well crystallized. Before the study of these interesting localities can be complete a personal visit must be made by a mineralogist to the mines and sufficient material obtained on the spot to allow of a chemical analysis.

Correspondence.

A Stroke of Lightning.

To the Editor of the Scientific American:

Your article of August 6, describing the lightning stroke at Manhattan Beach Hotel, calls to mind a similar occurrence at Masonic Temple a few years ago.

The flagstaff, about fifty feet high, on the central dome, had at the top a gilded ball. It was struck by lightning soon after it was put up, and about twenty feet of the top of it was broken off and thrown two hundred feet from the building, leaving a tall splinter on a stump.

The metallic ornamental cresting of the dome had been carefully gilded, and connected with the sewers of the city, through the cast iron water conductors of the building, by means of twisted copper rods, about three-eighths of an inch by three fourths of an inch, in anticipation of possible lightning strokes.

The missing portion of the staff above the stump and below the top of the tall splinter was reduced to matches and toothpicks, and scattered upon the main roof of the building.

The track of the fluid was marked upon a portion of the original surface of the spar remaining on the splinter by a spiral line scorched on the wood, but below a point six feet above the iron band, to which the guys were attached, no marks were seen to indicate that the spark had followed the wood to its connection with the iron.

The gilded ornaments of the cresting were twelve feet at least from the point where the track disappears from the wood, so that if the fluid left the spar to follow the prepared lightning conductors, and rejected the course through more direct metallic connections, there must have been strong reasons for its preference.

I write this hoping you may have something more to say on the subject of protecting buildings, as well as persons and animals, from the capricious action of lightning. Its freaks appear to be little understood by the public.

New York, September, 1881. JOHN W. KELSEY.

Encke's Comet.

This celebrated periodic comet is now in a favorable position for observation in the eastern sky after midnight. Its period is the shortest of any known comet, making its revolution about the sun in three and one-third years. It has no tail, but presents a round flat disk, slightly condensed near one edge, ill-defined, and brush-like upon the opposite edge.

The comet's position in an observation made by me yesterday was right ascension 6 hours 42 minutes; north declination 42 degrees 54 minutes. This brings it on a line drawn easterly from Capella through Beta Aurigæ and about one and a half times as far from Beta as Beta is from the first named star. It is at present moving about three degrees daily in this direction—a very little south of east. On October 1 its position will be R. A. 8 hours 2 minutes, + 42 degrees 5 minutes, or about 10 degrees northeast of the well known star Castor. On October 10 it will be in Leo Minor, R. A. 9 hours 51 minutes, + 34 degrees 50 minutes. October 20 the comet will be in R. A. 11 hours 31 minutes, + 19 degrees 59 minutes, or about 4 degrees north of Denebola or Beta Leonis.

This very interesting comet may be well seen with moderate sized telescopes, and will amply repay the trouble of picking it up. It is quite a bright object in the five inch aperture reflector. A three inch refractor with a good low power or comet eyepiece should readily show it. It is visible with an aperture reduced to two inches.

WILLIAM R. BROOKS.

Red House Observatory, Phelps, N. Y.,
September 26, 1881.

An Erratic Season.

Of the first eight months of 1881, four—January, February, March, and June—were decidedly wet, the rainfall exceeding by six inches the average of the corresponding months for a period of forty-one years. April, May. July, August. and September have been exceptionally dry, particularly April and August. During these months the rainfall was over ten inches below the average. The record by months for the longer and shorter periods named, as compiled by Dr. Draper, Central Park Observatory, stands as follows:

	41 years. Inches.	1881. Inches.
January	3·30	4·80
February	3·40	4·93
March	3·76	5·81
April	3·80	0·95
May	4·51	3·20
June	4·13	5·35
July	4·02	1·25
August	4·74	0·86
Average total..	31·66	27·15

The maximum rainfall, in forty-one years, for the month of August, was 15·26 inches in 1843, and the minimum this year 0·86 inch. The maximum for April, for the same period, was 9·05 inches in 1857 against 0·95 this year.

STEAM ENGINE NOTES.

At the last weekly meeting of the Polytechnic Association of the American Institute, the President, Mr. Stetson, read an abstract from one of our technical journals, in which a correspondent avers that he runs an engine of 5 inch stroke at 600 revolutions, and has run it for a short time at 2,000 revolutions per minute. The diameter of the cylinder is 5 inches.

