis affects only a part of the "personality," while a psychosis affects the whole "personality" (p. 354)—is, of course, a rationalization, that is, it is an attempt to interpret rationally something which is basically irrational. One who adopts this rationalization would have to admit that every psychosis commences as a neurosis; which destroys the distinction claimed. He would have to ignore the existence of neurotics who are as completely disorganized as are many who are classed as psychotics. He would have to ignore also the fact that psychiatrists differ as to whether certain cases are neuroses or functional psychoses. The distinction actually seems, like Topsy, to have "just growed up."

The theory that the primary cause of involutional melancholia is dysfunction of the sex-glands is adopted by the authors by implication, if not explicitly (p. 351); a theory which ignores the high probability that the decrease in secretion of the sex-hormone may be only a predisposing cause in some cases and a precipitating cause in others, the primary cause being psychological in all cases. In every case the reviewer has examined, the psychological cause or causes of the mental feature of the disorder have been readily discernible. The probability is indicated by the occurrence of the mental disorder in some cases several years before the menopause, and by the absence of mental disorder at the menopause in the majority of women.