bers were elected. The association was well represented at the dinner of the naturalists and affiliated societies on the evening of the twenty-eighth, and the next night, following the president's address, an enjoyable smoker was held in conjunction with the Psychological Association.

H. N. GARDINER.

SCIENTIFIC BOOKS.

An Introduction to the Modern Theory of Equations. FLORIAN CAJORI. New York, The Macmillan Company. 1904. Pp. ix + 239. $1.75 net.

The present work falls into two nearly equal parts. The first 103 pages treat the following topics: Elementary properties and transformations of equations; location and approximation of the roots of numerical equations; solution of cubic, biquadratic, binomial and reciprocal equations; the linear and Tschirnhausian transformations. The remaining 120 pages are devoted to substitution groups and Galois's theory of the solution of algebraic equations.

The work has much that may be praised; in particular, its very moderate size, its choice of topics, copious references for further study, and a large number of illustrative examples and problems.

We mention now a few points which we believe might be improved in a later edition.

The definition of algebraic and transcendental functions in § 1 is not quite satisfactory. The author really defines *explicit* algebraic functions, and the reader might easily infer that all other functions were transcendental.

Would it not be well to give a mathematical definition of continuity of a function in § 25? The reader would then have a clearer idea of the import of the theorem of this section.

In § 26 the author assumes that a continuous function which has opposite signs in an interval must vanish in this interval. This requires demonstration unless an appeal to our intuition is allowed. If so, the demonstration the author gives, that every equation has at least one root, might well be replaced by a simpler one which rests on the property that a continuous function attains its extremes.

In § 65 the author makes use of continued fractions to prove the relation $mb - na = \pm 1$ where m, n are relative prime. It seems preferable, because more elementary, to prove this by means of the algorithm of the greatest common divisor.

In § 70 the assumption is made that numerator and denominator of a symmetric rational function are also symmetric. The definition of *incommensurable* in § 53 might be improved; we would also suggest the representation of complex numbers by points and not by vectors, as in § 22.

Let us turn now to the second half of the book which deals with Galois's theory. As the author tells us, he follows the exposition given by Weber. We must, however, in justice to Weber, note that the latter's treatment is not only more general, but is also free from a lack of precision of statement which mars the work under review and which is at times quite provoking.

The author restricts himself to equations whose coefficients are either constants or independent variables; why, we are unable to see. Certainly not because a greater simplicity is gained.

But this restriction once made, the reader should have clearly in view whether the coefficients of the equation dealt with in a given case are constant or variable. For results true when they are variable may be false when these coefficients are supposed constant. We regret to say the author is extremely careless in this important particular. Thus in chapter XI. we are informed in a footnote that the coefficients in this chapter are variables. In chapter XIII. we are left entirely in doubt; yet the theorems of Exs. 1, 2, § 119, which are used in a later chapter, may be incorrect if the coefficients are not independent variables.

This lack of explicitness is manifest in other parts of the book, *e. g.*, in the chapter on cyclic equations. The casual reader might well believe that the results established here are true for all cyclic equations. This, however, is not the intention of the author, for in one of the examples he informs the more careful reader that a large class of equations are excluded from consideration. This is, indeed, necessary, as otherwise the reasoning of § 172 may become illusory by the vanishing of $[\omega, a]$, as simple examples will show. But even with this restriction it must be shown or assumed that this expression does not vanish.

Another point which we believe has not been sufficiently emphasized relates to the equality or inequality of rational functions of the roots. How often in Galois's theory do we have to decide whether a rational function of the roots has or has not been *changed* or *altered* by a set of substitutions. The only explanation of this fundamental and delicate matter we have found is in a footnote on page 124.

Would it not be well to restrict the term *general equation* to one whose group is the symmetric group? The author follows well-established usage in calling a general equation one whose coefficients are independent variables. Because algebraicists thought a century ago that these equations represented the general case is no reason to perpetuate a term which is sure to produce confusion in the mind of the beginner. Apropos of these equations we must express our regret that the author has allowed the demonstration given in § 158 to pass muster; it is a demonstration which does not demonstrate.

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La contagion mentale. Dr. A. Vigouroux et Dr. P. Juquelier. Paris, 1905. Pp. 250.

This is one of the volumes in the French *Bibliothèque internationale de psychologie expérimentale, normal et pathologique.* Mental contagion is the name here given to what is generally known as imitation in the narrow sense, *i. e.,* unconscious imitation. The process is unconscious on the part of both the imitator and the person imitated. Thus contagion excludes voluntary imitation and personal suggestion. The first half of the book deals with normal contagion and the second half with abnormal.

Assuming that the reflex arc is the fundamental type of neural action, and that the impulse may enter a given sensori-motor circuit from any sense and at any point in the circuit, we may trace a physiological explanation for all the contagious acts, *e. g.,* yawning, laughing, crying, coughing, dancing, marching, etc. Then, on the theory that every emotion tends to express itself in muscular adjustment, that this adjustment may be transmitted by contagion, and that a given emotional expression creates the emotion, the same explanation accounts for the contagion of emotional states *e. g.,* fear in a panic, anger in a revolution, the soldier's adoration of Napoleon, the schools of art and the havocs of intellectual bias. The same principle may also be extended to ideas because all ideas are more or less fused with feeling, *e. g.,* belief, scientific theory, dogma. The idea is contagious in proportion to the feeling present. Good analytic and genetic accounts run parallel to this mode of explanation, and special emphasis is laid on the social conditions and significance of mental contagion. The second part of the book consists largely of citation and classification of cases. The less normal the individual or the group, the more liable to contagion. Like the microbe, the mental contagion may be either beneficent or noxious.

A practical lesson from this book is preeminent: mental contagion is preventable. If insanity and crime are contagious, that principle should be recognized in our penal and corrective institutions; and society may take steps to prevent epidemics of fanaticism and crime. To-day science is interested in the physical microbes of disease; in the near future there will be a similar interest in the facts of mental contagion.

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SCIENTIFIC JOURNALS AND ARTICLES.

The American Journal of Science for January contains the following articles: 'Submarine Great Canyon of the Hudson River,' by J. W. Spencer; 'Radioactivity of Underground Air,' by H. M. Dadourian; 'Types of Limb-Structure in the Triassic Ichthyosauria,'