

Correspondence.

The Explosion at the Dominion Carbide Works, Ottawa.

To the Editor of the SCIENTIFIC AMERICAN:

The SCIENTIFIC AMERICAN recently published a short editorial on the accident at the Dominion Carbide Works. The coroner's inquest held at the request of the City Council brought out the following facts:

The fire originated in a building adjoining the carbide works, cause unknown.

A hole was cut in the roof of the works directly over a crucible containing about 1,000 pounds of molten carbide.

Water from the firemen's hose was poured in through the hole on the upper floor, whence it streamed down into the furnace room on pigs of carbide lying on the floor, and on a small quantity of broken carbide ready for packing. Gas generated from the water dripping on the cold carbide. It was ignited by burning wood falling through the ventilating shaft, and burned quietly as rapidly as it was given off. Suddenly an accumulation of water poured into the crucible on top of the molten carbide. An explosion followed that wrecked the plant and injured eighteen men. The verdict of the jury was that the explosion came from that crucible, but left it an open question as to whether it was caused by the rapid conversion of the water into steam or by water gas formed by the vaporization of the water on the unfused mixture of coke and lime. The expert testimony was all against the possibility of the explosion being acetylene. Such men as Thomas Macfarlane, analyst for the Department of Inland Revenue; Prof. Shutt, analytical chemist, Dominion Experimental Farm; Prof. McGill, of the Geological Survey, and the men engaged in manufacturing carbide, deposed that it was impossible to generate acetylene from red hot carbide. Medical evidence as to the injuries from the explosion showed that they were the result of dry heat, not steam. The victims themselves said that the burns came from the hot unfused mixture of lime and coke. Only one injury was serious, resulting in the loss of an eye.

The coroner's verdict has dissipated a great deal of prejudice against carbide. The jury came to the conclusion that its manufacture was not of a hazardous character when conducted in a fireproof building. The City Council, acting on the finding of the jury, have instructed the by-laws committee to frame a by-law to regulate the manufacture and storage of carbide. They consider this necessary because Ottawa is destined to be the center of an immense carbide industry. Within the city and in a radius of 45 miles, there is over a million horse power in waterfalls, abundance of lime, and easy access to coke and charcoal. In this northern country, where the nights are so long in the fall and winter, acetylene is bound to take a front rank as the poor man's light.

A. HOLLAND.

Ottawa, Canada.

Fossil Hunting in the Rockies.

BY LOUIS E. VAN NORMAN.

The State of Wyoming is a geological wonderland. It is new land, the newest land on the continent, geologically speaking. In the prehistoric ages, but nearer to the time of the advent of man than that at which any other American land appeared, if not after this advent, this part of the United States arose out of the primeval waters. Up to this time there had been an inland sea, or several seas, over all Western North America from the Gulf of Mexico clear upward to the Arctic Ocean. The outlines of this primeval sea can be traced almost all over the great plains through the Dakotas, Montana, Wyoming, Colorado, Arizona and New Mexico, by the fossil remains which are scattered throughout this vast area in great profusion. The long ages subsequent to this uprising of the land, the Mesozoic time of the geologist, have also left rich deposits to mark them, from the little invertebrate ammonites to the giant vertebrate dinosaurs of the Jurassic age, the largest land animals that ever lived. The natural surface formations all through this vast region are magnificent from a scenic point of view and marvelous from any standpoint. The Bad Lands, or lava fields of Dakota, the geysers, boiling springs and vividly colored rock formations of the Yellowstone National Park, the tremendous cañons through which the great rivers have cut their way to the ocean, the alkali lakes and deserts and the rich mineral wealth so comparatively near the surface—all these attest the youth of the earth's crust at this point and indicate some of the marvelous transformations which are being ceaselessly carried on in Nature's vast laboratory.