Mr. Sutton said the high velocity of piston was one of the marked innovations in modern engines, but these figures were extreme, and undoubtedly far beyond what was good policy. An Allen engine, 12 inch stroke, in one of the recent fairs of the American Institute, made 500 revolutions per minute regularly. High speed was one of the elements which has lowered the cost of fuel from 8 lb. to 2 lb. per horse-power per hour. Our Corliss engines, running at about the old rate of speed, have, in many cases, got considerably below 2 lb. per actual horse-power; and the Buckeye, a quick running engine, has got down very close to it. The Wheelock engine, at the late Millers' Fair in Cincinnati, had stood high among a host of excellent competitors, and had, with a high velocity, regulated so perfectly as to vary less than one of its quick revolutions in suddenly changing load from running light to ten-horse power. Even speed was of great importance in spinning fine thread, especially silk.

The tendency of the parts to change their dimensions and proportions by springing under great strains at high speeds was referred to. One speaker knew a modern upright engine, considered the acme of proportion and stiffness, to be sprung enough when heavy loaded to change the relation of the parts, and introduce obviously defective working. It was always all right when examined cold, and when worked slowly and lightly.

Steam-engine packing, was the subject of a brief paper by L. F. Lyne.

The paper referred to the difficulty encountered in the fact that almost all piston-rods are not true, and cites an instance in which the piston-rod, 12 inches in diameter, was out of the center of the cylinder about three-eighths of an inch, and varied in diameter about three-sixteenths of an inch. This rod was neither perfectly round nor straight, and was run at a high speed. This is a worse than ordinary example, but it is well known that it is almost impossible to get a piston-rod perfectly accurate. Piston-rods that have been long in use will, as a rule, be found smallest in the middle, and of an oval shape at the ends. It has been found, from experience, that the follower ends of a rod will be worn most upon the bottom, while the crank end will be most worn upon the top. All these causes make it hard to make the packing steam-tight.

It is customary upon locomotives, when putting in a new piston and rod, to set the piston about one thirty-second of an inch high, thus destroying the perfect alignment at once.

On locomotives new piston-rods are sometimes nearly destroyed within forty-eight hours after they leave the shops. This is caused by the use of hemp that has gritty substance in it. So long as a piston remains in line there is little difficulty in keeping it tight with a good quality of fibrous packing which is entirely free from grit, but as soon as the glazed surface upon the rod is abraded or the parts get out of line it begins to cut and constant trouble may be expected.

The paper referred at some length to the very early use of metallic packing. A patent was taken by one Cartwright, November 19, 1797, in which he described flat matallic plates cut into segments, which were pressed against the piston-rod by steel springs in the shape of the letter, U. The first of which we have any authentic account of the pressure of the steam itself being used to hold the packing tight is in a patent to F. J. Johnson, February 10, 1863. This system has been developed by many subsequent inventors, and has proved to be highly satisfactory.

The present and most approved forms of metallic packing make use of this feature, and have a partial ball joint to allow of slight changes in the angle and positions of the piston-rod. A strong spring in one form or another is generally used to insure that the packing rings of soft metal remain in their position, bearing fairly against the rod. The substance of the soft metal rings has to be very carefully looked after. If lead or soft metal is used, grit will embed itself and wear away the rod, but when a proper mixture of anti-friction metal is obtained, it avoids this difficulty and shows great durability.

The cotton packing largely used in the steamers in New York waters for piston rod stuffing boxes was explained and drawn on the blackboard. It is by a recent improvement braided square and required but little compression to make it fit nicely when bent around the rod in the box. Much of it is now made of all cotton, the old core of square rubber being found to be of little account. The nature of cotton is to wear long and create a smooth surface of little friction. It is saturated with tallow and plumbago.

Mr. Sutton gave his experience with hemp packing for the piston head of a high pressure engine of some twelve inches diameter. It needed renewal every day or two days, but he liked it.

The President said modern improvements in boring and fitting had made elasticity far less necessary than of old in a packing for the body, or head, as some term it, of a piston. A perfect fit of metals together without any yielding was absolute perfection if the parts could be kept in this condition. Fulton's metallic packing, many years used and probably still used in large high pressure steamers on the Ohio River, was on this principle with simply peculiar means to make the fit. Soft metal rings were compressed by the follower of the piston and caused it to gush out till they just fitted; no elasticity was allowed anywhere. There was a patent on it, or, rather, on the use of thin copper or brass rings at the edges to keep the plastic metal from dragging out by the friction, but it had long since expired. Andrew Fulton, of Pittsburg, was the patentee, and used to supply it, and was very successful in getting the alloy just hard enough to serve properly.

