

matically renewed, then electrocution serves as well as the guillotine; but life, in the physiological sense, cannot be expelled thus from a living thing, for when the body is dead, that is, cannot renew its functions, the muscles may be alive, and when the muscles are disintegrated, and therefore dead, the tissue is still alive, for it may be grafted upon another body and grow. Nothing but chemical disintegration destroys such life.

A. E. DOLBEAR.



Encke's Comet and the Planet Mercury.—When this reaches our readers, Encke's comet will be nearing its perihelion, having just passed almost directly between us and the sun, at a distance of about fifty-seven millions of miles. It was the first discovered of the short-period comets, and makes the quickest circuit, returning every three years and a third. At the present return it was first seen early last November, precisely in its computed place.

Since then it has been under continuous observation, but is so small and faint that in the mere star-gazer it excites little enthusiasm: it is visible only by the help of the telescope, like a rounded smoke-wreath, slightly brighter in the center, but almost structureless and quite inactive,—in striking contrast to the brilliance and incessant vivacity of the great comets. To the mathematical astronomer, on the other hand, it is perhaps the most interesting of all the cometary tribe.

The peculiarity which gives it this preëminence is that, for some reason not yet certainly known, its orbit is becoming steadily smaller and rounder, its period is continually shortening, and its speed is continually accelerated as it winds spirally inwards towards the sun. Unless something intervenes to check the process, or unless the comet itself meets with some catastrophe like that which is supposed to have caused the disappearance of the lost comet of Biela, it must ultimately fall into the central fire; and that soon, as astronomers reckon time,—that is to say, within a thousand or fifteen hundred years.

This shortening of the comet's period was first detected more than sixty years ago by Encke himself, and was for a long time supposed to be due to the action of the "ether," the hypothetical substance which is supposed to propagate the waves of light and other radiances through interstellar space. But when it was proved, as it has been, that other comets show no such effect, it became necessary to seek a different explanation, and thus far the only one which has anything like a scientific standing is that somewhere in the circuit of its orbit it encounters, and is retarded by, a swarm of meteors. Such a retardation, it is to be noted, would cause the orbit to shrink in size, and so, indirectly, and almost paradoxically, would shorten the period and accelerate the comet's speed.

The comet has been the subject of a most thorough investigation, extended through nearly thirty years. It was begun by Von Asten, of St. Petersburg, and was taken up by his successor, Backlund, who has, within the last year, brought the exhaustive work to a satisfactory conclusion and published his results.

It appears that from 1819, for more than forty years, the diminution of the period went on at a perfectly uniform rate, each revolution being about two and a half hours shorter than the preceding. About 1860, this acceleration began to diminish, and it continued to do so until, in 1871, it was reduced to about two-thirds of its former amount; then it ceased to change, and ever since the period has been shortening about an hour and fifty minutes in each revolution. At present, therefore, the comet's period is a little more than two days shorter than in 1819, and its mean distance from the sun less by over two hundred thousand miles.

Another point of interest about this comet is that it frequently comes very near to Mercury, and by its perturbations affords the best means we have for determining the "mass" of that intractable little planet. Backlund concludes with much confidence, as one result of his investigations, that Mercury's mass must be about *one-thirtieth* of that of the Earth, and its density, therefore, about two-thirds. These values are notably less than those given in the standard text-books, and are undoubtedly more trustworthy.

C. A. YOUNG.

rendering another animal safe against the poison by the injection of this serum into its system. More important still, he found that such serum would effect a cure in an animal already suffering from the poison secreted by the diphtheria bacillus.

Professor Behring's first experiments were on small animals, as guinea-pigs, etc., but he subsequently rendered horses and other larger animals immune to the poison of the diphtheria bacillus, and found that their serum, when injected into the system, was very beneficial to human beings suffering from the disease. In the case of animals experimented with, as the diphtheritic sickness was always produced artificially, there was no liability to error in the diagnosis of the case, and the cure could be tested under perfectly known conditions. In the case of human beings the situation is widely different. In the first place, without a bacteriological examination the disease cannot be certainly detected in its earlier stages, so that it is liable to be far advanced before the curative is applied. It was shown with animals, that the cure was more certain the sooner the serum, or anti-toxine as it is called, was injected after the animal became afflicted from the diphtheria poison. The statistics of the cures of children in the Paris hospitals also show that the more promptly the serum is administered after the disease is acquired the more probable the cure.

The Paris statistics give an idea of the value of the discovery in its present state of development when applied to human kind. These statistics may be summed by stating that for six months of this year ending with July, of the children treated for diphtheria by the new cure at one of the Paris hospitals, twenty-four and one-half per cent. died; at another hospital in the same city, sixty per cent. of those treated by the old methods died. Even better results have been reported from some of the German hospitals. In this country, while the trial of the serum cure has not been so extensive as on the continent of Europe, its value is fully attested. In both New York and Chicago arrangements are being made for its preparation.

