the clouds above, before the flash. Otherwise they could not have reached the earth at so nearly the same time. In fact, Professors Ayrton and Perry show (*Phil. Mag.*, 1878, v., 197) that condensation is a cause for increase of electrical potential, and this may produce the flash, and not the flash the condensation.

If, then, the lightning is the source of the sudden and increased downrush of rain, in thunder-storms the same evidence precludes the thunder also as a cause. If General Dyrenforth's heavy cannonading and concussions could evoke the rain-drops, then much more should we expect the increase with the terrific reverberations of the thunder. But all the proof is against his sound theory. The heavy detonations, then, upon which General Dyrenforth bases his theory are unnecessary, and the success of his experimenting must be looked for in causes other than the noises of the explosion.

One turns naturally, then, to the products of the explosives. In General Dyrenforth's experiments, minute solid particles of silica and carbon were liberated as results of the explosions of the dynamite and rackarock. This fine dust, entering into the upper air-layers, might have served as nuclei about which the moisture could gradually condense to finally form rain-drops. When this has been accomplished the rain fell, and not before. Even where the immense oxy-hydrogen balloons were exploded, the dynamite batteries were for hours steadily throwing fine powders of silica and carbon into the air.

Now it is well known that hail-stones, which are products of the vapor condensation, often show a nucleus of a particle of dust, and in volcanic regions frequently of a granule of ashes. In these cases a dust-particle was the centre of the condensation. This fact furnishes strong evidence to support the theory, that very small particles of dust may form the nuclei of the rain-drops and that the sudden presence of fine powder in the upper strata of air will lead to condensation if sufficient moisture be present.

It is well known that during the first few strokes of an air-pump, a vaporous cloud appears in the receiver. Some ten years ago Mr. John Aitken, in studying the London fogs, proved that if the air in the receiver be first filtered through cotton-wool so as to be dust-free, then no vapor cloud appeared (Nature, Dec. 30, 1880, 195). He came to the conclusion, and stated it clearly, that no condensation will take place unless some solid nucleus as dust be present.

The writer has recently performed some laboratory experiments similar to those of Aitken, to seek corroboration of his results, and to determine any relative difference in the properties of different dusts as regards their power for condensing moisture. I find with Aitken that condensation under the receiver of the air-pump does not take place in dust-free air, and, further, that, with different powders introduced, the amount of apparent condensation varied. The experiments were then repeated without the air-pump as follows: Into a large glass sphere filtered air was introduced, and then a steam jet discharged into it. No trace of condensation was present. Then air containing products of sulphur combustion was put in, and a heavy condensation became visible. In a similar way, vapor clouds appeared with ordinary atmospheric air and with air containing gun-powder smoke.

In this way it was found that such powders as carbon, silica, sulphur, and common salt are particularly capable of precipitating the moisture, while the burning of sulphur or gunpowder gave heavy visible clouds of vapor.

Laboratory experiments cannot represent conditions which hold on a larger scale in Nature. Still they may be suggestive. So from these experiments it may be legitimate to reason that the finest dust introduced artificially into the higher regions of the atmosphere will furnish centres for condensation, and by gradual agglomeration of moisture induce a rain-fall. It must, however, be borne in mind, that there must be sufficient water vapor in the atmosphere above to gradually collect upon the dust. Therefore not under every atmospheric condition could a rain-fall be hoped for.

To prove and to make practical use of this dust theory, elaborate and expensive experiments would not be necessary. In place of the costly outfit required by General Dyrenforth for producing his terrific noises, upon which his sound theory depends; in place of the heavy mortars transported to the plains; in place of the immense retorts with acids and chemicals for producing oxygen and hydrogen gases necessary for his balloons, there could be substituted the relatively inexpensive fire balloons. By sending up a few of these there could be carried aloft a mile or so apart a quantity of impalpable powders. Then at the heighth of about a mile any feasible means of scattering this powder into the air might furnish the occasion for an artificial rain-fall. The burning of sulphur or gun-powder by fuses timed for the proper height of the balloons should also be tried.

