foundation of all hypotheses of ghost-seeing, of ecstatic visions, and even of poetic frenzy. A curious instance directly in point, which came to our notice very recently, is that of a well known writer on the press, who, for some time past, has devoted attention to the subject of morbid mental conditions. This gentleman, in a letter to a daily journal, states himself to be the victim of the horrible spectacle of two men hanging from a gallows, a sight which he once beheld while acting as a city reporter. The suspended corpses are clearly brought before him by the sound of rain (the execution occurred during a rainstorm), and also by the sound of laughter, since, through some uncontrollable impulse during the hanging, he was induced to utter an untimely peal of merriment. That the writer's brain is injured, possibly by the excessive mental strain peculiar to his profession, seems probable; and the lesion is manifested, as already described, by the constant recurrence of the apparition.

It is a well known fact that we have two natures, one purely organic and emotional, the other subject to the reasoning powers. The organic nervous chain exists in the body as a link between emotional mental acts and vascular supply. An impression from without, made through the organs of the senses upon the emotional centers, is reflected directly from them to the vascular expanse. The part flushes or blanches, and the heart hesitates, palpitates, rebounds, or intermits; so that these centers, excited by anxiety, or grief, or joy, or sorrow, influence the waves of blood passing through the system, and the brain promptly feels the imperfect regulation of the supply. Under varying tensions of the vessels, there are flashes, chills, coldness of the extremities, and other oppressive symptoms, while in addition appear the distressing ringing or hammering sounds in the head. These sounds are arterial murmurs, vibrations of the blood which presses with each impulse of the heart on the bony surroundings of the relaxed carotid canal, situated at the base of the skull. The canal is in direct connection, by solid conducting substance, with the organs of hearing, and thus the faintest vibration is detected. The sound produced when it is sudden and unexpected, as in moments of fear, is occasionally mistaken for a sound proceeding from without with no obvious cause.

Thus the sufferer is likely to see visions and hear strange noises, impalpable so to speak, but as purely physical as the most common things in life. In some instances they are actual perceptions of real facts or objects, caught by an extremely susceptible and delicate nervous surface. In others they are an intensified recognition of movements within the body; but in the vast majority of instances they are actual impressions made at some time on the organism and now recalled and rendered more definite by constant recurrence.

At this point, if the mental powers be allowed rest and the fountains of care be closed, recovery may take place; but if the over strain continue, the disease assumes still graver form. There is a maddening desire for work, more work, coupled with the sad sensation that the physical powers are failing; and then there are lapses of memory. The man of business forgets important details, he is irritable, distrusts everybody and himself most, makes mistakes, and yet persists in accumulating more work on himself. The poet and novelist become over sentimental and morbid; the man troubled with remorse for guilt confesses his crime, or commits suicide. The downward course is rapid; in one case epilepsy occurs, in another paralysis, a third developes some hereditary malady like cancer, a fourth dies from nervous failure and local disease of some vital organ. The majority, escaping these special ends, become prematurely old, and sink helplessly into death. The brain becomes disorganized, the balance is broken, and anarchy succeeds to what once was order.

"In every brain, in fact, there is set up primitively a kingly force, to which all other forces bend. The king may be good or bad, he may be an hereditary king or a usurper, but he holds the balance; kill the king, and, in ninety-nine cases out of hundred, the kingdom is made chaos and dark night."

THE APPARENT SIZE OF THE MOON AT THE HORIZON.

A correspondent forwards us an article containing the views of Dr. Montucci, of Paris, on the above-named subject. As the learned doctor has expressed a wish that it be published in some widely circulated scientific journal in this country, we accede to his request, making, however, some comments on his theory.

