The most interesting portion of the volume, is the one relating to the influence of race and nationality as determining the suicidal rate. We have always believed that a most important contribution to the elucidation of the problem of suicide could be made from this side of the question. And it is to be regretted that the talented writer before us has not added to the numerous tables, which render his volume, a mine of valuable information, one showing in four columns, the name of the nation, the proportion in same per million, the proportion of each form of insanity, and the suicidal rate. We believe that a noticable parallelism would be observed in these columns. The Germanic race preponderates over all others, and the German and Scandinavian branches divide the supremacy. The Anglo-Saxon stock has, however, gained by its long separation from the German mother, and its admixture with other races, for its suicidal tendency is much smaller. The Celto-Romans, on the whole, show a small suicidal rate, this increases, however, with the geographical approach to the Germanic borders, and the fact is of startling interest, that as keen an analyst as Morselli, attributes the higher suicidal rate in France and Belgium to the remote, continuous and the in modern times as persistent invasion of German elements sweeping up the valleys of the Scheldt, Seine, Somme, Meuse and even that of the Loire! The lowest suicidal rate is found among the sclavonic peoples. Morselli in this part of the work fails to refer to the fact that the Bohemians, isolated from the sclavonic parent stocks by an ocean of German States, have lost the relative immunity of suicide, just as the Anglo-Saxons have gained in this respect by separation from the "suicidal" race. The general conclusion, however. would seem to be flattering to the nations having most suicides. Savage peoples commit suicide only under the stress of hunger, but as civilization progresses a thousand new motives arise, with the mental needs. The reflection is not made directly by the author, but it can be read between the lines, that a similar reason accounts for the lesser proportion of suicides among Catholics as compared with Protestants. Judaism has a very favorable influence; but this is an exceptional instance, it being the only religion tied up in a single race. A very interesting fact, is that other conditions duly considered, the votaries of that creed which is in a great minority in a given country, show a lesser number of suicides; the reason given by Legoyt is that the intolerance of the surrounding population exercises a sort of moral coercion, making the dissenters desirous to avoid giving any excuse for harsh criticisms.

As to social influences, it is concluded from the general parallelism of suicide and criminality that a deterioration of morals is favorable to suicide. To this there are however some marked exceptions, especially in southern Italy, where grave crimes are common and suicide is rare, and a revision of the question induces Morselli to modify the conclusion ordinarily held by saying that in those countries "where crimes against property predominate, suicides are more frequent than where crimes of blood are frequent." Remarkably enough it is found, with regard to the influence of economical conditions, that it is not the exact period of economical crisis, but a subsequent one that shows an increase of suicide. The influence of the Austrian crisis of 1858-1859 was shown by an increase of suicides in 1860-1861. The Franco-Prussian war of 1870-71 led to more suicides in 1872-1873.

Without any question the most interesting part of the volume consists in its appended "suicidal" maps. These are maps of Europe and of the individual European countries, exhibiting by the intensity of shading, the proportion of suicides in the population. On glancing over the map of Europe it is seen in a moment, that the highest proportion is found in Saxony; in the neighborhood of Paris and of Vienna. It is not alone race but also the density of the population which exert an important influence here, and as the contest for existence naturally culminates in the destruction of the weak, the only advice the author is able to give as a preventive against suicide, is "to develop in man the power of well-ordering sentiments and ideas by which to reach a certain aim in life; in short, to give force and energy to the moral character."

While we venture to regard this advice as a fruitless one, believing that in view of the author's earlier conclusions expressed in the same volume, all the good advice and training that might be given would not materially change the suicidal ratio. We can only commend the perusal of the work to the reader as alone calculated to furnish an adequate conception of the vast array of useful facts gathered by its author, illustrative of many profitable lessons in sociology and ethnology. That in a treatise dealing with the statistics of so many lands and with authorities who have written in so many tongues, an occasional error should creep in, is not to be marveled at, and it is only where such errors are made the basis of conclusions that the reviewer considers it his duty to call attention to them.

