

member of the Oceanographic Institute (who accompanied the expedition, together with Dr. Richard, director of the Monaco Oceanographic Museum, and other equally distinguished gentlemen) has christened it the *Eryoneicus Alberti*.

The fauna inhabiting the Sargasso Sea was studied on the surface, between the latter and the bottom, and on the bottom itself up to a depth of 11,364 feet. A numerous but sparsely varied fauna lives amid the weed covering this sea; it comprises Actiniæ, Ascidia, Nudibranchiæ, Crabs, Isopods, and a few pelagic animals clinging mostly to the surface of the weed. Mimicry is a very marked feature of animal life in the Sargasso Sea. A new species of pelagic Holothuria was found, and there were captured on several occasions many specimens of a curious hemiptera (*Halobates Vüllerstorffi*) which jumps about on the surface of the sea.

An interesting item of the voyage was that (when in the Sargasso Sea at a distance of 840 miles from the nearest continent) the "Princesse Alice" was visited by five swallows of the American variety called *Hirundo rustica erythrogaster*, Bödd. A remarkable feature of the whole region comprised between the tropics, the continent of Africa, and the Azores, is the almost total lack of any animal life on the surface of the sea. No cetaceans or marine birds were met with; flying fishes and the Plankton were the sole redeeming features in a dreary and silent waste of waters. A curious double lunar rainbow was seen on one occasion (August 28, 1905), and was painted by an artist accompanying the expedition. The curious phenomenon known as the "Green Ray" was also often seen.

ELECTRICITY AND MATTER IN A GASEOUS STATE.

BY PROF. EDGAR L. LARKIN.

When Newton announced the law of gravity, the effect must have been akin to the discovery of radium in our own time. Really, a rapid wave of expanding science spread over the world, and everybody talked about the mystery of all time, gravity. What has happened? If a newly discovered law equal to that of attraction should now be telegraphed to every scientific body in existence, would a scene of animation and activity set in? Or, have discoveries "followed fast, and followed faster" of late than can be assimilated? Or, would the discovery of what gravity is, or matter, or mind, occasion more than a few remarks on a street corner, about the passing wonder?

Ionization and conductivity are equal to gravity. They form two granite and hewn stones round about and under nature. If the actual gravity is ever explained, the explanation must and will be found hidden in these. All scientific men were filled with admiration—yes, hidden adoration—for Newton, when the Principia appeared. But another Principia is here—a book, "The Conduction of Electricity Through Gases," by Prof. J. J. Thomson. To the writer, it is as a basic Principia, upon which can be erected a vast, new, and comprehensive view of all that part of the universe known to man. Since Newton, literatures of science have teemed with the sentence: "Inversely as the square of the distance." But a new term or sentence is now appearing in scientific literature of the highest type. Here are quotations: "The saturation current between two parallel plates of given area depends upon the amount of the ionization that takes place throughout the whole volume of gas between the plates, then the greater the distance between the plates the greater is the saturation current, so that if we use constant potential differences large enough to produce saturation, the greater the distance between the plates the larger is the current. Thus the behavior of the conducting gas is very different from that of a metallic or liquid electrolytic conductor; for if such conductors were substituted for the gas, the greater the distance between the plates the smaller would be the current." And: "The peculiarities shown by the conduction through gases are very easily explained on the assumption that the conduction is due to ions mixed with gas" (p. 13, Thomson). And another: "The condition essential to stability in chemical combination is, 'The attraction of one atom to another (or others) increases as the distance increases'" (Berisford Ingran, Knowledge, April, 1905, p. 75). Since science began, there have not appeared more important discoveries or wisdom. While heat, light, gravity, magnetism, and electricity, when in the form of circular waves, vary in intensity inversely as the square of the distance, electricity, while traversing ionized gases as a "current," increases in quantity as the distance increases! This surely is because it gathers up ions on the way from one mass of matter to another, that is, takes up electricity. If the masses are two suns forming in space, from primordial gas, ionization allows colossal quantities of electricity to circulate from sun to sun, whether two or two trillion. And this brings the writer of this note to the point of starting, for during many years we have advocated, in season and out, the electrical basis of the universe. On page 8 Prof. Thomson says: "The electrical conductivity of