"Everybody must have noticed the enormous size of the full moon when it rises at dusk, just when the sun has set. That it is owing to an illusion is notorious, first, because our satellite cannot undergo any real change in size during its short progress from the horizon to its culminating point, and secondly, because, whether observed at the former or the latter, the micrometric measurement of the visual angle under which it is seen is always the same. This curious circumstance has always been a puzzle to scientific men. La Place says that, since the celestial hemisphere above our heads appears to us depressed, the rays coming from the horizon must seem to us longer than those from the zenith. Other physicists, finding this explanation unsatisfactory, assert that our judgment is led astray at the horizon by the trees and houses bordering on it, and which, having a size known to us by habit, induce us to compare the moon to these objects, and so to think it larger than it is at the culminant point, where it is quite alone, without any type of comparison in the vicinity. To prove this explanation of theirs, they prick a hole through a card, and look through it at the moon on the horizon, thus covering all the terrestrial objects that might lead us astray; and in this way the moon's disk is indeed reduced to a much smaller size. In an article published in the *Memorial Diplomatique*, Dr. Montucci expresses his astonishment at finding that atmospheric refraction, the only reasonable cause of the phenomenon in his opinion, is not only overlooked in this question, but actually rejected by all school book writers on natural philosophy, as well as by graver men. The demonstration by the pricked card he shows to be worthless: 'for,' says he, 'go about in the evening and look at the gas lamps through the card, and you will find them suddenly dwindle down to pins' heads, because you reduced the radiation of light by narrowing the field of vision. In the same way, if you look at the moon, it becomes less, just like the gas flame; but do not imagine that it is thereby reduced to its culminating size. No, you cannot have two sets of weights and measures; if you look at the moon through the hole when she is at the horizon, you must do exactly the same when she is at the zenith; and then you will see her smaller than you ever saw her.' The card being thus set aside for ever, Dr. Montucci proceeds to examine whether the illusion can be brought about by a type of comparison, and he enumerates several reasons why it cannot, among which is this: When the moon rises close to a large mass of houses or a mountain standing out in high relief above the real horizon, she loses her exaggerated diameter very quickly as she goes higher up; so that, by the time she has reached the top of the prominent object, she has diminished considerably. But that object is still there, it has not changed: then how comes it that, the type of comparison being the same, the object compared has diminished? Illusion from that source cannot therefore be pleaded here. Dr. Montucci next takes up refraction as the sole explanation possible. The misty atmosphere presents itself to the eye of the observer as a concave lens; the moon is outside, and forms with the atmosphere a divergent lens, which enlarges objects on a dark ground. Hence the moon, as well as all terrestrial objects, are increased in size on being projected by refraction through the atmosphere. This view of the case, the author confirms by various experiments with concave lenses."

We must confess that the statements, reasonings, and conclusions of the writer excite our surprise, as the fact is that this curious illusion has never been a puzzle to such scientific men as have taken the trouble to consider it carefully. They all agree with La Place that the celestial hemisphere appears depressed above us, and that objects near the horizon look much further off than those near the zenith; our judgment is not led astray at the horizon by the trees and houses bordering on it, but, on the contrary, these objects give us some faint idea of the great distance of the moon, for in this case alone it becomes perceptible that the moon is so much farther off than the largest distant objects, and the comparison allows some kind of appreciation of the moon's size; while when the moon is at the zenith, there is a total lack of objects of known size with which to compare her, and we are thus led astray by the impression of a smaller distance, and so underestimate her size. The fact is that experience trains us in our judgment of distances in a horizontal direction; but when we look upward, for lack of intervening objects for purposes of comparison, we always underrate the real distances. A six foot man, at 700 feet distance, when on the ground looks to be of natural size, notwithstanding that we see his whole figure under the small angle of less than a third of a degree; but let the man be raised to the top of a tower 200 feet in hight, and let us go a little nearer, so as to see him at the same distance (700 feet) as before, and therefore under the same visual angle, or let us even increase the angle, and the man will look very small indeed. Almost every one has experienced the surprise with which we observe that the real size of any object, with which we have become familiar by seeing it always in an elevated position, is so much larger when placed on the ground than it appeared to us while elevated.

Pricking a hole in a card, and looking through it at the moon's disk near the horizon, is a very imperfect and clumsy way of effecting an otherwise good and conclusive experiment. A hole of exactly a quarter of an inch in diameter should be punched in a card, and this card placed at the end of a tube, of cardboard or other material, 28 inches long; then the hole will appear, to the eye placed at the other end of the tube, under an angle of half a degree, which is the angle under which the moon always appears to us, whether she be at the horizon or at the zenith, and when she is at her mean distance from the earth. If we look through the tube at the moon, when she is near the horizon and appears large, and also when she is near the zenith and appears small, we shall see that she is in both cases of exactly the same size, covering the hole nearly perfectly.

The only effect which atmospheric refraction can have is to lift objects, situated outside of our atmosphere, higher above the horizon than they really are, and this action increases as the objects come nearer to the horizon. At the horizon itself, it amounts to only about half a degree, the angle under which we usually see the sun and moon; so that when the sun or moon appears to touch the horizon with its lower edge, it is in fact below the same, and without the atmospheric refraction would show just a trace of the upper edge. As this refraction is greater at the horizon itself than half a degree above the same, the lower edge of the sun or moon is apparently lifted up higher than the upper edge. This has the effect of causing the luminary to appear with a diminished vertical diameter; so that it appears flattened, an appearance which has no doubt been observed by many of our readers; and this takes place to an exaggerated extent when the atmosphere was laden with vapors.

