number of students pursuing original research; but the university is poor and, but for his timely aid, might have waited long for this addition to its teaching facilities. The present phase of scientific investigation is marked by a need for costly apparatus which earlier experimenters do not seem to have felt so acutely and which certainly could not have been supplied. Lord Rayleigh, we may judge from a reference to his earlier studies, does not approve the tendency to disparage simpler methods of research, and it is conceivable that some day a great man will again arrive at an epoch-making discovery by means surprisingly simple. Originality is perhaps not always fostered by a wealth of apparatus, still there is an immense amount of work at the present day which can be carried on nowhere but in well-equipped laboratories like the Cavendish. When the present extension has again been overtaken by the influx of students, Cambridge will no doubt again find among her sons some one to emulate the liberal and public-spirited action of her present distinguished chancellor.—The London *Times*.

SCIENTIFIC BOOKS

Social Psychology: An Outline and Source Book. By Edward Alsworth Ross. New York, The Macmillan Company. 1908. Pp. xviii + 372.

It must have required considerable courage on the part of Dr. Ross to venture a new book on social psychology. For although he says in the preface that "the ground is new," still, as he well knows, and as his materials show, the subject itself is very old and has been worn threadbare. The only thing that could be done, and the thing that he has virtually done, was to undertake a new compilation of the matter already extant. For, without making a count, it seems safe to say that fully one half of the matter of the book is between quotation marks, and its character as a compilation would have been apparent if all the citations had been printed in different type. But this is very far from being a criticism of the book. Indeed, under the circumstances it is its highest commendation.

And yet he has by no means utilized all the literature. Professor Sumner's "Folkways" reached him too late for use, but it would have been an inexhaustible source of facts for such a work. One of the most important omitted works is Michailovsky's elaborate treatise on "The Heroes and the Crowd," which first appeared in *Russian Wealth* in 1882 and was republished in a collection of essays in 1896.[1] In this essay imitation and suggestion are ably handled, and many of Tarde's best thoughts are anticipated. The religious epidemics of the middle ages are described in detail, and contagious manias of suicide and homicide are fully treated. The subject of the influence of the mind on the body, now brought into such prominence by christian science, received special attention, not merely in recording the alleged instances of "stigmata," but in enumerating many other illustrations. In no other work, so far as I know, is the case of Jacob's "ring-streaked, speckled and spotted" sheep and goats referred to this principle, not only as illustrating its effect on animals, but as showing that it was understood by Jacob and effectively acted upon.

Another of the older, much neglected works is Carpenter's "Mental Physiology," 1875, which deals in a scientific way with many of the psychic phenomena now referred to social psychology. Carpenter laid great stress on the principle which he called "expectancy," which is really none other than that now perhaps less happily called "suggestion."

But of course Tarde's works stand out as the leading contributions to social psychology, and it is refreshing to see them prominently recognized by Dr. Ross in the preface to this book. It has become so much the custom of American writers, while reiterating the truths they contain, to ignore their source, that this manly acknowledgment will be appreciated by all admirers of the great French sociologist.

Dr. Ross well says that social psychology is not the same as psycho-sociology. It is not

[1] "Heroi i Tolpa," Russkoe Bogatstvo, 1882; Sochineniya, Vol. II., St. Petersburg, 1896, pp. 95–190.

the psychology upon which sociology rests, and which furnishes society with both its motor power and its guidance. That is an entirely different and far more important science. Social psychology is the science of the mutual influence of psychic phenomena. Mr. H. G. Wells has properly described it as "an exhaustive study of the reaction of people upon each other and of all possible relationships."[2]

Social psychology, thus understood, has been treated by all kinds of writers. Very little of value has been contributed by the psychologists proper. When they approach it they load it with such a mass of technical terms, borrowed from their psychological "jargon"—dialectic, ego, alter, socius, eject, project, subject, etc., with the innumerable derivatives of these terms, that, however commonplace such ideas may be, the reader's mental stomach is so turned by their pedantic iteration that it is incapable of following what little thought they may represent.

But many writers besides Tarde have treated special aspects of the subject with clearness and force. Among these Dr. Ross himself must be counted and placed in the front rank, for his "Social Control" and other writings deal primarily with social psychology. In the present work he lays under contribution a great array of authors and a vast literature. No attempt can be made here to summarize this body of knowledge. The arrangement of the material is the original part of the work, and this could not probably be improved upon.

In some of the later chapters Dr. Ross has been able to free himself more fully from his historical bearings, and to strike out into fields more distinctly his own. This is especially the case with Chapter XV., on the Relation of Custom Imitation to Conventionality Imitation, and Chapter XVI., on Rational Imitation, which is the coming form of imitation based on intelligence and scientific knowledge. Chapter XVIII., on the rôle of Discussion, is also luminous, and pushes the subject some distance beyond the point where Bagehot left it. Chapter XXI., on Compromise, is all too brief, and John Morley is not mentioned.