It is stated, in speaking of the influence of religion on suicides, that in Saxony half the population are Catholics. The fact is that Saxony is one of the most intensely Protestant countries in the world, the stronghold of the Reformation, and a land in which the slight vestige of Catholicism (not consisting of one-twentieth of the population among its votaries), is only maintained by the court which is Catholic since the time of the libertine, Augustus the Strong. ED. C. SPITZKA.

THE SUN: by PROFESSOR C. A. YOUNG, with numerous illustrations. International Scientific Series. D. Appleton & Co., New York, 1881, pp. 321, 12mo.

It is an extremely fortunate thing when we have a book on a special subject, written by a man who has himself made capital discoveries in this subject and who, at the same time, has a culture wide enough to appreciate the philosophical relations of his special subject to science in general.

If at the same time the whole exposition is written in a graceful style, perfectly plain and easy to follow, and dignified as well, we have special reason to be grateful. Professor Young is the descendant of a line of professors, and lucid exposition is natural to him, as we find from this work. It is not necessary to say that in the other degrees mentioned Professor Young is precisely the one person to whom we should first look as authority.

There are certain things which an author can best say for himself. In Professor Young's preface we find this: "I have tried to keep distinct the line between the certain and the conjectural, and to indicate as far as possible the degree of confidence to be placed in data and conclusions."

Throughout the work we have found this carried out consistently, not as a task, but as a natural outcome of the author's method of thought.

The work opens with an introduction which treats of the sun's relation to life and activity upon the earth. In this section (page 18) the accepted beliefs with regard to the sun's constitution are laid down. This is a point of departure.

Chapter I. deals with the distance, dimensions and mass of the sun. The low density of the sun is quoted as showing the strong probability that the sun is mainly a mass of vapor or gas, powerfully condensed in the central portions by the superincumbent weight, but prevented from liquefaction by an exceedingly high temperature.

Chapter II. deals with the methods of studying the solar surface.

Chapter III. relates to the Spectroscope and to the solar spectrum in general.

On page 87 we have a table of the twenty-two elements

which are present in the solar atmosphere. Oxygen is included. Nitrogen is not. The point is here made that the elements *not* present in the atmosphere of the sun are precisely those which are most common on the earth, and Mr. Lockyer's *dissociation* explanation is given and a very full and fair statement of the reasons for and against it.

We would have been glad to see in this place an examination of a paper by Dr. Hastings in the first number of the *American Journal of Chemistry*, in which the writer attempts to show that Lockyer's hypothesis is entirely untenable, and in conflict with received kinetic theories of gases.

The fourth chapter deals with the sun spots and the solar surface. In this chapter is quoted a very remarkable account of the phenomena attending the growth and decay of a sun spot, written by that veteran observer of the sun, Dr. Peters, of Hamilton College. A foot note to page 137 suggests a most interesting research in relation to the acceleration or *drift* of the spots in longitude, and it is in such suggestions as this as well as in its general views that the book will owe its great value to the astronomical student.

Chapter V. deals with the periodicity of sun spots and with the theories as to their cause and nature. "On the whole," Prof. Young says, "it seems probable that the cause of the periodicity is in the sun itself" and is not due to external causes. The relations of sun spots and climate are discussed completely, yet briefly. Professor Young is one of the few English speaking astronomers who can keep his temper upon this subject.

In giving the various theories as to the cause and nature of sun spots, the author deserves our thanks for a few very simple diagrams, for the want of which many of us have gone astray in reading the sun spot war records in the *Comptes Rendus*.

The next chapter deals with the chromosphere and the prominences, their appearances and the theories of their formation and causes.

In dealing with the lines of the chromosphere spectrum we have two lists: First, those always present, and, second, those readily seen by suitable manipulation ("on slight provocation"). The catalogue of 273 lines seen by Prof. Young at Sherman in 1872 is not given here. The discussion of the causes of the great velocities observed in prominences on pages 211, 212 is especially interesting and suggestive.