gases in the normal state is so small that, as we have seen, the proof of its existence requires very careful and elaborate experiments." Then he gives several ways of making excessively rare gases conducting, thus: Draw them from the neighborhood of flames, or from electric arcs, or from glowing metals; but far better is to allow Röntgen, Lenard, or cathode rays to pass through them, or rays from uranium, radium, polonium, thorium, and ultra-violet light to traverse and ionize. Thus two metallic plates may have rare gas between them, and electricity would have difficulty in forcing a passage. Now ionize the gaseous particles, i. e., separate them into corpuscles, and electricity will "flow" from positive to negative with slight resistance, and external rays from any radioactive substance are able to ionize. It is almost impossible to resist the temptation to apply the new laws to cosmological processes in primitive conditions of matter. This primordial state was without doubt gaseous. Perhaps dissociation reigned. At all events, the mechanics of liquids and solids did not act. Finer forces, radio-active energies, and activities wrought for ages before gravity wheeled worlds into revolving systems. Let two suns be, say, within 25 trillion miles of each other. The space between, if filled with normal gas, would offer high resistance to transmission of electricity. Let rays from radium or any electrostatic field shoot across the intersolar gases at right angles and ionize them; then vast flows of electricity would take place from sun to sun. There was a circulation throughout the universe then, as well as now. The entire structure of nature is a living unit. It has a pulse. All matter by hypothesis was once ultra-gaseous. It therefore obeyed laws able to act on matter in that state, and no others. Every one of the laws is electrical.

Deviation of rays is a stupendous fact, deep-seated and far-reaching. From a study of the bending aside of rays in laboratories, imagination can easily carry back to primordial cosmical times. Radium emits alpha, beta, and gamma rays and many others besides. Magnetism is able to turn alpha rays one way and beta the other. The fact stands out that they are separated. Gamma rays cannot be bent out of their original straight lines. To begin gravity, matter must be charged with electricity. Of course, this is a "working hypothesis." This is the way to do it.

Let vast masses in space, like the nebula in Orion, or like the giant suns Antares or Canopus, be radio-active, and let floods of rays pour into space—for a frigid nebula or a hot sun can be radio-active.

Let an enormous mass be, as it were, an electrostatic "field" in space many million miles away. Electrostatic fields attract and repel precisely like a magnet. Floods of alpha, beta, and gamma rays attempt to pass in front of this field. Let a stream of alpha rays be separated out and be deviated to one side. Let them strike a world in process of formation. It will instantly be positively electrified. And another electro-magnetic or static field can deflect beta rays upon other worlds, and charge them negatively. Charges are thus set up daily in physical laboratories; why not in space? Radio-active rays are absorbed by matter with great avidity. But these rays must be electric, else they could not be diverted by magnetism. At present, it is not known what effect gamma rays have when they hit a forming world. For world building has not ceased. Another cosmical worker is induced radio-activity. An active nebula or sun can establish activity in others at a distance. It is a common thing to charge suspended insulated spheres by induction electrically in every laboratory. Suns may differ actually in their phases of matter, as much as their spectra. Thus let a nebula in space at the absolute zero of temperature be composed of corpuscles—bodies smaller than the chemical atom—in dissociation.

Let alpha rays only be deflected upon it for a million years, and let beta rays fall on another nebula; then the phases of matter produced would no doubt differ. The suns condensed from them must be unlike and project differing spectra. From the vast mass of literature received on this mountain peak, it appears that the entire scientific world is going the radio-active way. And well it is, for radiant energy, in the forms of alpha, beta, gamma, Röntgen, Becquerel, and doubtless a hundred other kinds of rays, together with deflection, induction, catalysis, "acting at a distance," and ionization—these all, and surely others not yet discovered, were and still are the cosmical builders, workers, and carriers. When Crookes lighted up his low-pressure tubes he opened the gates of a world more inscrutable than that of Hermetic mysteries. And a science of boundless ramifications into every nook and corner of nature is founded and grounded on Prof. Thomson's classic book. Electricity can start from one sun to go to another. If electro-active fields are passed, then the primitive gas is ionized, and the original quantity gathers more as it flies and pours a larger flood on its neighbor. It does not weaken as the squares of the distances increase. This is absolutely new in science, is revolutionary in character, is literally true, and will overthrow all existing cosmological

