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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

VOLCANIC ACTIVITY AND RADIUM.

Were it not for the fact that Major C. E. Dutton is considered one of the foremost authorities on earthquakes and volcanic activity in this country, his new theory of volcanic activity, published in the pages of a monthly scientific review, would probably be received with scant attention, although his arguments are both ingenious and plausible. Almost every natural phenomenon which has been inadequately explained by the theories at present in vogue, has latterly been attributed to some form of radio-activity.

Major Dutton starts with the fundamental proposition that our present conception of a volcano, which is that of a safety-vent, is inapplicable to the conditions which we know exist. The earth is no longer regarded as an immense sphere of liquid or semi-liquid material surrounded by that solid crust of indeterminate thickness which constituted the interesting but unconvincing teachings of our schools and colleges some twenty years ago, but as a fairly solid globe. Furthermore, the discharged masses of any single volcano are hardly sufficient to bear out the existing theory, which can be proved simply enough. Draw a segment of a section of the earth, and plot upon it to scale a section of a volcanic lava reservoir. Severe as many eruptions concededly are, it will be found that the quantity of lava discharged from the plotted volcano will only in exceptional cases be more than two or three cubic miles. To be sure, masses as high as six cubic miles have been estimated, but such a discharge is unusual. An investigation of this character must show how small, indeed, is the amount of lava expelled for the amount of activity manifested.

If we conceive a volcano to be nothing more or less than the geological safety valve of our schooldays, why is it that one eruption does not immediately reduce the internal pressure and render the volcano dormant? We find, on the other hand, that eruptions constantly recur before and after an outburst of maximum force.

If we may judge from a study of the relative intensity of the disturbances caused by eruptions, we are more or less justified in holding, as Major Dutton states, that a lava reservoir is very shallow, perhaps rarely more than three miles deep. When we consider the fact that seismic disturbances, as a general rule, increase to a certain point and then subside, we may assume that there is a gradual development of volcanic heat and a gradual diminution. At the point of maximum temperature the steam invariably contained in lava exerts its greatest pressure, and forces out the lava in an eruption of more or less violence.

Dismissing the old conception that the material discharged was maintained in a molten condition for ages after the earth cooled down; dismissing, too, the idea that the lava reservoirs are but the projections of a central molten mass, because such projections would have solidified millions of years ago; and dismissing further the doctrine that the cause of volcanic activity is steam generated at great depths, because steam would be unable to lift the thousands of tons of rock above it, Major Dutton holds that the heat must be generated in or surrounding molten lava.

The next step is to ascertain what may be the cause of this internal heat. Major Dutton finds in radium a substance which has all the properties that he seeks. It is admitted that the earth contains either radium or radio-active minerals. The calculations which have been made, rough, to be sure, but still sufficiently accurate for the purpose in hand, tend to prove that the heat developed by subterranean radium is far greater than can be radiated into space under normal conditions. The only weak point in the theory is the amount of radio-active material which must be contained in a volcanic reservoir to produce disturbances as violent as those which have been recorded in historic times. Furthermore, there is the difficulty of the relatively short life of radium; but this, it must be confessed, is overcome by granting its constant re-formation from some material such as uranium, a supposition which the latest views of physicists justify.

Whether or not we accept the theories which Major Dutton has advanced, we must at least admit that they are as plausible as the theories which have dominated geological teaching for the last half century.

THE CAPTURE OF A LIVE OKAPI.

Great interest has been aroused in English scientific circles by the recent communication from Capts. Boyd-Alexander and G. B. Gosling, who are making a tour of exploration through the Congo, that the party has secured a specimen of the okapi. The animal was secured in the district of Angu on the River Welle by the captains' Portuguese collector. The latter made several attempts to obtain the animal by means of the rifle, but it was too wary and nimble. At last the Portuguese resorted to the native trapping methods, by digging a pit in which a specimen ultimately fell. Capt. G. B. Gosling has also gathered some definite data concerning the somewhat speculative nature and habits of the okapi. He states that it is generally found singly and sometimes in pairs, but according to the Mombatti hunters, groups of three have been seen on rare occasions. He also remarks that the okapi frequents haunts where there is a small stream of water surrounded with muddy and swampy ground. In such regions there thrives a certain plant with a very large leaf, growing on a single stalk, and which invariably attains a height of some ten feet. This leaf constitutes the favorite food of the creature, and Capt. Gosling ventures to suggest that the animal is only to be found in those districts where this plant exists. The creature feeds and prowls around through the swamps during the night, since it is never observed in the daytime. It has, however, been seen feeding by the natives up to as late as eight o'clock in the morning, but very rarely. During the day the animal lurks in the fastnesses and seclusion of the forest, venturing abroad in search of food at dusk. Capt. Gosling on three occasions observed the animal busily feeding, and was able to approach quite close to it without frightening it away, so that he was able to follow its movements and habits among the swamps with perfect ease. Capt. Gosling is the first white man to see the okapi alive, and it is anticipated as the result of his close observations, that he will be able to contribute extensively to our meager knowledge of the animal. On these occasions at first it could hardly be discerned, so carefully was it concealed in the swamp vegetation. The animal is possessed of remarkably acute hearing, and on this account the Mombatti natives class it among the bush-buck, the local name of which is "bungana." Owing to its extreme wariness, even the natives, who are born hunters, very rarely succeed in running it to earth, the most successful methods of securing it being by means of the pit trapping. The dead specimen that has been procured will probably be forwarded to one of the English museums, since it is stated to be in excellent condition.

