demned at that highest of courts which demands fruits for judgment.

It must, therefore, be a relief to the minds of those having a knowledge of the need for social effort and at the same time a conception of the value of true scientific methods in such effort to know that there is at present being developed a movement having for its principle aim the general solution of the problems attacked in the light of a scientific study of the conditions and the elements actually involved in the various problems as presented in the lives of our municipal communities.

This movement to which we refer, the University Settlement effort, came originally from Oxford and was the practical suggestion of Arnold Toynbee, for whom the great settlement of London has been named and from whom came the inspiration of the workers in this and other countries.

To solve the problem of heat and light or electricity while being shut out from a possible knowledge of the facts involved or a possibility of experimenting with those forces we would to-day consider to be the height of intellectual absurdity and worthy only of the *a priori* philosophers of the Middle Ages, whose opinions are of value only as curiosities.

Or once having exactly ascertained the existence and the laws of physical phenomena and not to attempt to make use of our knowledge for the practical advancement of life upon the globe and for progress in the arts we are bound to regard as lack of enterprise and the spirit of ultimate scientific progress.

But in the so called "Social Sciences" and their application we are only gradually adopting the inductive method for gaining knowledge and have been devoting more time to the attempted ultimate solution of fundamental problems on insufficient premises than to the practical application of such knowledge as we have already gained and the actual face to face study of the conditions for the discovery of future data.

With the sense of this lack of scientific method in the study of our social questions and the feeling of urgency in the necessity for the application of such truths as we have already obtained, the men and women of the University Settlements have established, in several of our great cities, houses, to be centres for work, set down in the midst of the conditions which are to be investigated and acted upon.

While many of the people who have taken up this work are undoubtedly so directed from their affiliation with the Church and its efforts for regeneration, the methods used are essentially foreign to what has been known as "Church work," and their aim is very far from being along the lines of attacking the problems which are purely physical from the spiritual standpoint. But striking out along the grand lines of the early development of altruism from egoism though the fellow feeling for those with whom we are in personal contact, they have adopted the idea of the self-help of a neighborhood as their governing principle. With this moving principle in view the University Settlement movement is easily understood.

Primarily it is, by bringing to the view of what has been called the "submerged tenth" the lives of those successful in the battle for contentment in life through higher ideals and greater education, to create a feeling of dissatisfaction with surroundings not typifying those ideals and to open to their minds the possibility of progress through advancement in knowledge and the attitude of mind which is not content with the creature means of existence, and, as neighbors, to help all such as have already gained a desire to become more worthy citizens, men and women. As a means for such influence the work of the settlement in visiting, clubs, classes, and all kindly actions is instituted.

For those beyond the possibility of these influence, and even beyond the effect of any efforts made for social regeneration, the situation in the midst of such classes offers a possibility for the study of the conditions and the internal life and movement of the subjects to be acted upon. Studies have begun in the collection of facts and phenomena which gradually but only gradually develop the laws of social dynamics and social statics which have been so often approached from the theoretical but so seldom from the standpoint of induction and experiment.

As the facts are discovered and these laws developed the personal relations of the workers in such fields must yield to their minds the true methods of attacking and solving the problems which perhaps only first in these studies have been presented and enable them to point out to individual workers as well as to municipalities the directions of sure progress

Not by any means the least productive effort of the settlement is this unification of the direction of the efforts which various social workers have been making towards a greater advance in economic progress and the bringing of the various classes of the community into harmony with each other.

There is no one that will doubt that a common humanity actuates us all, but it is at the same time impossible to say that there is a comprehension of this fact in the minds of the individuals belonging to the several classes.

While our origin and essential characteristics may be identical, it is nevertheless true that the variations in the external conditions have so far led us to apparent hostility that the fact that there is a common point of interest has become almost completely extinguished.

Here lies the dangerous element in the growing movement towards the usurpation of the rights of the individual by the community, for on both sides there always remains a fear of oppression and of usurpation of power by the other. To counteract such a dangerous principle, in either its idea or its application, it has become more and more necessary that our heterogeneous communities should come to a knowledge of their essentially homogeneous character, a knowledge which must rest upon firmer foundations than the mere intellectual conception of a truth and be guarded in a trust across the social barriers, only to be gained by a more intimate knowledge of each other's characteristics as well as each other's conditions of life.