The explanation given by Dr. Montucci is by no means new, and is found in many elementary text books of astronomy. It appears in a little treatise for school use, published 40 years ago by Arago, and it has been frequently copied by other authors, as apparently the easiest mode of explaining the phenomenon; it cannot, however, stand the test of scrutiny, as the upper surface of our atmosphere, being parallel to the surface of the ocean, cannot be more curved than the ocean, but is actually less curved, having a somewhat longer radius. As, however, the surface of the ocean can be considered level for all practical purposes, the upper surface of our atmosphere may more reasonably be treated as a flat surface, owing to its larger circumference; but it can in no way be considered to act as a lens. This old theory has been so long since exploded that it is surprising to see it brought forward at the present day.

PROGRESS OF THE CENTENNIAL.

Imagine over a hundred carloads of every conceivable product of art and industry arriving daily, and an immense army of workmen working as if for dear life, early and late, and some idea of the present condition of affairs at the Centennial will be realized. That the American exhibition will be far from complete at the opening day is certain; but fortunately the same is not the case with the foreign contributions, and hence a reasonably good display may be looked for on the 10th of May.

Three new bridges are being built over the tracks of the Pennsylvania Railroad in order to complete the approaches to the Centennial grounds. One is constructed on the rigid suspension principle, another on the stiffened triangular truss system, and the third is an iron truss structure. The last is one of the largest street bridges in the country, and will cost $300,000.

A new building has been erected near the west end of the main building for a general reception room for all visitors. It contains parlors, baggage rooms, toilet apartments, writing conveniences, and telegraph and mail stations, and is the headquarters of the corps of Centennial guides.

The interior decoration of Horticultural Hall is now nearly completed, and the main hall presents a magnificent display of tropical plants. All of the garden beds have been laid out, and a large quantity of flowers are in full bloom.

The Japanese building is complete, and exquisitely furnished in a style corresponding with the better residences in Japan. The walls are elegantly papered, and the windows are furnished with a peculiar style of paper in lieu of glass.

The Chilian exhibit has arrived by steamer at Aspinwall, and will shortly reach Philadelphia. It includes a magnificent collection of precious ores, and native wines, besides a large quantity of machinery. Some of the small South American republics, not distinct exhibitors, occupy part of the Chilian space. Among these, Guayaquil has sent samples of a straw hat made from the delicate young palm leaf. It takes several months to make one hat, as it can only be worked upon by night in order to escape the action of the sun and heat. No seam or joint is visible, and each hat is valued at several hundred dollars.

The Granger's encampment at Elm Station, on the Pennsylvania Railroad, is now so nearly completed that the buildings will be ready by the opening day of the Centennial. The terms are only $1 per day for room rent and 50 cents per meal. A branch railroad line will run to the Centennial grounds, and a nominal fare will be charged. The Grangers have the preference in securing quarters, but the general public is accommodated on the above terms. Working men will probably find these accommodations very convenient.

The great 100-tun Krupp cannon has safely arrived. The principal display of war material will be found in the United States section. A very interesting feature in that portion of the exhibition is a small working model of a Hitchcock forge, which will be so arranged that at stated periods miniature guns will be actually constructed, built up from iron sections. The Gatling gun will be shown in all its modifications, and there will be a complete set of small-arm-making machinery in practical operation.

The carriage building is about finished. It is of wood sheathed with corrugated iron, and of very ornamental design. The exhibits consist entirely of pleasure carriages, as all carts, farm wagons, omnibuses, etc., will be displayed in the Agricultural Building. Palace and street cars will, however, be exhibited, together with all improved carriage appliances.

The Art Gallery is rapidly progressing, and in parts of it the hanging committee have already begun arranging the pictures. The judges' pavilion and the Massachusetts building are finished, and present a beautiful appearance. The Pennsylvania building, begun very recently, will not be completed for several days.

The London Artisans' Institution and several French working men's associations are making preparations to send delegations of workmen to the Centennial. We have as yet heard of no similar action on the part of trade associations and large manufacturing concerns in this country. We have already pointed out at some length the advantages to be gained by affording every possible facility for workmen to visit the exhibition, and certainly no other such opportunity for observation and study will be afforded our mechanics during the present generation. This country will never be able to compete with Europe in the matter of artistic workmanship until our workmen have the same advantages, in the shape of galleries and collections of industrial art, that are possessed by their European brethren. In respect to art productions, the Centennial will be especially rich; and with proper opportunity for study, American operatives can gain a fund of information and ideas which will be not only valuable to them, but directly beneficial to all our industries.