lems are still undergoing solution nothing can serve better than this outline of Prof. Hueppe.

Beginning with a brief yet complete treatment of the morphology of bacteria and their relations to other groups of plants, the author passes to a consideration of their relations to their environment. Valuable sections are given upon the effects of light, temperature, oxygen, poisons, etc. He treats of the effect which bacteria have upon the medium in which they are growing, of the products to which they give rise, as well those produced by the decomposition of the culture medium as those produced by synthesis and as secretions. He deals of the subject of the food necessary for the life of the various organisms, and in this section, in short, gives a general survey of the relations of bacteria to the environment, thus indicating how and why they may play an important part in nature's processes.

A summary of the relations of bacteria to diseases follows. The different types of germ diseases are distinguished and their relations to micro-organisms. The discussion is more than a simple collection of facts. It brings into prominence the distinction between strictly pathogenic bacteria and those which are pathogenic only under special conditions, between those which are always injurious and thus strictly parasites, and those which are normal harmless occupants of the human body, but which occasionally produce trouble. It emphasizes the personal factor in the matter of infection or in preventing the invading organisms from developing. The discussion can hardly fail to clear our notions, since it gives a sharp and happy summary of our present knowledge of the relation of various diseases to parasites and of the individual to the infecting bacteria.

The most novel and original part of the book is the somewhat extended discussion of the causes of disease and the methods which bacteriology is promising as a means of meeting the various diseases. This subject is too comprehensive and too condensed for summary. The author finds the potent cause of disease rather in the organism itself, looking upon the pathogenic organism simply as a stimulus. He succeeds well in disentangling the miscellaneous confusing facts which have accumulated in the last few years upon the matter of toxines, antitoxines, protective and curative serums, immunity, etc., reducing the subject to something like logical completeness. In this section we see much more than simple compilation of facts and can recognize the author's personality in the method of treatment. Even Prof. Hueppe, however, is not able to reduce this matter to anything like clear logic, since our present knowledge is so largely filled with lacunæ. At best, the matter of immunity and toxines must be left with many questions. It is impossible to read this discussion of toxines and antitoxines, nucleins, phagocytosis, active and passive immunity, etc., without having a better notion of the proper bearing of the different phases of the subject.

This work of Prof. Hueppe is useful to two classes of readers. Those who are not bacteriologists, but who desire to learn the general facts which the last quarter of a century has discovered, will find here a brief but intelligible summary. Those who are already familiar with the general facts will, perhaps, find the book of even more value in giving a clear and simplified conception of the various confusing facts which have so rapidly accumulated in recent years.

H. W. Conn.

SCIENTIFIC JOURNALS.

THE ASTROPHYSICAL JOURNAL, APRIL.

The opening article, by Prof. J. Wilsing, contains a short discussion of previous papers on the law of the sun's rotation. The differential currents on the sun's surface are shown to be results of earlier conditions of motion, and can be destroyed by internal friction only. The least time in which changes of the surface currents would become perceptible is calculated to be millions of years.

In a report on solar observations for the second half of 1895, by Prof. Tacchini, there is shown a continued decrease in the number of spots, with a secondary minimum in November. There was a disproportionate decrease in prominences with a minimum in October.

In discussing the spectrum of Mars, Prof. Lewis E. Jewell contends that spectroscopic proof of the presence or absence of water in the

atmosphere of Mars must be regarded as unattainable. With reference to oxygen, its presence might possibly be detected if present to the amount of a quarter that in the earth's atmosphere.

In an article on A New Form of Refractometer, Mr. C. Pulfrich describes one with a scope of application including almost all quantitative investigations on refraction and dispersions at varying temperatures. Its essential features consist of a 90° prism, one face of which, turned upward and made horizontal, is brought in contact with the object to be investigated, while through the vertical face is observed the boundary line limiting the light which, after passing through the object, enters the prism under grazing incidence.

The latest article in the series on the 'Modern Spectroscope' is by Professor Newall. It is a description of the new Bruce spectroscope constituted for the Cambridge observatory. The instrument is unique in being designed solely for photographing spectra of the fainter stars and in having no provision made for visual micrometric measurements. A single white-flint prism is used, giving a spectrum of 20mm. in length between Hβ and K, or, with a telephotocombination, a spectrum of about 44mm.

Other articles are, 'Light Curves of Variable Stars Determined Photometically,' by Edward C. Pickering; 'The Arc Spectra of Rhodium Ruthenium and Palladium,' by Henry A. Rowland and Robert R. Tatnall.

Among the minor contributions is found a concise summary of the properties of the X-rays and a comparison of them with those of light and cathode rays; and a recommendation that, in place of mercury as a reflecting surface for sextant and other work, a dark cylinder oil be used, such as may be procured of any locomotive engineer. It is freer from vibration, cheaper, lighter to carry, and easier to obtain in out-of-the-way places.

THE AMERICAN GEOLOGIST, MAY.

The Genus Temnocyon and a New Species thereof and the New Genus Hypotemnodon, from the John Day Miocene of Oregon: By JOHN EYERMAN. The new species described is *Temnocyon ferox*, of which a very complete and detailed description is given. The new genus *Hypotemnodon* is proposed for the reception of Cope's *Temnocyon coryphæus*.