Small wonder, then, that this region is the paradise of the geologist. A number of scientific expeditions have explored these plains—notably the early ones of Dr. F. V. Hayden, from 1854 to 1859, and those of Prof. Marsh in the early seventies. The latter made more than 20 trips across the mountains and discovered 200 new species of animals. But the fossil field of Wyoming seems to be practically inexhaustible. For the past two or three years Prof. Reed, of the University

of Wyoming, has been prospecting throughout the State, and last year he made several highly important discoveries. About ninety miles northwest of Laramie he came upon the bones of the most colossal animal ever taken from the earth's strata. This was a huge dinosaur, a monstrous lizard, measuring over 120 feet in length, the petrified skeleton alone, it is estimated, weighing more than 40,000 pounds. The labor of removing this giant is so enormous that the skeleton is still in its natural resting-place, but it is calculated by the university authorities that, by next spring, they will be entirely excavated.

What is, without doubt, the most thoroughly organized scientific expedition which has ever entered our great western domain has just finished its field labors. Led by Prof. W. C. Knight, of the University of Wyoming, 80 scientists, mostly professors of geology from the great universities and colleges all over the country, and their assistants, have spent "40 days in the wilderness"—exploring, examining fossil exposures and gathering specimens.

The expedition was thoroughly organized and equipped. Seventeen teams, with tents, paraphernalia and provisions, with seven cooks and a dozen cameras, left Laramie, the seat of the State University, on July 20. Three secretaries, Prof. Collier Cobb, of the University of North Carolina; Prof. E. H. Barbour, of the University of Nebraska, and the writer, kept a systematized account of what was being done, and gave information to the press of the more important finds. Everything possible was done to secure excellent and permanent record of the results of the trip. For the photographers a dark room, or, more properly, a dark tent, was provided, and every new move and scene was recorded on a dozen plates. The route lay through Southern and Western Wyoming, with the Grand Cañon of the Platte River as the chief objective from a scenic point of view.

The progress of the party had been systematically planned beforehand, to take place so that the fossils might be found in order, from the lower to the higher, from lowest invertebrate to highest vertebrate. Ammonites, baculites, belemnites—but there is no use going over the list of scientific names. Many beautiful and almost perfect specimens of these mollusks were found and shipped back to the various universities whose representatives were with the party. A number of slabs of carboniferous sandstone were obtained with ripple marks and very beautiful impressions of leaves on them, some of the latter as exquisitely limned as though carved with an engraver's tool or cut by the photographer's lens. Of course, however, the great objective of the trip was the vertebrate remains, found first at Lake Como, Aurora, in the massive ledges of sandstone which rise in successive tiers at this point. The landscape seemed familiar to us as we camped at the foot of the ridge one hot, dusty evening about five o'clock. Then we remembered. Prof. Marsh took out his great dinosaur (now in restoration at Yale) from this exposure and afterward painted the surroundings. The dinosaur was a mighty lizard, whose remains are found plentifully scattered throughout the Cretaceous and Jurassic inland seas of Wyoming. It was probably a land animal, though possibly it lived amphibiously on land and in fresh water swamps, and perhaps even along the shores of the salt oceans. Prof. Reed, in speaking of the monster discovered by him last year, said:

"An accurate idea of a living dinosaur is practically out of the question. According to my opinion, I should say that the animal now being brought to light weighed in life about sixty tons, that he had a neck thirty feet in length, and a tail perhaps sixty-five feet in length. His ribs were about nine feet in length, and the cavity of his body with the lungs and entrails out would have made a hall thirty-four feet in length, sixteen feet in width, and arched over probably twelve feet in height. Such a space, if properly arranged, would seat at least forty people. A round steak taken from the ham of the animal would have been at least twelve feet in diameter, or more than thirty-five feet in circumference, and would have had a solid bone in the middle twelve by fourteen inches, with no hollow for marrow. A set of fours in cavalry could easily have ridden abreast between his front and hind legs, provided he had not objected. Every time he put his foot down, it covered more than a square yard of ground and must have fairly shaken the earth. The smallness of the head of this animal is a peculiar thing. I should say that the head of this mighty dinosaur was probably not larger than a ten-gallon keg. He must have been a very sluggish creature, as his brain cavity would certainly not warrant the belief that that organ weighed to exceed four or five pounds."

