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A NEW THEORY OF THE FORMATION OF DIAMONDS

The natural history of the diamond is one of the puzzles of geology, the place of its origin being until recently as great a mystery as the manner of its formation. Happily, however, the first part of the problem has been solved; the diamond has been tracked home; and though the process by which it attained its crystalline isolation remains as obscure as ever, a clue, at least, has been gained to the conditions of its development.

We need hardly remind our readers that in South Africa diamonds are found under two very dissimilar conditions: first as water-worn pebbles associated with pebbles of quartz, agates, zoolites, and the other common attendants of the diamond in other localities; second, in circumscribed pits or shafts filled with a chalky or clayey earth, more or less hardened. The famous Colesberg Kopje is a fair example of the latter sort, several of which have been discovered in the Vaal River country. In all these cases, the diamond bed is surrounded by a rim of rock dipping outward from the center, but attaining within a short distance the horizontal position characteristic of the rocky strata of the district. Inside the rim or "reef," as the miners call it, the diamonds are found at home and untraveled; outside they are absent, or occur only in layers of gravel, itacolumite, or other products of running or dashing water.

That the gems within the shaft have rested undisturbed since their formation, save by the pick and shovel of the miner, is attested by the nature of their matrix, which at Colesberg has been mined to the depth of two hundred feet without any apparent decrease in the richness of the yield, by the sharpness of the edges and angles of the crystals; and still more by the tendency of the gems thus found to check, flaw, and even explode with violence on being brought to the surface and subjected to the action of light and air. No such accidents occur to diamonds found in drifts, for the simple reason that they are the survivors of a similar process of natural selection, all their sensitive comrades having been eliminated by exposure in past ages.

Obviously, if we can decipher the geological history of these singular diamond beds, a very long step will be taken toward the solution of the question how the diamond originated.

The record begins apparently at a time when the great interior basin of South Africa, in which they occur, was the bed of a vast inland sea. The physical geography of this region reminds one of our own Utah basin. There is first a mountain ridge from 4,000 to 10,000 feet high, roughly following the line of the coast, except where it crosses the

continent toward the equator, broken only by the Orange and Limpopo rivers which drain the basin. Toward the sea the descent is abrupt, often precipitous; inward, the slope is gradual, sometimes almost imperceptible, the bottom of the basin lying several thousand feet below the average crest of the rim. Everywhere throughout the interior are abundant and unmistakable proofs of the former presence of water, filling the basin as a vast inland sea, at one time the scene of great volcanic disturbance, more recently of a process of desiccation like that which turned the Sahara from a sea to a desert, or that which dried up the sea of fresh water which, but a little while ago, geologically speaking, filled the now arid Utah basin to the brim.

The period of diamond production appears to have been while the sea prevailed, their distribution in the gravels resulting from the subsequent movements of water, to which the widespread gravel beds bear witness. While the sea yet filled the basin, volcanic action was going on more or less vigorously, evolving gases, rending the overlying rock, and producing all the other well known effects of igneous disturbance. Among the minor effects we can imagine the formation of vents or craters, to be filled, when the violence was passed, by the silty deposits of the sea bed, washed in by returning water.

Here, then, we have the conditions of future Colesberg Kopjes—minus the diamonds.

Let us follow the process a little further. A constant product of volcanic action, we know to be carbonic acid gas, which contains the basis of the diamond combined with oxygen—a gas capable of being liquefied by the pressure of a column of water less than fourteen hundred feet high, and the ancient South African Sea was several times that depth. We know that this same gas is frequently imprisoned in the soft mud of stagnant pools, where it lies unabsorbed, escaping as bubbles when the mud is disturbed. It is not unreasonable to assume that the less energetic discharge of this gas from the heated depths below the sea bed might be stopped in the muddy filling of the vents, where, liquefied by the pressure of the superincumbent water, it might remain until deprived of its oxygen by some process of Nature's chemistry, leaving the free carbon to crystallize as the sparkling gem so eagerly sought for by the miner.

This, of course, is a mere hypothesis, for we know of no process by which the oxygen could be so withdrawn; but in every other respect the supposition is based on known conditions, and there is apparently no other way in which the raw material of the diamond could be so readily distributed in crystallizable condition throughout these natural diamond factories. The matrix in which the diamonds are found is unquestionably of aqueous origin; and we know, from the vegetable and other substances found enclosed by diamonds, that they could have been formed only in the presence of water. The two seem, therefore, to be contemporaneous.

It is a well known fact also that diamonds sometimes contain cavities enclosing a transparent liquid. We have seen it stated, but are not sure of the authority, that diamonds of this sort have been broken and their contents found to be carbonic acid: a fact which, if true, would add materially to this new theory of their formation.

THE EXPLORATION OF THE LIBYAN DESERT.

Nearly a year ago the staid citizens of Leipsic gathered in crowds in their streets to stare at two queer-looking wagons which were remarkable for enormous height, and which were slowly dragged through the city en route for the Austrian port of Trieste. These were the water carts of the great expedition, soon to start for the exploration of the Libyan desert under the command of the intrepid German traveler, Gerard Rohlfs, of Weimar, and under the liberal patronage of the Viceroy of Egypt. From the European journals of the day, we gleaned a brief account of what the explorers proposed to accomplish, which, in the first number of our last volume, we laid before our readers, mentioning, at the same time, the departure of the caravan for the oasis of Koufra, in the center of the desert. Brief notes of progress have since appeared, but in so disconnected a form that little could be learned from them. Mr. Bayard Taylor, in a recent letter to The Tribune, now states that the expedition has returned, and gives an outline of its journey into the interior of the vast but little known African continent.