It might be urged against this theory, that many instances may be cited where dust has been superabundant even in the upper air layers, and no increase of rain-fall noticed; that volcanic eruptions emit quantities of finest ashes to the atmosphere above, as did Krakatoa a few years ago, whose dusty breath circled the earth for many a month, and yet no unusual aqueous precipitations were observed. But it is to be remembered that if the number of the dust particles is excessive, the amount of moisture in the air, which is always limited, will be divided among so many that the agglomeration upon each will not be sufficient to cause it to fall as rain-drops.

If this dust theory be true, the amount of powder borne aloft and exploded from the balloons need not be beyond the limits of practicable experimenting. At least the experiments necessary to test the theory would be incomparably cheaper than General Dyrenforth's, and, if successful, artificial rains could be ordered at a cost which General Dyrenforth's explosive bombardments cannot approximate.

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NOTES AND NEWS.

DR. A. H. BEALS has been appointed professor of pedagogics and natural science, Georgia Normal and Industrial College, Milledgeville, Ga.

— At the sixty-fourth meeting of German naturalists and physicians at Halle, on the 22d of September, Dr. Below gave an important address on "Health in the Tropics." He came to the conclusion that the opening up of the tropics for Europeans was practically a question of hygiene, and that, with proper sanitary precautions, the most apparently unhealthy districts may be rendered salubrious.

— At the recent meeting of the Italian Congress of Internal Medicine initial arrangements were made for the next International Medical Congress, which is to meet in Rome in 1893. In what month of the year it will be held is an important question not yet decided, according to *The Lancet*. At midsummer, or in the early autumn, Rome is not likely to be found attractive to those who dread subtropical heat in a malarious vicinity. If held in the spring, or the late autumn, many teachers of medicine will not be able to attend. The last fortnight of September is what the

majority of Italian practitioners would suggest as the most convenient time for all parties, and this will most probably be the decision of the Organizing Committee. Meanwhile, that committee has just been formed. Dr. Baccelli, at a meeting of the heads of the profession, was nominated president by acclamation. On his declining the honor, the question was put to the vote, when, out of a ballot of twenty-six, he obtained twenty-five "si," as against one "no," which was himself. He had, therefore, to bow to the overwhelming importunity of his colleagues. The post of general secretary fell, almost unanimously, to Professor Maragliano of Genoa. Presidents of the various sections were next elected. These sections are twelve in number, and, as the results of the various ballots, the following gentlemen were appointed: anatomy, Professor Antonelli; physiology, Professors Albini and Albertoni; pathology, Professors Bizzozero and Foà; pharmacology, Professor Cervello; clinical medicine, Professors Baccelli, Maragliano, Murri, and Bozzolo; surgery, Professor Bottini; obstetrics, Professor Morisani; psychiatry, Professors Morselli and Tamburini; ophthalmology, Professors Devincenzi and Secondi; dermo-syphilopathy, Professors Campana and Barduzzi; forensic medicine, Professor Tamapia; hygiene, Professors Pagliani, Celli, and Canalis. The importance attached to this great medical parliament is already apparent in the number of physicians and surgeons who have intimated their intention to assist.

— The Volcano Islands have been annexed by Japan. The group lies 135 miles to the south-east (south-west?) of the Bonins and about 1,700 miles from Yokohama. It consists of Sulphur Island, situated in 24° 46′ north latitude, and 141° 19′ east longitude; St. Alexander, 40 miles to the north of Sulphur Island; and St. August, at the same distance to the south. The area of the middle island, which is the largest of the three, is only five square miles. The only natural product of any importance is sulphur, which is found in a very pure state ready for shipment. The natives of the Bonins also visit these islands for the sake of the fishing.