Remains of a number of other animals, mostly reptilian in their nature—with a few primitive mammals and birds—are to be found in great profusion in these Mesozoic beds of the West. It is believed by scientists that these animals inhabited the ancient lakes and swamps by myriads, and, in dying, sank in the mud. Their bones were covered over with other deposits and became petrified. All through the long geological ages they lay sinking deeper and deeper,

until covered with perhaps 20,000 to 30,000 feet of solid rock. Then, in the titanic process of the birth of the Rocky Mountains, the great surface beds were tilted and twisted and bent upward, and, by erosion, the bones are brought to light. Owing to its massiveness and hardness, the bone most frequently found in the case of almost all fossil animals is the femur, although ribs, skulls and vertebræ are also plentiful. The second day of the camp at Aurora the expedition came upon its first dinosaur bones. Mr. Edquist and his assistants, of Gustavus Adolphus College, Minnesota, discovered a great femur, six and a half feet long, which they were able, by arduous and protracted labor, to excavate without much damage. A number of others—bones of all descriptions—were obtained on the expedition, the full value of which cannot be accurately estimated until the scientists return to the laboratories and begin the work of restoration. Quite an interesting and valuable collection of mineral specimens was also secured. There was a taxidermist with the party, and he can show a fine set of specimens of the bird life encountered on the trip. Mr. J. E. Cameron, of Coe College, Iowa, acted as botanist to the expedition, and went home laden with a collection of the rare and beautiful flowers which strew the prairies and deck the mountain sides.

As a camping trip what a splendid, delightful success it was! The fine, tonic air, the magnificent scenery, all the charms of outdoor life, in the finest game and fish country in the world, made the day pass hilariously and full of enjoyment.

In closing, I cannot resist the temptation to relate a little incident. As this is "on" the narrator as well as others I presume he will be pardoned for the telling. Let me preface the story by saying that up to the time of the occurrence I refer to, our acquaintance with coyotes, those small wolves of the Western plains, had been confined to hearing them howl most dismally and blood-curdlingly at about four o'clock in the morning—not so very far from the tent. The day I speak of, three of the party—a man from California, a man from Minnesota and the writer, who hails from the "effete East"—were exploring an old unused coal mine, indeed only a hole in the ground where the railroad had been prospecting for coal. The California man had a Springfield rifle and a belt fairly bristling with cartridges, the man from Minnesota was equipped with a double-barreled shot-gun and the other fellow had a six-shooter in his hip pocket. As we crept along the low gallery—so low in places that we were almost forced to go on all fours—suddenly there was a terrible howl which echoed throughout the narrow spaces till it sounded like a whole legion of demons—and something white and furry, with gleaming eyes and red jaws, dashed by us out toward the entrance to the mine. The mighty hunters, guns, revolvers, and all, tumbled over one another in headlong rout. The revolver went off promptly, with the result of causing the armor plating—pardon, the stiff corduroy trousers—of the deponent to be bent outward like the armor on the ill-fated "Maine." Upon our hurried exit we spied a very small coyote, probably much more frightened than we, scudding off over the plain. Then we redeemed our sportsmanship. Three firearms rang out simultaneously—though what was accomplished by the shotgun and the revolver it is hard to determine—and Mr. Coyote went to join the great company of former citizens of earth whose bleached skeletons whiten the trail from Wyoming to Utah.—The Independent.

Free Seed Distribution.

As most of our readers are aware, \$130,000 is appropriated annually for free seed distribution, and this has occasioned much adverse criticism. Secretary Wilson is now preparing the part of his report which treats of free seed distribution. As far as possible, he wishes to avoid the hostility of the seedsmen by distributing entirely new varieties, which was originally contemplated in the appropriation, and distribute the varieties of seed which the commercial seedsmen are not handling and experimental seeds which have not gained a foothold. The Department's agents are engaged in a search for such varieties all over the world, and after carefully testing the seeds they will be distributed in the appropriate sections of the country. After the species has gained a foothold, the seedsmen may be trusted to take care of the current demand. Secretary Wilson is of the opinion that there is ample work for the Department without distributing time-tried seeds, and that there is enough room in improved grasses alone to absorb to advantage the entire appropriation that the government allows for the seeds. The introduction of one new variety of rice in the South which is now growing successfully is said to have a commercial value of \$1,000,000 a year to the American growers; it cost the government only about \$5,000. In connection with the rice cultivation it is interesting to note that investigations are being carried on relative to cultivating rice in an artificial swamp, which may be drained off when harvesting time arrives, so as to permit the use of labor-saving machinery. This will enable vast prairies to be utilized.