Early Pleistocene Deposits of Northern Illinois: By O. H. HERSHEY. The author discusses the glacial geology of a part of northern Illinois, especially the Pecatonica valley, in which was formed a glacial lake named Lake Pecatonica.

On a Supposed Discovery of the Antennæ of Tribolites by Linnæus in 1759: By C. E. BEECHER. In the Geological Magazine for March, Törnquist calls attention to a discovery, by Linnæus, of the antennæ of *Parabolina spinulosa*, which has apparently been overlooked by later workers. Dr. Beecher not only shows that this discovery has not only been overlooked, but also that what Linnæus considered as antennæ are not antennæ at all.

The Deposition of Gold in South Africa: By S. CZYSZKOWSKI. (Translated by H. V. WINCHELL.) The theories advanced by de Launay, Jules Garnier and others to explain the origin of the auriferous beds of South Africa are not in all respects acceptable. Instead of the contemporaneous deposition of gold and mechanical sediments of conglomeratic nature it is held by M. Czyszkowski that the gold was introduced by mineral waters circulating through the porous strata subsequent to their consolidation, and as an accompaniment of a period of general earth movements and eruptive phenomena. The auriferous strata are believed to occupy synclinal basins in which the gold ores have been developed in favorable situations. Summarized descriptions of the geology of South Africa are given, and several comparisons are made between these ore deposits and those of Spain. The introduction of the gold is believed to have been of Carboniferous age, and prior to the formation of the Cape diamonds. From a more detailed discussion of the geological structure of the several Transvaal districts it is inferred, on the one hand, that the ore deposits may be far from inexhaustible; while, on the other hand, it is shown that there are many more geological conditions and other horizons which appear to be favorable for the concentration of gold ores, and where explorations may be conducted with profit.

Minerals and the Röntgen Rays: By W. G. MIL-

LER. The author presents some notes on X-ray photographs of minerals and thin sections of rocks; the article is accompanied by an illustration.

SOCIETIES AND ACADEMIES.

ACADEMY OF SCIENCE OF ST. LOUIS.

AT a meeting of the Academy on May 4th Prof. Nipher read a preliminary paper on *A Rotational Motion of the Cathode Disc of the Crookes Tube.*

He had been studying the change in the character of the Crookes effects due to long continued operation. It was observed that the cathode disc of aluminum was slightly loose, and that it was rocking to and fro in rotary motion on the aluminum wire. It finally became loosened and started into a slow rotation. The motion was a halting one, as the disc was out of balance and the bearings were rough. When stopped by pinching in the bearing, it began to struggle and rock against the restraint and would finally become loosened again and continue its motion.

It was impossible to either accelerate or retard the motion by powerful bar magnets, applied as in Barlow's wheel. Change in position with respect to the earth's field or the induction coil produced no effect on the rotation. Looking at the disc from the point where the cathode wire enters the tube, the disc rotates counter clockwise. The brush discharge of a Holtz machine yielded even better results than the induction coil when the leading conductors were separated by spark intervals.

The rotation has not yet been obtained between spark terminals in air of ordinary pressure nor when the movable disc forms the anode, but work on these points is not yet concluded.

Prof. Nipher stated that the experimental evidence thus far indicates that the effect is due to action and reaction between the cathode plate and the radiant matter. If so, the radiant matter starts from the disc in a vortex, whose axis passes through the dark spots opposite the disc faces. It may also be due to direct action and reaction between the disc and the surrounding field due to the current. He is now having apparatus constructed which will determine between the possible explanations. Prof. Nipher stated that he had long sought some experimental basis for imposing a condition of rotation upon the equations for force and potential within a wire conductor. Without such term the equations lead to absurd results.

Dr. E. C. Runge described an interesting case of insanity, unrecognized for twenty-eight years.

WILLIAM TRELEASE,
Recording Secretary.

NEW YORK ACADEMY OF SCIENCES.—SECTION OF ANTHROPOLOGY, PSYCHOLOGY AND PHILOLOGY.

THE Academy met on April 27th, with President Stevenson in the chair, and proceeded to organize the new Section in Anthropology, Psychology and Philology. Prof. N. M Butler was chosen temporary chairman.

Prof. F. H. Giddings was nominated and elected Permanent Chairman of the section; Dr. Livingston Farrand, Secretary of the sub-section of Anthropology and Psychology, and Prof. A. V. Williams Jackson, Secretary of the subsection of Philology. The officers were elected for a term that will end at the annual meeting of the Academy, and it was resolved that the two sub-sections meet in alternate months.

Prof. F. H. Giddings read a paper on *A Plan for the Systematic Study of tribally organized Societies*, which will be printed in SCIENCE.

Prof. J. McKeen Cattell described a *Method for Determining Photometric Differences by the Time of Perception.* A series of gray surfaces was exhibited making over 200 nearly equal shades between black and white. The shades are so nearly alike that they cannot be distinguished with certainty, and when the observer attempts to sort them out in order an error of displacement occurs which measures his accuracy of discrimination. With nine observers the error varied from 6.04 to 11.05, the average being 8.1, from which it follows that about 25 shades can be distinguished between black and white. The relation of the error of observation to the brightness of the light was shown. The speaker further described experiments now being carried out with the same gray surfaces, in which the time it takes to distinguish the difference between two sensations is used to measure