SCIENCE:

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THE alleged discovery of a new motive force for driving engines, patented by Professor Gamgee, of Washington, is already condemned on theoretical grounds, both in this country and in Europe.

The principle involved is not a new one, and, so far, all previous attempts in the same direction have ended in failure. In this case, Chief Engineer Isherwood, of the United States Navy, gives an endorsement to Professor Gamgee's scheme, which has caused some eminent physicists to give an attention to it which perhaps it hardly deserved.

From what we can gather, we understand that Professor Gamgee proposes to work his engine with ammonia, taking advantage of the fact that in a liquified state it boils at—37.3° Fahr., and that at 60° Fahr. it exerts a pressure of seven atmospheres—or, say, 100 lbs. to the square inch.

Authorities differ on this subject, but so far as liquid ammonia is concerned, it is stated as follows: "That at atmospheric pressure, and a temperature of 62° Fahr., 1 lb. of the gas occupies about 23 cubic feet, while 1 lb. of liquid ammonia would occupy only 36 cubic inches."

According to Mr. Isherwood, the "zero-motor" is an apparatus in which liquid ammonia can be vaporized under considerable pressure by means of the heat in water, or in the external atmosphere, and the gas so obtained is used to propel a piston through a cylinder—the gas being employed with the greatest measure of expansion found possible.

At this point the difficulty is presented of returning the ammonia to the boiler. Professor Gamgee offers no explanation, but claims to be able to accomplish it by some method he has invented. He asserts that in its expansion the liberated gas is refrigerated and diminished in bulk, and becomes partially liquified at the end of the stroke of the piston, when it is exhausted and returned from whence it came.

Against this, Professor Simon Newcomb and some English writers assert, that in the absence of demonstration to the contrary, it will absorb as much power to convert the ammonia gas into the liquid form as the latter will give out when vaporized.

In the "zero-motor" Professor Gamgee professes to have an engine capable of exerting great power, and without the necessity of using any fuel, and indirectly the claim is made of solving successfully the problem of perpetual motion.

Apart from some fundamental errors which underlie the scheme, many theoretical difficulties could be suggested, but as a practical test of "the discovery" will probably be made, further discussion may profitably be postponed until the result of the trial is known.

It will no doubt be a genuine surprise to all students of nature to learn that a German scientist has found fossil plants and animal forms in most of the meteorites (chondrites) which he has examined for the purpose.

DR. OTTO HAHN, who has taken a prominent part in the discussion on the "*Eozoön canadense*" has, in the usual way, prepared sections of many of these bodies. These he has had photographed and thereby attained a result which is independent of the microscopist's vision. Dr. Hahn claims that they show many forms of plants and animals in a fossil state contained in their mass, of which the highest forms are crinoids, corals and allied species. He has placed this collection of sections in the hands of Dr. Weinland of Tübingen, (formerly of Philadelphia) for thorough classification.

We regret that we are unable to endorse this interesting discovery. Professor Whitfield, superintendent of the fossils and minerals in the American Museum of Natural History, has seen Dr. Hahn's drawings and was unable to verify the presence of the organic forms referred to. He attributed Dr. Hahn's error to a too sanguine temperament, and an "imagination which bodies forth the form of things unknown."

WE are indebted to our Washington correspondent for a brief mention of an interesting paper by Dr. George M. Sternberg, on "A Fatal Form of Septicæmia in the Rabbit, produced by Subcutaneous Injection of Human Saliva."

Dr. Sternberg recently published a translation of Dr. Antoine Magnin's work on Bacteria, and has had considerable experience in making investigations on septic organisms. He now asserts that the human saliva carries with it a deadly poison, which will kill a rabbit in forty-eight hours; other animals also appear to be influenced more or less by the same cause, while still others—the dog, for instance—resist the

poison. Some salivas are more fatal than others—that of Dr. Sternberg being especially virulent. It will be noticed in our report that Dr. Sternberg attributes the poisonous element to the presence of Micrococci—having found this form of Bacteria both in the saliva employed and in the poisoned blood of the victims.

These facts may be considered in conjunction with experiments by M. Pasteur in the same direction.

SCIENTIFIC SOCIETIES IN WASHINGTON.

THE BIOLOGICAL SOCIETY.—At the last two meetings the Society has listened to four papers: A Fatal Form of *Septicæmia* in the Rabbit produced by Subcutaneous Injection of Human Saliva, by Dr. George M. Sternberg; On the Mortality of Marine Animals in the Gulf of Mexico, by Mr. Ernest Ingersoll; A Statistical View of the Flora of the District of Columbia, by Professor Lester F. Ward; and Notes on Scale Insects, by Professor J. H. Comstock. All of these papers were of the highest scientific value, prepared by specialists in connection with their own immediate investigations. Dr. Sternberg has been making experiments for the past two years under the patronage of the National Board of Health, concerning the causes and development of epidemic diseases. In the course of his labors he has made careful observations with reference to inoculation, and in the paper referred to above gave the Society the benefit of his experiments on saliva injected under the skin of the rabbit. As an elaborate report will appear in the proceedings of the Board of Health, it will be necessary to state only the conclusions arrived at, which are as follows: The rabbits impregnated died invariably in less than 48 hours. Other animals which did not succumb were afflicted with sores. Dogs resist the poison, guinea pigs yield less readily than rabbits, fowls escape entirely. Some salivas are more fatal than others; that of Dr. Sternberg is especially virulent. The presence of Micrococci in the saliva, in the blood of the poisoned animals, and in that of animals infected with this poisoned blood led the author to the conviction that the evil effect was owing to these minute bacteria.