theories. Soon it will be admitted that electricity exists in a practically infinite number of modes and forms, ordinary "currents" and "charges" being common-place. In a few years it will be fashionable to say that a cubic inch of iron and another of water contain equal quantities of matter; since both are nearly incompressible, and that the reason why iron tends toward the center of the earth with a force 7.8 times that of water, is because it contains 7.8 times as much electricity.

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THE DESCENT OF MAN.

Kollmann, the professor of anatomy, has recently written an exhaustive article on the subject of the relationship between man and the *Pithecanthropus erectus* of Dubois. It will be remembered that some years ago Dubois discovered in the island of Java some bones, the femur and several bones of the cranium, which resembled both the corresponding bones in the human frame and also in the frame of a monkey. This discovery was much talked of, since it was thought that in these bones had been discovered portions of a prehistoric animal, which might have formed the so-called missing link in the chain of descent of man from monkey. It was the scientist Schwalbe who, in accordance with this idea, christened this hypothetical animal with the name *Pithecanthropus erectus*, or man-monkey standing erect. A minute examination of the bony remains of Java permitted the hypothesis that they had belonged to a being of great stature, with habits still arboreal, and which probably passed a great part of its time in the trees, but which, like man, already possessed the faculty of speech. But Kollmann now shows that although these bones discovered in Java are of great paleontological importance, they should be interpreted in quite a different manner. He asserts that the animal to which they belonged could not have been a precursor of man, for, although they certainly belonged to one of the most highly developed of the anthropoid apes, its habits and customs could not have differed from those of its cousins still living, the chimpanzee, the gorilla, the orang-outang, all species of animals which have reached the extreme limit of their variability. Kollmann is rather of the opinion that the direct antecedents of man should not be sought among the species of anthropoid apes of great height and with flat skulls, but much further back in the zoological scale, among the small monkeys with pointed skulls; from these he believes were developed the human pygmy races of prehistoric ages, with pointed skulls, and from these pygmy races finally developed the human race of historic times. In this manner may be explained the persistency with which mythology and folk lore allude to the subject of pygmy people, and it would also explain the relative frequency with which recently the fossils of small human beings belonging to prehistoric periods have been discovered.

THE DEATH OF DANIEL B. WESSON.

After a long illness Daniel Baird Wesson, the rifle and revolver maker, died at Springfield, Mass., on August 4.

Born in Worcester, Mass., Mr. Wesson was the founder of the firm of Smith & Wesson. He went to Springfield a poor man, but died immensely wealthy.

He was the inventor of the cartridge with a percussion cap. In 1883 he formed a partnership with Horace Smith, of Norwich, Conn., and there worked out the principles of the Winchester rifle. He first put into use the self-primed metallic cartridge, used during the civil war. About the same time he succeeded in perfecting a revolver, the principal feature of which was that the chambers ran entirely through the cylinder.

Mr. Wesson was also the inventor of several other improvements in firearms, the most important of which were the automatic cartridge shell extractor and the self-lubricating cartridge. He also introduced the hammerless safety revolver.

It is reported that the Canadian Pacific Company has decided to await the outcome of experiments by the New York Central and New York, New Haven & Hartford Railway Companies before taking steps for the electrification of any part of its system. Both the latter railways are spending enormous sums upon experiments, the former with a direct and the latter with a single-phase alternating current. The line from Montreal to Quebec will in all probability witness the first installation. All the electric power necessary can be obtained from the Shawinigan Falls.

Efforts are being made, by constructing embankments, to improve the channel at Rouen and keep it to one course, the present difficulty being that the channel is constantly shifting. Plans are now under consideration for the lengthening of the embankment on the left side of the estuary, and for the construction of embankments on both sides of the same to confine the channel to certain limits between Val de la Haye and Biessard.