— An extended tour of a representative of Tiffany & Co., New York, during the past summer, through Ireland, England, France, Germany, Austro Hungary, Bohemia, Russia in Europe, and Asia, where he visited all the cutting centres where stones are mined, the collections and museums, enables them to show a finer collection of gems, precious and semi-precious stones, and art objects in stone, jade, crystal, etc., than has ever been brought together at one time in this country. Notable, from the Ural Mountains, is a collection of Alexandrites, topazes of blue, green, and sherry colors, demantoids or green garnets, royal purple amethysts, changing color by artificial light, the finest and largest that have been seen in modern times; from the Ural gold washings, sapphires; pale, yellow, and blue rubies; beryls of golden yellow and green, of which two are the finest that have come from Russia in the last decade; and lapidary work peculiar to the Urals, in rock crystal, garnet, amethyst, topaz, sard, jade, and rhodonite; from the Hungarian opal mines, the finest specimen of noble opal that has been obtained for many years; from France, lapidary work equal to that famous in the periods of Louis XIV., XV., and XVI.; from Italy, Bosnia, Greece, Bactria, Assyria, and Egypt, antique intagli, stone scarabie and cylinders, incised sard cornelian, chalcedony, plasma, sardonyx, essonite, hematite, etc., some dating as early as the fifth century B.C.; from Ireland, Mourne Mountain, deep blue aqua-marines, and one very fine amethyst.

— A bulletin has been issued by the Bureau of Education, Washington, for the purpose of giving information respecting the appointment of a chief of the Department of Liberal Arts, known as Department L, and respecting the organization for holding educational congresses in connection with the World's Columbian Exposition of 1893. Since Bulletin No. 3 was issued Dr. Selim H. Peabody of Illinois has been appointed chief of the Department of Liberal Arts. Dr. Peabody was for many years the president of the University of Illinois, at Champaign, Ill. The World's Congress Auxiliary of the World's Columbian Exposition is a body authorized and supported by the exposition. It has been organized to provide for the holding of such congresses in connection with the Columbian Exposition in 1893 as will best show the intellectual and moral progress of the world. The intention is to provide proper committees to secure the attendance of leaders in all branches of human knowledge, to provide convenient meeting places, to arrange and superintend the meetings, and to publish the proceedings of all the congresses. The organization is composed in the first place of two branches, the men's and the women's, and each of these is again subdivided into two classes, resident and non-resident. The resident class of each branch is the part from which the members of committees are to be chosen. Certain non-resident persons who may be especially invited to co-operate with local committees are to be made members of advisory councils of departments, divisions, chapters, or sections, and they are expected to aid the local committees by corresponding freely and by personal conference as opportunity may offer. Other eminent non-resident persons are to be known as general, honorary, and corresponding members of the auxiliary. The general officers of the auxiliary are Charles C. Bonney, president; Thomas B. Bryan, vice-president; Lyman J. Gage, treasurer; and Benjamin Butterworth, secretary. The address is Rand Building, Chicago, Ill. Congresses are proposed for each one of the six months that the exposition is to be open. Those proposed for July are science, philosophy, invention, and education, including congresses of colleges, universities, teachers, superintendents of schools, astronomers, archæologists, botanists, chemists, electricians, geologists, ethnologists, geographers, mineralogists, metallurgists, zoologists, etc. The arrangement for the educational congress has been entrusted to a committee appointed for the purpose by the National Educational Association. Now that a chief of the Department of Liberal Arts has been appointed, the Commissioner of Education calls the attention of all educational exhibitors to the fact that the Bureau of Education has a position quite similar to their own, and can not be expected to give any information regarding the plans and scope of the educational exhibit, excepting in so far as it may be requested to do so by Dr. Peabody. All such information should be obtained directly from Dr. Selim H. Peabody, whose address is Rand Building, Chicago. The Commissioner of Education is desirous of aiding in the preparation of this work in any way that does not conflict with the authority of the regularly appointed officers of the World's Columbian Exposition.

— The King of the Belgians has offered a prize of 25,000 francs (£1,000) to be awarded in 1897 for the work giving the most satisfactory replies to the following questions: Describe, from the sanitary point of view, the meteorological, hydrological, and geological conditions of the territories of Equatorial Africa. Deduce from the present state of our knowledge concerning these matters the hygienic principles suitable for these regions, and lay down, with observations in support of the conclusions arrived at, the best scheme of life, diet, and work, as well as the system of clothing and form of dwelling best adapted for the preservation of health and vigor. Describe the symptomatology, etiology, and pathology of the diseases which characterize the regions of equatorial Africa, and indicate the treatment, both prophylactic and therapeutic. Define the principles to be followed in the choice and use of medicaments and in the establishment of hospitals and sanatoria. In their scientific researches, as well as in their practical conclusions, competitors should particularly take into account the conditions of existence of Europeans in the different parts of the Congo basin. The prize is open to foreigners as well as to Belgian subjects. Competitors must send in their works to the Minister of the Interior and of Public Instruction at Brussels before Jan. 1, 1897.