A NEW BLOWPIPE WELDING PROCESS.

One of the most recent improvements in the use of the blowpipe on an industrial scale for the melting and welding of metals and performing different operations at a high heat has been brought out at Paris by the Société l'Oxyhydrique. For a long time inventors sought for a good system of blowpipe which would give a complete combustion of the hydrogen, acetylene, or other gas in the oxygen, and especially to form a homogeneous flame. But the fear of explosion prevented them from operating the mixture of the two gases before burning them, and the gases were brought by two separate tubes, either parallel or converging. Under these conditions the flame was composed of regions having quite a different nature. In the present case, the inventors succeed in mixing the two gases in the body of the blowpipe itself, before the burning. Completely mixed the molecules of oxygen and combustible gas arrive at the flame in the proper proportions for a complete combustion. As to how the inventors were able to prevent the explosion of the mixture which is thus formed, we find that it is by giving to the gas mixture a speed which is higher than the rate of propagation of the flame. Since the researches of the Fire-damp Commission, we find that an explosive mixture inclosed in a tube does not inflame at once throughout the entire tube. From one end of the tube, the ignition goes to the other at a certain speed which increases as the square of the tube section. If the gaseous mass moves toward the ignition point at a higher speed than this, the fire will not reach the inside of the tube. The application of this discovery to a blowpipe is very simple, but it required some one who should think of it, as always happens. That the idea is new is evidenced by the patents which the company has obtained in the leading countries. It has been using the apparatus for the last few years with great success. This latter is of simple form, and the blowpipe consists merely of a long conical nozzle at the large end of which the gases are introduced by two openings. A rubber tube passes from each inlet to a gas cylinder provided with valves and pressure gages combined with gas-expanders. Oxygen and hydrogen are used. In the larger form, the rubber tubes go from the cylinders to a common mixing chamber and from this a single tube passes to the blowpipe. The lighter form of blowpipe weighs only half-a-pound, while the acetylene blowpipes weigh several times this. The new system is specially useful for welding tubes, sheet steel pieces, boiler work, etc. A remarkable application is that of cutting metals, and a round piece is cut out by the flame from a one-inch steel plate at the rate of one foot per minute. By using a compass-like device which brings the flame down on the plate and rotates it around, the circular disk is cut out of the thick plate like a saw cutting a soft plank, and the gap which it leaves is scarcely wider than a saw-cut. The outlying metal is not affected, as the blowpipe action is quite local.

THE VAGARIES OF WELLS.

According to the observation of M. Grosseteste upon some of the wells which are situated in the canton of Geneva, it appears that the wells have the remarkable property of drawing in air at certain times and of blowing out air at other periods. These wells are considered by the inhabitants of these districts as very exact indications of the weather. When the wells blow out air, it is a sign that rain is to follow, and when air is drawn in, it is a sure indication of fine weather. Since the wells are covered with a flat stone having a hole in it, according to the custom of the region, it is easy to observe the direction which is taken by the current of air. Some observers installed upon one of the wells a pressure-gage of U-form and were thus able to find some interesting points about the air-currents. Thus they find that a well is very seldom in a state of equilibrium. It blows out when the barometer falls, and sucks in air when it rises. These variations do not exceed a height of one inch on the gage. As to the theory of the action of these wells it is to be remarked that they lie in strata of alluvial gravel covered with vegetable earth which is quite or nearly impervious to water. We may therefore admit that owing to the spaces which exist between the stones of the gravel, these strata form a reservoir of great capacity in which the water circulates. The water comes into the cavities when the atmospheric pressure is lowered, and it leaves them when the pressure rises. The effect of these movements is thus felt within the well, inasmuch as the latter forms the connecting point with the outer air. This phenomenon may be said to have a considerable analogy with the emission of gases by certain hot springs, to caves where a current of air circulates upon the ground, to the variations in the flow of springs, and other phenomena of a like nature.

NERVE IMPULSES AND THEIR PROPAGATION.

In a paper on the propagation of nerve impulse, published in the American Journal of Physiology, W. Sutherland gives it as his opinion that the electrical properties of nerves have received much attention, and the present hypotheses of nerve impulse propagation, though seemingly purely mechanical, are in reality to be regarded as electrical also. For though he refers the "conductivity" of nerve to the rigidity of its substance, he has previously given electrical explanations of cohesion and rigidity. Two lines of thought lead to a conception of the possible importance of rigidity in the phenomena of nerve and muscle. In the first place it is known that a jelly offers but little more resistance to the passage of a small ion than does pure water at the same temperature, despite the enormous difference in the large-scale viscosities of the two media. This proves that in a jelly the molecules of the gelatine form a mesh dividing the jelly into compartments with network walls which confine the molecules of water in batches. The cellular structure gives to the jelly its rigidity, yet the meshes are so open that an ion urged forward by electric force has little difficulty in passing from one compartment to another, and encounters most of its resistance in passing through the batches of water molecules. Thus the jelly has rigidity on the molar scale, and fluidity on the molecular. Just as an ion moves through the jelly almost independently of the presence of the network, there ought to be phenomena of the jelly confined to the network as regards cause and effect. How would it be possible to propagate disturbance through a jelly without appreciably affecting its contained water, as a diver signals by his rope to the man in charge of the air pump. It seemed to Mr. Sutherland that muscular contraction and nerve conductivity might be physiological answers to this query. The second line of thought regards the slowness of the propagation of nerve impulse as probably connected with the small rigidity of the soft tissues in the animal body.