Chapter VII. is upon the Corona—its phenomena and the theories of its cause. The figure on page 225, with its explanation on page 215, appear to the writer to give too much weight to observations of a streamer in the direction of the sun's poles at the solar eclipse in 1878. It is not impossible that such a streamer existed, but it seems at any rate very improbable in the light of the photographs given in the Eclipse Volume of the Naval Observatory.

Chapter VIII. on the sun's light and heat is a rapid survey of the important work which has been done on these subjects. The light is first considered, and an expression for the sun's light in candle power deduced.

Prof. Langley's interesting comparison of the light of a Bessemer Converter to the sun's light is quoted as showing the brightness of the sun to be over 5,000 times that of the glowing metal. The positive carbon of the electric arc is from two to four times fainter than the sun.

The light from various portions of the sun's disc is next considered, and the absorption of the light near the limb brings us to the question of a solar atmosphere.

This solar atmosphere has usually been considered as gaseous, but the author quotes Hastings' lately proposed theory that this absorption is produced by matter in a pulverulent condition at a lower temperature than the photospheric clouds and dispersed through the lower portions of the sun's true atmosphere.

"If the sun's atmosphere were removed, its brightness would be increased several times. It is almost certain that the amount of light received by the earth would be doubled; it is hardly likely that it would be quintupled."

The data as to the sun's heat are more precise; and the results of experiments (fully described) are put in a striking way. The sun would meet in a single swing of the pendulum a solid column of ice 2¼ miles in diameter and 93,000,000 miles long, provided his whole power would be concentrated upon it. What is the source of this enormous energy which amounts to something like one horse power *continuously* acting to each thirty square feet of the earth's surface? Simple combustion of any matter which we know would not suffice to keep up the the sun's heat for any length of time. The *effective temperature* of the sun is next considered, *i. e.*, the temperature which a uniform surface of lamp black of the same size as the sun would have to keep, in order to radiate the same quantity of heat as the sun itself. The results of Rossetti (18,000° Fahr), are quoted with approval. The two most important theories as to the way in which the solar heat is maintained—the meteoric theory—and the contraction theory are next examined. Both causes are undoubtedly operative. Probably the contraction of the sun is the most effective agent. If this theory be accepted then the sun has a limited future as well as a finite past, so far as we can now see.

Chapter IX. opens with a valuable table of numerical data relating to the sun—a table of statistics for the solar globe.

The constitution of the solar nucleus and atmosphere with an examination of various theories of this constitution constitutes the main portion of this chapter, which closes with the statement of some of the more important and immediate problems of solar physics.

The usually received theory of the constitution of the photosphere is given (p. 290) and the first authoritative criticism of the recently proposed theory of Dr. Hastings is given on pp. 291-294. It seems to the writer, however, that Prof. Young, in urging as an obvious objection to this theory, that whatever is precipitated at a lower temperature than is the photosphere element must increase the depth of the photosphere, has overlooked an essential point of the argument. The photosphere substance is supposed to have a much higher vaporization temperature than those of other elements, *e. g.* iron, therefore any precipitated iron belongs, not to the photosphere, but to the over-lying "smoke" envelope.

This chapter closes the work proper of which we have been able to give but the barest outline. Its chief characteristics seem to the writer to be: perfectly clear statements of the facts of observation and what is far more valuable, of the theories to be considered. These are made definite by every way possible—by lucid statements and by diagrammatic figures; candid discussion of these facts and theories in the light of the best information now attainable; and lastly the drawing of the most certain conclusions which are possible from the data, taking care in each case to give a proper idea of the degree of certainty which our present knowledge allows.

These are high excellences and make the book a most important one. In pointing them out the writer has done no more than any reader can do for himself.

EDWARD S. HOLDEN.

M. COCHERY intends to spend the surplus of the Electrical Exhibition, which is said to exceed 16,000*l.*, in establishing a research laboratory for electricity.

PROFESSOR HAECKEL is at present in Ceylon, where he is to stay for three months making a scientific exploration of the island.