— The World's Fair Archæological survey, under the field assistants, Warren K. Moorehead and Dr. H. G. Cresson, located at Anderson Station, Ross County, Ohio, made a remarkable discovery upon Mr. C. Hopewell's farm, Nov. 14. The tumulus examined is 500 feet long, 200 feet wide, and 28 feet high. It lies in the centre of a group of twenty-six mounds, all of which were opened in September and October with good results. On account of its great size the mound was divided into five sections of forty feet each for convenience in excavating. In the first cut made i

the east end nothing was found. Near the surface of the second cut two bowlder outlines resembling panthers were uncovered and measured. Like the effigy mounds in Wisconsin, they were 85 to 90 feet long, being composed of one thickness of stone. The heads, limbs, and tails were distinctly outlined. Near the bottom of the second cut were three skeletons, with objects of copper, bone, and shell. North of this deposit lay the great medicine man, or chief of the village which had erected the mound. If the number of implements is evidence of the esteem in which a prehistoric man was held by his people, he was certainly the most important Caique of the Scioto Valley. At his head were imitation elk-horns, neatly made of wood and covered with sheet copper, rolled into cylindrical form over the prongs. The antlers were twenty-two inches high and nineteen inches broad at the top. They fitted into a crown of copper, bent to fit the head from occipital to upper jaw. Copper plates were upon the breast and stomach; also on the back. The copper preserved the bones and a few of the sinews. It also preserved traces of cloth similar to coffee sacking in texture, interwoven among the threads of which were nine hundred beautiful pearl beads, bear teeth split and cut, hundreds of other beads of both pearl and shell. Copper spool-shaped objects and other implements covered the remains. A pipe of granite and a spear-head of agate were near the right shoulder. The pipe was of very fine workmanship, and highly polished. The mound is still in process of examination, two months being yet required to open it thoroughly. It is thought to indicate connection with the Aztec people, as such head-dresses are only found in Mexico and Yucatan.

— Since Laveran discovered a parasite in the blood of several patients suffering from malarial fever ten or twelve years ago, many other observations on this interesting subject have been made both by himself and by many other writers, Continental, American, and Indian. One of the latest papers on the subject is a dissertation by Dr. Romanovski of St. Petersburg, reported in *The Lancet*. He thinks that the malarial parasites are so inseparably associated with the disease that the blood of patients supposed to be suffering from malaria ought to be examined as a matter of routine, as the sputum of phthisical patients is, for microbes. He finds that the amœboid parasite of tertian fever has a nucleus which acts by means of a fibrous metamorphosis of the chromatin net-work, and not by a direct method. When quinine is administered in sufficient doses it causes the destruction of the amœboid parasite, the degeneration, which is easily observed, chiefly affecting the nucleus. With regard to the prescription of quinine, he says that it should be given in two doses of about fifteen grains each during the twelve hours immediately preceding the attack, because during that period the number of adult parasites is at its maximum. From some observations made with tincture of sunflower Dr. Romanovski was led to the conclusion that this drug, though not without its influence on malarial fever, cannot be considered as a satisfactory substitute for quinine. He appends to his work references to more than 120 articles bearing on the subject, some few of which are in Russian, but the great bulk are in more accessible languages.