The Michigan Fire.

The burning of the village of Bad Ax, the seat of Huron County, illustrates the awful suddenness of the assault of wild fire on most of the fated settlements and the completeness of the destruction wrought. A correspondent of an Eastern paper says:

It began to grow dark in the forenoon from smoke, and in a few hours the pitchy blackness was like that of a close cellar, so that it was impossible to see a foot. It was known that there were fires three miles south, but there was no thought of danger until suddenly there came a lurid glare, the flame and wind immediately followed, and in thirty minutes fifty-three of the fifty-five buildings in the place were in ashes. The courthouse was of brick, covered with slate, and there people went for protection. The building escaped destruction, and those within it were saved, although they suffered badly from heat. There were no lives lost here, but this was exceptional good fortune. Reports from some places are too horrible to read. Numbers of people flying from danger were overtaken and died in the roads, some perished miserably in wells and other places where they had sought safety, and in the terrible time a few women were taken with the pains of childbirth. Everywhere it is a sickening story of suffering and of roasting human flesh in every conceivable way. In some places the heat was almost incredibly intense, and the smoke was everywhere unendurable and caused many deaths by suffocation.

The work of destruction was very uneven. Some towns in the district escaped with a loss which seems trifling, while in others, apparently no more exposed, there are but a few scattering buildings left. The same was true of the villages, some strangely escaping, while others were strangely destroyed. In some fields the grass roots, and, it is said, the soil itself are burned so that it is impossible to tell whether the land was plowed or not, while in others near at hand crops of grain are left in the shock untouched.

A remarkable thing in the story of the calamity is the presence of mind that was everywhere shown. The people were accustomed to danger from fire, many of them had been through the similar experience of 1872, and there were fewer lives lost than might have been expected. There seems to have been but little panic and few threw their lives away. Nearly all sought to preserve themselves and property intelligently, to have done about the best that was possible and very much better than could have been expected. Domestic animals and fowls nearly all perished, and it is noted that they died in groups, each with its kind; rarely did cows, horses, or chickens die alone, but all sought the companionship of their kind. Great numbers of birds and insects took their way to the lake, and, overcome by the smoke no doubt, died and were found floating on the surface.

The Presidential Bullet.

In reviewing the case from an autopsical standpoint, it is quite easy to offer criticism. The stubborn facts of a *post-mortem* always stand out in bold relief against decisions rendered *ante mortem*. But it must be recollected that there were peculiar difficulties in the case. They are best appreciated by all who have had experience in the treatment of gunshot wounds. However greatly we may regret that, in view of the great public importance of the case, a correct opinion as to the course of the ball was not made at the beginning and was not proven at the end, it is quite difficult to see how the error could have been avoided. There were no symptoms during life to point to the locality of the ball. But, even at the worst, as proving that the surgeons never knew during the life of the patient where the ball was located, there is nothing to show that in consequence of that error the patient suffered. The ball itself, by being firmly encysted, became harmless, while the real cause of all the trouble had its origin seemingly in the comminution of the eleventh rib. It is a matter for much congratulation that the bullet was not found in a pus-cavity. Under such circumstances, even if it were impossible to remove the bullet, there would have been many who would have claimed that such an operation should have been attempted, or at least that the neglect to resort to such a procedure was indirectly the cause of the patient's death. But all doubts in such a direction are cleared up by the autopsy. On the supposition that the ball should have been extracted in any event, what have we not escaped? At least the wisdom of not cutting down upon the missile until the locality of the latter was clearly made out, cannot be gainsaid. As nearly two hours were consumed in finding the ball at the autopsy, what might have been the chances of extracting the missile during life?—*Medical Record.*

The St. Lawrence Tunnel Scheme.

Notice was recently made of a scheme for tunneling the St. Lawrence River at Montreal. It is now reported that the scheme is likely to be abandoned in favor of a bridge, the English member of the Tunnel Company having joined a railway company holding a charter for a bridge across the St. Lawrence near Lachine.