## DECEMBER 9th, 1892.

The American Academy of Political and Social Science held its sixteenth Scientific Session in Philadelphia, on Wednesday evening, Nov. 30th. Dr. Franklin H. Giddings, Professor of Social Science at Columbia College, made an address on the "Ethics of Social Pro-gress." This address the uncertainty of the loading This address by one of the leading ociologists of the day is of interest to many classes in the community who feel the need of tocial reforms in many of our institutions. This is the first scientific session this season of the American and Social the American Academy of Political and Social Science. As usual, a large number of scientists Were present to take part in the discussion. According to the academy holds According to its custom, the Academy holds regular sessions each winter; the papers read discussion to the session of the sess discussion they excite, are published in the Proceedings issued under the name of the "Annals."

That it is economical for electric street hillways to maintain their own machine shops demonstrated by a writer in the American achinist. It proves to be the case, he says, that no less than twenty-four roads are main-taining mathing here doing all their own retaining machine-shops, doing all their own re-pairs and manufacturing many supply parts. They say unhesitatingly that there is economy in a doing the supply parts of In so doing. They give as their reasons : First, that they can make better material than they can have the they can make better material than they an buy; that they are perfectly familiar with the requirements and conditions of the busi-Position to know just what is needed, and are in better able to judge of the strength and dura-bility of the bility of the apparatus than those who have bever been in a similar position. A second twenty-five to fifty per cent. by manufacturing the majority of second the majority of parts.

And now electricity is being utilized to trom coal. E. D. Chaplin, of Boston, has been experimenting for some time in this direction. And claims to have devised an apparatus that haterially cheapens the cost over the old methd. Another great advantage in favour of this roceas, Mr. Chaplain claims, is that screen-is can be used; in fact, it will probably be Proc to a broken condition; hence the immense dumps at the mills and mines in Pennsylvania and other manufacturing centres can be utilthe other manufacturing contres can be bed either for making into gas or converting the coke for their furnaces; in which latter others. operation the gas generated in the process will furnish the fuel for the conversion, thus mak-ing it uturish the fuel for the conversion, thus max-ing it a very economical process, and the coke produced will be of the best quality, being knost, if not absolutely, pure carbon. This process is performed by the aid of electricity, and is continuous, during which the heat gen-the by the combustion will largely furnish the power required for the dynamos. the power required for the dynamos.

New England with its great mill and facthey interests, says the Commercial Bulletin, for power transmission. A large woollen mill the fatter of the shout to put in the largest elec-the Cataract Construction Company, of Niag-ar Falls of course will be without exception, The Falls, of course, will be, without exception, the largest power plant in the world, but it supply current for all purposes. The Taft-equipment, which will be strictly a mill power in concenter, and transmit power from power in generators, and transmit power from vaterfalls three and a half miles distant. This will operate a large part of the mill machinery. Is locations where water-power is cheap and the through the agency of relatively handy, it can, through the agency of electricity, be made to run machinery cheaper than by any other method. We predict that to want and elsewhere, that are now running waste, will be harnessed by electricity to

Among the different kinds of mirage perwived at the seaside or on the border of the lakes, that one known as the Fata Morgana is the most interesting and the least studied. Its most interesting and the least studied. Its inguishing marks are as follows: Objects of rated from the observer by a certain extent water (some kilometers) appear magnified

greater than in the conditions of ordinary atmospheric refraction ; walls or houses a few metres in height seem transformed into im-mense cliffs. Frequently a layer of fog seems to float between the objects and the water. The Fata Morgana is very fleeting ; in general it lasts a few minutes, disappears, reappears, and so on, several times in succession. Quité often, at the moment of ceasing, the object which was strangely magnified, seems to be excessively reduced. At the same time, on the surface of the water where the phenomenon was produced, the depression of the horizon appears to vary considerably from one moment to another; it also changes from right to left, so that the horizon apparently represents an undulating line, continually changing. One essential condition for the production of this phenomenon is a perfectly calm atmosphere. This mirage is visible at Lake Leman in summer, and particularly in the spring during the first warm days, when the temperature of the lake is still very low; March, April and May are the months in which it is oftenest seen. It has been observed and described alike by different scholars, particularly by Castberg, Humboldt, Woltmann, Charles Dufour, Forel, but in no case has any satisfactory explanation of the phenomenon been found. When the air is warmer than the water, in the mirage known under the name of mirage d'eau froide, distant objects have their dimensions vertically reduced ; at the same time the horizon appears elevated. Bravaís, in his "Notice sur le mirage," explains this very clearly. How, then, does it happen that when the difference in temperature between the air and the water becomes very great a considerable enlargement of objects is observed, contrary to that which happens in the ordinary mirage of cold water ? In carefully regarding that phenomenon with a strong lorgnette one sees that, in reality, the objects are not magnified, but that several images of the same object are observed, super-imposed upon each other, now in proper posi-tion, anon reversed. M. A. Delebecque, from whom the statements in this article have been borrowed, has counted as many as five. These images were generally so close to one another that it was difficult to separate them with the naked eye, and they therefore had the appear-ance of one large object. They often enance of one large object. They often en-croached upon each other, which increased the Sometimes it was only a single part illusion. of the object which gave birth to these multiple images. "Thus," says M. Delebecque, "it often happened to me to see vessels with two hulls the sails showing nothing extraordinary ; a few minutes after there would be but one hull and the sails would have gigantic proportions." The Fata Morgana appears, then, to be a mirage of multiplied images. But here mathematical analysis is able to explain the observed facts. In his account of the mirage, Bravais demonstrates by calculations suffic-iently complicated the possibility of three images in case that "a layer of warm air should more or less suddenly superimpose itself on a layer of cold air, and when the calmness of the atmosphere would permit these two layers to remain for some time in that condition." These are precisely the conditions which exist during the apparition of the Fata Morgana, since, as M. Delebecque has said, the phenomenon is produced when the air is warmer than the produced when the air is warmer than the water and the atmosphere is very calm. That existence of three images is the only particular case of the Fata Morgana, of which M. Bravais thus gives a mathematical explanation without knowing it. M. Delebecque has attempted to explain the production of five increase in the explain the production of five images in the same manner, but has been stopped by the complexity of the calculations. The method of Bravais, nevertheless, shows why, as in the case of the sailboats, only certain parts of an object give rise to multiple images. Finally, the instability of the equilibrium of layers of air very different in density, and the necessity of an almost perfect calm, sufficiently explains the variability of the phenomenon. If the dif-ference between the temperatures decreases, in that case we observe the ordinary cold water mirage, and that is why the objects seem to us to have dimensions alternately very large and very small.—Translated for Public Opinion from the Paris Revue Scientifique.



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