The final chapter (XXIII.), on Disequilibration, deals with invention (in the Tardean sense), and displays an astonishing grasp of the progress of human thought. No one has better shown how it is that premature discoveries lie dormant till the world is ready for them. Under the heading that "the higher the degree of possibility, the sooner the invention is likely to be made," he says (pp. 359–360):

> The inventions (or discoveries) in a particular field—and often those in different fields—are in a chain of dependence which obliges them to occur in a series. Each ushers in a train of possibles. Now when no intervening invention needs to be made, an invention may be said to be in the *first* degree of possibility. When it is contingent on another yet to be made, it is in the *second* degree of possibility. And so on. Now, when an invention or discovery reaches the first degree of possibility, it is *ripe*. Thus, after Kepler announces the laws of planetary movement, the discovery of the principle of universal gravitation is in order at any moment. After Galileo has proclaimed the laws of the pendulum, its use in time-keeping needs but a single stride. The electric telegraph is due any time after Ampère's discoveries. The invention of Crookes's tubes brings the X-ray into the foreground of possibility. After the discovery of the Hertzian waves, a few short steps bring wireless telegraphy upon the scene.

And in showing "how society can promote invention," he significantly adds (p. 360):

> The difficulty of making the combination of ideas for any particular invention will depend upon the number of persons who possess these ideas, and on the frequency in this number of individuals with the intellectual capacity necessary to combine the ideas into the invention. There is no way of affecting the latter condition, for the genius is in no wise a social product; but organized society can affect the former condition. A universal system of gratuitous instruction with special aid and opportunities for those who show unusual power amounts to an *actualizing* of all the potential genius in a population, and is the only rational policy for insuring a continuous and copious flow of inventions. It is hardly necessary to point out that only a stimulating, equipping education can mature geniuses. A régime that prunes, clips and trains minds levels genius

[2] "A Modern Utopia," New York, 1907, p. 83.

with mediocrity. A schooling devised primarily to produce good character, or patriotism, or dynastic loyalty, or class sentiment, or religious orthodoxy may lessen friction in society, but it can not bring genius to bloom. For this the prime essentials are *the communicating of known truths* and *the imparting of method.*

On the whole we have in this work an able marshaling of the knowledge thus far brought to light on the subject of social psychology, and a clear, untechnical, while at the same time often eloquent, discussion of the laws, principles and leading truths of that rather subtle and recondite branch of sociology.

Lester F. Ward

The Solar System: A Study of Recent Observations. By Charles Lane Poor, Professor of Astronomy in Columbia University. New York, G. P. Putnam's Sons.

From the above sub-title we naturally look for something different from the ordinary text-book on astronomy. Nor shall we be disappointed in this respect. The author informs us that the work grew out of a series of lectures, that these were mainly historical and were used to supplement standard text-books and to guide the students in their reading. Though the work includes much which may be found in the ordinary text-book, there is also much not usually to be obtained from such sources. On the other hand, some matters of great interest are hardly touched on in the present work. We mention by way of illustration the minor planets and the subject of eclipses.

The lecture notes seemed to have been followed quite closely. We are informed, for instance, page 235, that the last opposition of Jupiter took place in the latter part of December, 1906, and that the next will fall on the last of January and the first of February, 1908. We also learn that the last favorable eclipse of the sun occurred August 30, 1905, and the next eclipse which can be utilized, will take place October 10, 1912, and will be observable in South America. Precisely what disposition has been made of the eclipse of January 3, 1908, does not appear.

The subject of the solar energy is treated quite fully, with the different theories as to its maintenance, its constancy and results of measurement of the same. We confess, however, to finding ourselves a little disconcerted on learning, page 126, that such measurements are of no vital importance.

Naturally the reader in search of the latest and most interesting information relating to the solar system will turn to the planet Mars. The author acknowledges to having given to this planet more space than the subject really warrants. We find an entire chapter of twenty-four pages entitled "Has Mars Canals?" The leading authorities—Schiaparelli, Lowell, Newcomb, Barnard and many more are quoted at considerable length, with the result that we are finally told that "very little is actually known in regard to the conditions existing on Mars," that many of the problems are psychological and not physical. The seeker after truth, therefore, finds himself at the end of the chapter precisely where he stood at the beginning.

The author gives us an account of the discovery of the seven satellites of Jupiter, beginning with Galileo and ending with Perrine, but the ink is hardly dry on the page before the discovery of an eighth at Greenwich calls for a revision of the chapter, thus illustrating the impossibility of keeping such a work strictly up to date. In this connection let it be noted that the name of satellite IV. is Callisto, not Calypso.

Each planet from Mercury to Neptune is taken up in turn. Many facts of historical interest are given, among which are some old friends not usually found in the text-books, such as the famous Moon Hoax of 1835.

Chapters on comets, on meteors and on the evolution of the system close a very interesting and suggestive volume.

C. L. Doolittle

Flower Observatory

SCIENTIFIC JOURNALS AND ARTICLES

The Journal of Experimental Zoology, Vol. V., No. 3 (March, 1908), contains the following papers: "The Physiology of the Nervous System of the Razor-shell Clam (*Ensis directus* Con.)," by Gilman A. Drew. The