Science Notes.

A correspondent informs us that in 1890 twenty ostrich eggs were hatched by incubator and eighteen of the birds were raised.

Congress will be asked for the establishment of a national park in the southern Alleghanies, probably in the Blue Ridge or Smoky Mountains, west of North Carolina.

A telegram has been received at the Harvard College Observatory from Prof. Kreutz, of Kiel University, stating that a planet of the tenth magnitude was discovered on December 4, by Charlios.

The stain of banana juice is almost indelible. It does not proceed from the stalk or plant, but exists in the green fruit as well, from which when cut or bruised it exudes in the shape of viscid milk or cream-like drops.

The International Commercial Congress at Philadelphia was an entire success, and the city of Philadelphia spent \$100,000 in entertaining the guests. It is said that large orders were placed by foreign delegates for American goods.

In 1890 there were only four insurance companies in Japan, with a capital of 1,600,000 yen. In 1898 there were seventy-three registered companies with a capital of 34,720,000 yen. At the same period the thirty-six Japanese companies alone showed an issue of 510,000 policies, the value of 120,000,000 yen.

The President of the New York Board of Health has taken action toward the strict enforcement of the law regarding the sale of poisons. There have been many cases of suicide lately by carbolic acid poisoning, and if this chemical was more difficult to obtain, it would doubtless decrease the number of cases.

The climate of Egypt is magnificent, and there are few winter resorts that are preferable, meteorologically speaking. The air is fine and dry and the sunshine is perfect, while with equable temperature, wholesome food and water, and gentle breezes, there is little to be desired. Unfortunately, the sanitary arrangements in Egypt are very bad, and most of the hotels, even in Cairo, are built on contaminated sites.

Fruit is now being shipped from New South Wales packed in the bark of the ti tree and the outer bark of the Melaleuca leucadendron, which is shredded into a sort of coarse chaff. These barks seem to have some peculiar power of preserving oranges during carriage. This may be owing to the elasticity of the packing and the fact that it permits of ventilation. Unless the bark is cut too fine there is no sweating possible. The bark costs only \$20 per ton.

The work of the Egyptian Exploration Fund for the year has lain in the same district as before, a short distance down the Nile from Denderah. Altogether about 1,250 graves of prehistoric age and about as many historic graves—mainly about the twelfth dynasty—were opened and recorded. The society has already received from the Egyptian government the promise of a permission to work at Abydos, one of the most important sites in Egypt. Prof. Maspero will return to Egypt to resume the direction of the Department of Antiquities.

In 1897 in Germany 1,383,700,000 gallons of beer were consumed, 1,192,000,000 were drunk in Great Britain; 180,000,000 in France, and 90,000,000 in Russia. It is estimated that 36 gallons per head are drunk in Belgium, 32 in Great Britain, 25 in Germany, 21 in Denmark, 12 in Switzerland, 10 in United States, 9 in Holland, 5 in France, 3½ in Norway, 2½ in Sweden, and 1 in Russia. A writer in The North American Review declares that a large quantity of beer is consumed in order to satisfy the craving for the elements which are eliminated from wheat in making white bread.

According to Technische Notizen, the celebrated Parisian oculist Dr. Emil Berger has constructed a binocular microscope which admits of seeing objects plastically (i. e., in relief). As is well known, the stereoscopic effect is lost by the use of only one eye, and consequently of our monocular microscope, not to speak of the harmful suppression of the vision on one eye at the expense of the other. This new microscope places the object in a normal distance (about 33 centimeters) from the eye. If the news is credible, Dr. Berger's invention will prove a great boon to the hundreds of thousands whose profession forces them to use a microscope.