Mr. Ernest Ingersoll, who has been studying the waters of the Gulf of Mexico in the interest of the U. S. Fish Commission, reported that in certain years there occurred a great mortality among the marine animals. In the years 1844, 1854 and 1878 such disasters had been noticed, but the one most injurious in its consequences was in the year 1880. Oysters, clams, fish, and even sponges, were involved in the universal ruin. The beaches were so thickly covered with the dead bodies that the inhabitants were driven from their homes. Various attempts were made to account for the phenomenon, but with indifferent success.

Professor Ward is preparing a work to be entitled "A Catalogue of the Flora of the District of Columbia." It will include all the phænogamous plants and the vascular cryptogams. The number of species enumerated is 1233, distributed among 526 genera, as follows:

Polypetalous	genera,	173	Species,	354
Gamopetalous	"	169	"	388
Monochlamydeous	"	47	"	122
Monocotyledonous	"	120	"	321
Coniferæ	"	4	"	7
Vascular Cryptogams	"	13	"	41
		526		1233

Professor Ward then proceeded to give the census of these species with reference to the orders, to the position of the district north and south, and east and west, as well as in comparison with local floras which have been described with sufficient accuracy.

Professor Comstock's paper on the *Coccidæ*, or scale insects, was a very entertaining treatment of a very dry subject. The group under discussion is usually regarded as the most uninteresting of all the animal kingdom as well as the most anomalous. It is true that the lac of commerce and that of Arizona is the product of these insects, but the most of them are worthless or pernicious. They infest greenhouse plants and most of our useful fruit and timber trees. A specimen was exhibited which had been taken from Europe to Los Angeles, Cal, and back to Washington, upon a lemon, and at the end of its nine-thousand-mile trip was as lively as ever. The method of hatching, of the deposit of the meal, or lac, and of moulting in the male and female, were described and illustrated with drawings and cabinet specimens. The method of classifying these animals into species has been a very uncertain one. Even the later used characteristic, namely, the series of pores or openings on the penultimate ring not being always invariable. Professor Comstock has found the fringe on the last segment of the abdomen to be the most constant specific characteristic. An interesting point in the paper was a discovery made by Mrs. Comstock, that the poisers behind the wings are furnished with a hooklike process which fits into a groove on the back of the wing and helps to sustain it in flight.

THE ANTHROPOLOGICAL SOCIETY.—The entire session of the Society at its last meeting was occupied with the reading and discussion of a paper read by the Rev. Clay McAuley upon the Seminole Indians still remaining in Florida. Of this once formidable but now humbled tribe there remain in the vicinity of Lake Okeechobee 208 individuals, 37 families, 22 camps, and 5 settlements. There are no half-breeds among them, the occurrence of such a birth would probably subject the author to torture or death. They are healthy, have an abundance of food, and are probably increasing. The men are tall, well proportioned, erect, lithe, and graceful. The women are shapely, agreeable, vigorous, and many of them handsome. Dr. McAuley singled out three, whom he characterized as the stately, the beautiful, and the handsome among all the Indians whom he had visited. A very minute description was given of the dress, ornament, customs, and language of these people. A full report will appear in the publication of Major J. W. Powell's Bureau of Ethnology.

THE ULTRA-GASEOUS OR RADIANT STATE OF MATTER.*

BY PROF. H. S. CARHART.

The announcement by Mr. William Crookes, F. R. S., some six years ago, that he had produced mechanical motion by the direct impact of waves of light created a profound impression in the scientific world. But when it was found that the Radiometer, which was supposed to exhibit this new action of light, carried a system of blackened vanes, delicately balanced in a very high vacuum, it impressed most physicists as being an interesting form of heat engine receiving its supply of heat by absorption of radiant energy.

Mr. Crookes subsequently adopted the same view, which was the only tenable one, and investigated the subject in a long series of exceedingly skilful and ingenious experiments. His researches on the Radiometer formed the introduction to a more extended series of investigations into the movement of the residual gas of very high vacua, under the influence of heat and the negative discharge of electricity. These investigations carry us to the very farthest boundary of matter thus far attained, and furnish an ocular demonstration of some of those molecular movements that have heretofore been merely imagined. In fact the phenomena observed are such that Mr. Crookes has felt himself justified in announcing a fourth, or ultra-gaseous state of matter. Such an an-

*Lecture delivered before the New York Electrical Society on May 5, 1881.