It is admitted that the chances of cure are greatly decreased by the impossibility of always recognizing the disease in its earlier stages, but this difficulty may be partly overcome by administering the serum in every suspicious case, because if any prove not to be diphtheria no harm will be done. There accordingly seems to be good ground for the belief that we shall soon have a fairly certain remedy for this most fatal and dreaded disease.

S. E. TILLMAN, Prof. U.S.M.A.



Death by Electricity.—Serious results sometimes happen to one

who accidentally comes in contact with what electricians call a live wire: burnings, paralysis, and sometimes death, either real or apparent. Such cases, as well as the phenomena in electrocution, have led to the study of the physiological effects of strong electrical currents upon the bodies of men and animals. So far, the researches have added only a feeling of uncertainty as to actual death in many cases, for when the organs of respiration and circulation are intact there

appears to be no known test which is reliable as to death except actual chemical decomposition. Persons have been resuscitated when both heart-beat and respiration have been absent many hours.

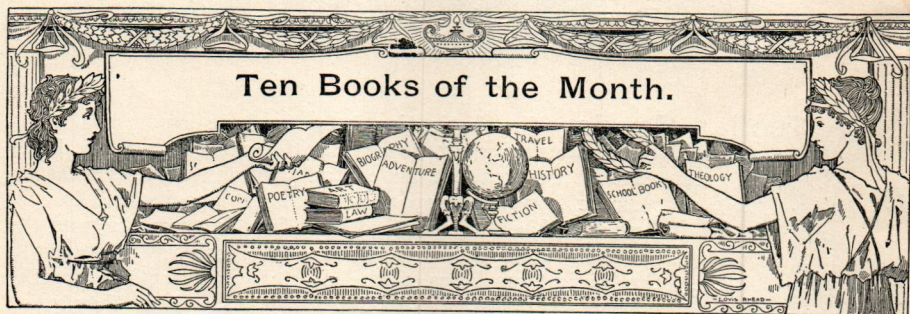
It appears that electrical currents may act upon the body in two ways: first, mechanically, in which either some of the essential organs or the nerves are disintegrated to such an extent as to render them incapable of performing their proper functions—lightning often acts thus;—second, without mechanical disintegration, the heart may be stopped by the inhibitory action of the nerves that control its action. This, of course, arrests consciousness, and there is the similitude of death, yet with proper artificial methods the processes may be renewed and consciousness recovered if the inaction has not been maintained for too long a time.

It is now questioned whether in electrocutions this inhibitory action of the nerves may not be the chief result and the autopsy be the essential thing to complete the execution! In the majority of cases there is no probability at all that recovery of consciousness would ever take place without artificial aids. If the intention be to so treat the body that the functions of its organs cannot be auto-

cepted the calamity with resignation as a cruel, but inevitable, dispensation. But an utterly unnecessary accident arouses resentment and incredulity, and forces us too consciously to seek refuge in the reflection that, after all, it is only a fiction. And such a reflection invariably weakens the effect, by rudely spoiling the illusion.

A second book by Miss Harraden, a collection of stories entitled "In Varying Moods," falls much below "Ships that Pass in the Night." The first story, "At the Green Dragon," is a fairly clever, but not remarkable tale, and the remaining half dozen do not seem to me to rise much above mediocrity.

HJALMAR HJORTH BOYESEN.



Ten Books of the Month.

FICTION.—**THE MARTYRED FOOL**, by David Christie Murray. Harper & Brothers.

THE TALE OF CHLOE, by George Meredith. Ward, Locke & Bowden. \$1.50.

POPPŒA, by Julien Gordon. J. B. Lippincott Co.

BIOGRAPHY.—**MEMOIRS OF THE PRINCE DE JOINVILLE**. Macmillan & Co. \$2.25.

HISTORICAL.—**THE CRUSADES**. A brief and practical history of their course and their effects. By T. A. Archer and Charles L. Kingsford. G. P. Putnam's Sons.

LITERARY.—**THE CONDITION OF WOMEN IN THE UNITED STATES**, by Mme. Blanc (Th. Bentzen). Roberts Bros.

TRAVEL.—**IN THE GUIANA FOREST**, by J. Rodway. Chas. Scribner's Sons. \$2.00.

GLIMPSES OF UNFAMILIAR JAPAN, by

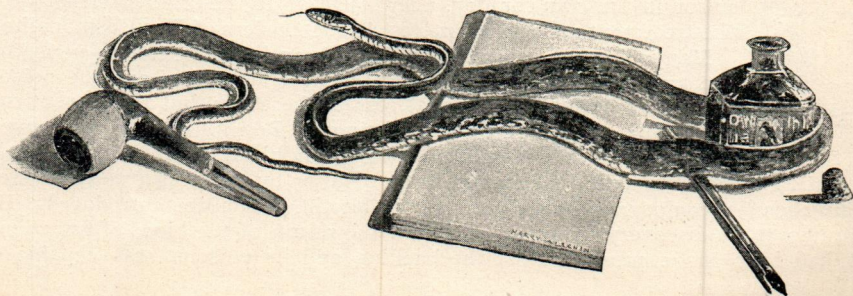
Lafcadio Hearn. 2 vols. Houghton, Mifflin & Co.