The current number of the SUPPLEMENT contains a most interesting account of the manner in which photographs are obtained in Paris in the theaters by M. Boyer. In brief, the system consists of an arrangement for burning several magnesium cartridges in succession. A number of batteries of burners are used, and pure magnesium is consumed. The powerful blowing apparatus permits a prolonging of the flash for the time required. The cartridge apparatus is actuated by electricity. In order that it may be possible for the operator to make a series of negatives without being annoyed by the smoke of the preceding flashes, there is installed a ventilating fan actuated by an electric motor. By means of a cloth sleeve the smoke and dust are carried outside of the building.

Engineering Notes.

The Cooke Locomotive and Machine Company, at Paterson, N. J., has just built five locomotives for the Barry Railway Company, of Wales.

The Boers do not seem to have learned how to render the rails of railways unserviceable. They heat them and then bend them around trees or other objects. They can, however, be easily straightened.

Ninety new locomotives have been ordered by the New York Central Railroad, and five of them will be built after the design invented by Cornelius Vanderbilt and tested by him on the Mohawk division of the road for nearly three months.

Between January 13, 1898, and August 13, 1899, new lines of railway, with a total length of 3,171 miles, were thrown open for traffic in European and Asiatic Russia. The total length of railways in the whole Russian empire, on August 13, was 30,321 miles.

Twenty railways threw open their shops to sixty Cornell students during their last vacation. Their employers now say they were cheap at the \$1.30 a day they were given, and the boys say what they learned was cheap at the price of a three months' vacation.

Rear-Admiral Rogers, President of the Naval Inspection Board, has returned to Washington from a visit with the Board to Peconic Bay where a test was made of the submarine torpedo boat "Holland." The Rear-Admiral made a verbal report, speaking in the most favorable terms of the boat.

The first railway in Corea was opened to traffic on September 18. It runs between Seoul and Chemulpo, and the track is now laid to within 5 miles of Seoul. It was built by the American Trading Company, is of standard gage, and is 26½ miles long. The Japanese government appropriated \$900,000 for its completion. American materials and cars are used throughout, and there are two trains in each direction a day.

What is believed to be the largest shearlegs in Great Britain have recently been completed by a shipbuilding company. They are guaranteed to lift 150 tons. The legs have an overhang of 60 feet and an inhang of 13 feet from the center of the trunnions. The front legs are 45 feet apart at the bottom, measured from center to center, and are long enough to describe a radius of 135 feet. The back leg is 185 feet long.

Each car of the armored trains which are now being employed in British operations against the Boers is painted khaki color. Both the engineer and the firemen are completely protected, and the orders are conveyed by bell signals. One of the engines is fitted with a steam pump. Hose is provided of sufficient length to enable water to be taken in from rivers or other sources of supply on the journey. The engine is placed in the middle of the train to allow for the use of Maxim and other guns.

It is stated that the application of heat accumulators on the locomotives of the Moscow-Koursk line of the Russian state railroads has given excellent results, allowing an increase of weight of trains of from 15 per cent to 25 per cent. The apparatus, according to The Engineer, consists of a cylindrical reservoir of cast iron with a capacity of about 300 gallons placed horizontally on the top of the boiler and communicating with it by pipes and valves. During stops or in running down grades, when little or no steam is consumed, it is used to heat the water in this reservoir, which is then used for the feed.

Engine No. 601 of the Lake Shore and Michigan Southern Railway made a remarkable run between Buffalo and Cleveland, November 22. It hauled a fast passenger train with eight cars. It left Buffalo 59 minutes late and ran into Cleveland 2 minutes ahead of time, thus making up one minute more than an hour in a distance of about 185 miles, the schedule time being 4 hours and 25 minutes. Between Perry and Painesville, a distance of 5 miles, the running time was made in 3 minutes. The engineer in charge of the train was of the opinion that even this speed could have been increased.

A German manufacturer, who recently visited Pittsburgh, was greatly surprised in the difference in the welcome he received eight years ago and at the present time. At the former period the manufacturers entertained the foreign visitors lavishly and showed them all the wonders of natural gas and the resources of their plants. All this is now changed. He requested permission to inspect certain mills and see the improved machinery and methods in vogue. He was surprised to find that it was impossible to obtain the required permit. Other foreigners have succeeded in entering some of the mills, but the manufacturers are becoming more and more chary in granting facilities for the inspection of their plants. There was a time, and it was not so long ago, when foreigners did not care to enter the mills; but at the present time they are very anxious to do so. It should be remembered that abroad in very few cases are foreigners ever allowed to inspect plants, and there is no reason why we should grant favors which we cannot receive in return.