By New Year's eve, the party had reached the oasis of Farafrah, hitherto unvisited by any European since Cailliaud in 1819. Here they celebrated the holidays, and astonished the natives by kindling a magnesium light; and then, after a rest of three days, started on the more arduous portion of their journey. A week's travel brought them to a sudden and astonishing change in the scenery, the chronicle of which reads more like a page from the Arabian Nights than a sober scientific statement of facts. "On both sides," says the writer, "arose detached limestone rocks, increasing in height as they advanced, and assuming the wildest forms. It was a labyrinth of lions, sphinxes, pyramids, obelisks, even semi-human statues, extending for miles. Then followed a colossal gateway of rock, the summits of which were 1,500 feet high. When this was traversed, they entered a second and still grander labyrinth, terminating in a second gateway, the towers of which overhung the cleft between them. The way then widened; the tremendous walls of rock fell apart, and the path descended toward a sandy plain. In another hour there came a fresh surprise: the final descent to the level of the oasis lay before them; the vast, mournful, sandy landscape vanished as by a miracle, and wheat fields of deepest green, dark palm groves, white walls and minarets sparkled in the light of the sinking sun."

This was the oasis of Dakhel, a large area of garden land

inhabited by 17,000 people. Near the town a large number of powerful springs burst from the earth, the water being at a temperature of 110°, and carried by irrigating canals over many miles of soil. A stratum of chalk underlies the whole oasis, and, wherever pierced, there a spring rises. This water, it has been supposed, came from the Nile; but the examination of the explorers upset the theory, and proved its derivation from an independent source.

Four days' journey from this favored region brought the expedition to a poor camel pasture, destitute of water or trees, which was believed to be the supposed oasis of Zerzora. A further march of two days to the southwest showed that no further progress could be made. Nothing but mountains of shifting sand was before it: nowhere a foothold, even for the broad-footed camel. Several attempts were made to penetrate this terrible region, but without avail; so the expedition skirted along the sand sea to the northward, seeking a crossing place. This was found in lat. 25° 11' N., and long. 27° 40' E., and the locality was named Regenfeld (rain field) on account of a steady two days' fall of rain there encountered. Steering a course by compass and astronomical observations (there was not a vestige of a trail), the explorers continued onward. The weather, it is said, became unexpectedly cold, varying from 29° to 23° Fah. in the morning; ice was formed upon vessels of water. Finally on the 20th of February, the oasis of Jupiter Ammon in Northern Libya was reached.

The journey from Dakhel to this point occupied thirty-six days, during which period not a single well was reached, although a distance of 500 miles was traversed. The iron tanks carried contained a plentiful supply of water for men and beasts during all this time. When it is considered that no other traveled route in all the Sahara has a longer space than a seven days' journey without water, the possibility of penetrating almost everywhere by the aid of Rohlfs's device becomes evident.

The oasis of Jupiter Ammon was found to have a depression of 100 feet below the Mediterranean level. From this point the expedition went to the great oasis of Kharjeh, 100 miles south and east, where photographs of the Egyptian temples were made. The inscriptions on these ancient monuments, it is said, give the names of eight Libyan rulers which have never hitherto been found recorded.

By April 15, the expedition had returned to Cairo, after traversing 1,700 miles of desert, two thirds of which distance was before totally unexplored. The oasis of Kufrah was not reached, nor is it believed that the same exists; and even if it did, the vast sand sea would prevent its practical connection with Egypt.

The results of the labors of the expedition are, in detail, said to be rich in scientific discovery. In general, however, the problem sought to be solved has only been negatively answered; that is, it is proved that the Libyan desert is absolutely uninhabitable, and cannot be explored without the most careful preparation, and good luck added thereto.

CAN YOU SWIM?

We do not mean: Can you swim for fun, or for sanitary refreshment; but can you swim for your life, with your boots on?

Swimming as an accomplishment is common; we should like to say common enough, but that would not be true so long as there remains a single individual who cannot swim at all, and unhappily such individuals are numerous. We can say, however, that swimming as an accomplishment is common compared with the art of swimming as a safeguard against drowning.

This is a distinction with a difference. There are multitudes, who are quite at home in the water in Nature's costume or with a light bathing dress on, especially when they know how far it is to the bottom and how far to the shore, who would go to the bottom with discouraging haste if suddenly pitched overboard in a strange place with their usual clothing on. The conditions are entirely different from those of ordinary swimming; and to one unaccustomed to the feeling and effect of clothing in water, the difference is very apt to nullify for the moment all his experience as a swimmer. The consequence is a sudden loss of self-control, which too often results disastrously, whereupon the friends of the victim marvel that such a good swimmer should drown so easily.

An accident of this sort occurred but a few days ago. The victim was the master of an excursion steamer, a good swimmer, his numerous friends say; yet when he found himself in the water unprepared for swimming, he acted as wildly as one wholly unable to swim. With all his swimming, he had probably never been in the water before in full dress; and the confusion of mind which ensued, when he found his limbs muffled with clothing, his buoyancy reduced, and all the usual conditions of swimming changed, kept him from making good use of the knowledge he possessed. So he tired himself and strangled himself with frantic struggles, and went to the bottom before a boat could reach him, though it was near enough to have saved one who could not swim at all, had he been cool enough to keep perfectly still.

The moral is plain. With all your swimming practice, don't neglect to accustom yourself to conditions such as you will be pretty sure to find yourself in should you ever have occasion to swim for your life. When you can keep your self afloat with heavy boots on, when you can tumble out of a boat in ordinary dress and strip in the water, and not waste your strength in suicidal attempts to overcome the resistance of clothing that cannot be removed, then you can safely answer in the affirmative the question: Can you swim?

There is a forceful proverb about teaching old dogs new tricks. We do not imagine that many adults will act upon