— The fame of the Cape as a health resort is not of recent growth, says *The Lancet*. In the old days of our Indian Empire, long before the Suez Canal was projected, and when connection with the East was maintained exclusively by sailing ships around the Cape of Good Hope, Cape Colony was the favorite recruiting ground for our countrymen exhausted by the toils or climate of Hindustan. The Suez Canal and steam have altered all this, and the Cape has suffered in consequence. It is once more becoming known as a health resort, in consequence of that widespread movement of travel which is now making all parts of the world familiar, and turning their special features to advantage not only for commerce and adventure, but for health. The broad features of the Cape climate are as follows. Great dryness, clearness, and rarefaction of the atmosphere; abundance of sunlight; considerable maxima of heat, which are nevertheless free from depressing effects and consistent with vigor and activity; cool nights, a considerable proportion of wind; a long summer and winter, with a correspondingly short spring and autumn; much dryness of soil and scantiness of forest and vegetation. The health record is, on the whole, good. There is no yellow fever or cholera. Pulmonary affections are alleged to be relatively somewhat infrequent. Hydatids, so frequent in Australia, are rare. Rheumatism and neuralgia are frequent. Speaking generally, accommodation and means of communication are bad, but appear to be undergoing a steady change for the better.

— The *Lancet*, in describing a military bicycling trip in which the party made one hundred miles in about ten hours, says in conclusion: The most interesting part of the narrative has still to be told. The veteran cyclist, Major Knox Holmes, at the near close of his eighty-third year, mounted on a tandem with Mr. Males, a young rider under eighteen years of age, accompanied the corps, and arrived at the termination of the expedition five minutes in advance of the rest. He was a little distressed on dismounting, from too hard riding the last few miles, but he soon threw off his fatigue and joined his companions at dinner with thorough zest. His condition is physiologically peculiar. In twelve weeks' new training he has, in the most striking manner, "developed muscle" in the external and the internal vasti, the rectus, and the muscles which form the calf of the leg. It has become so entirely a part of physiological doctrine that after threescore years and ten there is no new development of muscle, that if we had not seen with our own eyes, as we have, this actual development in one whose age exceeds by thirteen years the traditional span of human life, we should have doubted the possibility of its occurrence.

— An official report by Mr. Hughes of the Geological Survey of India, on tin-mining in the Mergui district of Burmah, contains a description by Mr. Adam of a remarkable tin deposit discovered in the Maliwun district. After tracing a reef which attracted his attention from hill to hill, and taking specimens in various places and in a variety of ways, these gave such extraordinary results "that I felt myself quite puzzled to account for the enormous masses of wealth lying unheeded, more especially as many years before a European company lost all its capital within a short distance of this very place. . . . It is a most extraordinary deposit, quite beyond anything I have ever seen in my travels, nor have I heard of any miner or prospector meeting anything so rich." He then details two experiments, by one of which he got 141 pounds of ore from two cubic yards of the most unlikely rock he could see, and by the other 141 pounds of ore from one cubic yard of unselected rock. "These results," he says, "multiplied by the enormous masses of these hills, would give figures altogether fabulous in their dimensions." Mr. Hughes is not quite so enthusiastic about the discovery. He says: "I twice visited this reef, once in company with Mr. Adam and again with Dr. King, the director of our survey. There is nothing I would term a main lode, but rather a zone of metamorphic rocks through which runs of varying ore-bearing quartzes can be traced. Many of the smaller seams, of a reddish-brown color, are heavily weighted with tin ore, giving as high a proportion as 60 per cent, The primary value of the reef is dependent on the persistence of these courses of quartz; for, apart from them, little or no ore was obtainable by rough washing samples of the rock. In dealing with the claim of this reef to exceptional richness, we have to allow for the vicissitudes which seem to dog the persistance of all metalliferous indications in India, and we have to allow for the accident of the courses of quartz dying away as they descend. At first sight there is nothing to suggest such a liability, but we have, in the history of unsuccessful efforts to work the lodes from 1873 to 1877, a warning as to the possibly fleeting nature of the deposit under discussion. This, however, is the very worst aspect that can be assumed. And the pleas on the other side are that the reef has been traced for more than three miles, that a large portion of it can be won by surface blasting, and that the statements made as to the precarious character of the runs of quartz are based on imperfect evidence. The point on which there can be no dispute is that there is a large mineralized zone of rock exposed in the form of a prominent, well-defined hill, which is free from any speculative doubts as to its existence. At the spot known as Khow Muang there are at least 60,000 tons of reef within sight."