Electrical Notes.

The Electric Review objects to the term "wireless telegraphy," and the other names which have been proposed seem equally objectionable, such as "wave telegraphy," "etheric telegraphy" and "space telegraphy."

A prominent detective agency has recently investigated the use of electricity for breaking the vaults of banks and safes. The report states that there has never been a single successful burglary of a bank vault or safe by electricity, and that there is no necessity for alarm on this score.

According to Engineering, a young Danish inventor has constructed a phonograph which will take telephone messages. It is said that a steel band is used instead of a wax cylinder. If true, this would be a most interesting and important invention, but we cannot vouch for its authenticity.

Wireless telegraphy will, it is said, be introduced into the British navy as a branch study. The "Hector," an old hulk lying off Portsmouth, has been fitted out as a school of instruction, and will be used as a receiving station, and the "Canopus" will be provided with a regular equipment of Marconi apparatus.

A curious novelty is a clock let into the sidewalk. The dial consists of a glass plate through which are seen large numbers denoting the hour and minutes. The upper line changes every hour, and the lower every minute. The figures are operated by electricity and are controlled by a master-clock inside the store. The numbers are carried on celluloid ribbons, which are fed by proper mechanism.

There was a test of the Pollak-Virag system of rapid telegraphy from Chicago to Milwaukee on November 22, and a test was also made on the same day on a line from Chicago to Buffalo and return. Messages were sent at the rate of 122,000 words an hour between the first named places, and 90,000 words an hour from Chicago to Buffalo and return. The results were not as satisfactory as was hoped, owing to the fact that all the apparatus could not be gotten into position.

A new dredge for use on the Volga River, in Russia, has just been built by the Cockerill Company, of Belgium, and is constructed in two parts so as to pass through the canal system leading from the Baltic. Each half is 216 feet long, 31½ feet wide and 9 feet deep, and each half can be operated separately making a bottom cut 62 feet wide. The dredge has steel hulls and is propelled and controlled by electrical machinery of American manufacture. Steam is generated by American boilers fired with naphtha.

A New York doctor has sent a letter to the Park Board proposing a system of signals in the park, which will do away with much of the uncertainty regarding runaways. He suggested that at the reservoirs there be stationed alarm bells, which will ring under certain conditions and that they be electrically equipped and connected with various stations along the different roads. At each station will be detailed a saddle horse and rider probably from the Police Department, and as soon as the bell rings the horse will be released, somewhat similar to the system in vogue in the Fire Department. Those in carriages and horseback riders will then be warned by the ringing of bells at the different stations, so that they can get out of the way of danger.

The Electrical World notes that in modern electrical development there is a general disappearance of the original form of the Kelvin mirror galvanometer. The instrument was simple, sensitive and useful, and before the dynamo came into existence this type of instrument was used in nearly all electrical measurements. When dynamos spread and multiplied, the convenience of this galvanometer for measuring purposes waned and direct-reading instruments were introduced. The worst trouble with mirror galvanometers was due to stray magnetism. The same is true of the tangent galvanometer. In the days of the early dynamo they were largely used. The D'Arsonval type of mirror galvanometer came to the rescue at this juncture, and now largely occupies the place of its predecessor. This instrument usually ignores magnetic changes in its neighborhood.

Stockholders of the Electrolytic Marine Salts Company, to which we have already referred on a number of occasions, are coming out of their speculation rather better than might have been expected. The final 6 per cent was paid in liquidation on December 4, making in all 36 per cent of the amount paid in on the stock. This result has been secured, according to Engineering and Mining Journal, by the sale of the dock and shore property in Maine, and by the surrender by the founder of the company, who was the inventor and promoter of the swindle, of a small part of his profits, and in return for this he retains a liberal balance and is left to pursue the studies of life in Paris which he undertook when he left the company and the country, free from annoying legal inquisitions. The company's plant at Lubec, Maine, is earning money for the parties who bought it. It is not, however, turning out gold bricks, but canned sardines.