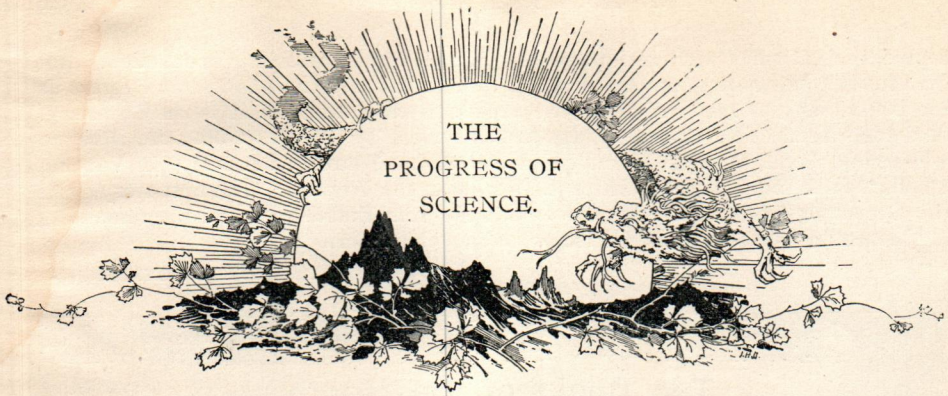
SPORT.—**A SPORTING PILGRIMAGE: Studies in English Sport, Past and Present**, by Gaspar W. Whitney. Harper & Brothers. \$3.50.

WILD BEASTS: A Study of the Character and Habits of the Elephant, Lion, Panther, Leopard, Jaguar, Tiger, Puma, Wolf, and Grizzly Bear. By John Hampden Porter. Charles Scribner's Sons. \$2.00.

ECONOMIC.—**MUNICIPAL GOVERNMENT IN GREAT BRITAIN**, by Albert Shaw, Editor Review of Reviews. The Century Co.

MISCELLANEOUS.—**FOUR AMERICAN UNIVERSITIES: Harvard**, by Charles Elliott Norton; **Yale**, by Prof. Arthur T. Hadley; **Princeton**, by Prof. William T. Sloane; **Columbia**, by Brander Matthews. Harper & Brothers.



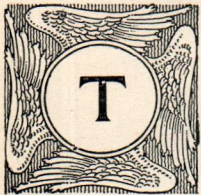


Æolian Sands.—The distinction between dune sands and beach sands is clearly one of great importance in geology. Sand dunes of great extent are frequent in central portions of deserts as remote as possible from contemporaneous beach deposits, and to confound the two would be to place a radically false interpretation on the geological record. Even when sand dunes are locally associated with beaches, the distinction between the deposits is essential; for the dunes often contain land plants in the position in which they grew, and were the æolian deposits mistaken for littoral deposits, such plants would be considered as evidence of oscillation of the coast level.

It is not possible to discriminate between the two sorts of sand by the mineralogical nature, or by the form of the sand grains, because the sand of dunes is often derived from recent beach deposits, or from ancient sandstones. On the other hand, the disposition and dimensions of the sand are characteristic. The dunes do not contain grains considerably exceeding one-eighth of an inch in diameter, because even gales of wind leave pebbles of large size undisturbed. The material of any one layer in a dune is also much more uniformly graded than is usual on beaches, because the wind is more steady than the waves. A wind blowing twenty miles an hour will carry dust into the higher atmosphere; it will fail to move large pebbles; while sand of a certain size will drift steadily along before it, and settle in a body as the breeze dies off. Of all the distinctions between these sands, the most striking is found in the slopes of bedding. Surf-bedded sand shows sloping layers of but few degrees. Dunes, on the other hand, often show slopes of twenty degrees or more, and sometimes overhanging layers, such as never occur in aqueous deposits.

An excellent work on dunes, by Mr. Sokolów, has just been translated into German by Professor Arzruni. It records, *inter alia*, many observations on the occurrences in the deposits of Asiatic Russia, which are little known to the geologists of Western Europe and America.

GEORGE F. BECKER.



The New Cure for Diphtheria.—Now that the newly-discovered treatment for the cure of diphtheria has received official recognition in our own country, a few facts as to the origin and nature of the treatment may be of interest to the readers of *The Cosmopolitan*.

Many different investigators have been instrumental in perfecting the knowledge of the diphtheria bacillus, its action, and the poisoning of the animal system that results therefrom, but the present cure is the discovery of Professor Behring, of Berlin. His first discovery

was that animals could be made exempt from the harmful action of this bacillus by inoculating the system with weakened cultures of it, or by injecting into the system certain chemical compounds at the same time that the poison was introduced. His most important discovery, however, was that the serum of the blood of an animal that had been made proof against the bacillus and its poisons, was capable of