By the studies we are describing the knowledge necessary is gradually being obtained, and the trust accorded by both sides to these students renders possible an actual contact from one side to the other and brings about a trust in the hearts and characteristics of men separated by the wide gulfs of circumstance. Studies such as these are developing, too, the manner of education needed for the most rapid advancement of the community, settling many disputed questions of the bearings on the lives of the people of manual training, day-nurseries, model tenements, boys' clubs, and other similar efforts which have been made from above downward, based on theories founded too often on insufficient knowledge of the facts involved and carried along with too little regard for the actual results attained.

We may, in consequence, expect from this movement a fruit of knowledge gained of social conditions and the results of sociological experiments which, while being of the character of the ascertainment of scientific facts obtained through a scientific method of investigation, yet carries with it practical results in the advancement of the life of the community toward a more rational fitness to the environment and a healthy improvement in the material conditions and culture of great masses of the community.

A NEW VISUAL ILLUSION.

BY EDMUND C. SANFORD, CLARK UNIVERSITY, WORCESTER, MASS.

THE following illusion is, so far as I know, new and seems of sufficient interest to put on record. A short-pointed star of white card-board, or even a square, is placed on the spindle of a rotation color-mixer and set in rapid rotation. The resulting appearance is a white central circle surrounded by a transparent ring — most transparent at the outer edge, least transparent toward the centre. If now a piece of black card-board of a length somewhat greater than the diameter of the star from point to point be brought behind it while in rotation, the advance of the edge of the card can be followed, not only behind the transparent ring, *but also behind the opaque central circle.* It is most noticeable just within the circumference of the central circle, and is most marked when the black card is kept in motion. When the card remains stationary, the illusion weakens; and for perfectly stationary objects, like the parts of the rotation apparatus itself, it fails altogether. The portion of the central circle, through which the card seems to be

seen, is also appreciably darkened by its presence. When the star is black and the card behind it white, the illusion is still present, though a brightening of the black takes the place of the darkening just mentioned.

The rationale of the illusion is easy. The outer ring is really transparent, and the edge of the card is really seen through it. The transparency of the ring strongly suggests the transparency of the centre, a suggestion that we accept the more easily because the rapid rotation changes the appearance of the central portion somewhat from its familiar resting appearance. The apparent darkening of the portion of the central part overlying the black card is to be similarly explained. It is especially interesting, however, as being clearly a psychological illusion, an "illusion of judgment," while the color illusions formerly so called are being shown to be physiological, and largely, if not entirely, due to the mutual influence of adjacent portions of the retina.

A physiological explanation of this illusion seems hardly possible; and its psychical character is further attested by the ease with which it is corrected when the card remains stationary, and the unequal degree in which it seems to affect different observers.

A SUGGESTION AS TO TOPOGRAPHIC MAPS.

BY ARTHUR P. DAVIS, LOS ANGELES, CALIFORNIA.

WHILE the scientific and technical bodies of California and other States are agitating the question of topographic maps, educating the public on the question, and endeavoring to secure State appropriations and Government coöperation for such surveys, it may not be amiss to suggest other sources that might be made to furnish valuable contributions toward the same end. I refer to the very extensive and costly surveys made by engineers, promoters, and companies to determine the necessary information for the construction of railroads, irrigation systems, etc.

I have known cases where a large number of preliminary or trial lines have been run, the aggregate cost of which amounted to many times that of a good topographic map of the region under investigation, which would have shown all that the afore said surveys can show, and a great deal beside; for it is always an open question, whether the line finally determined upon is in reality the best in all respects, or whether some other, of the many untried possible routes might not be somewhat better or cheaper. All these possible routes would be shown by a good contour topographic map, and in addition thereto it would serve as a valuable piece of data for any future additions or alterations in the work.

Another argument in favor of the contour map that ought to weigh strongly in its favor with the persons above referred to, is the philanthropic one, that such a map is a valuable and permanent contribution to science. A large percentage of the scientific discoveries that have contributed so prodigiously to the intellectual and material advancement of the human race, have been made by persons working without the incentive of financial gain, and it is safe to say that few of them would have been made, if that had been the only incentive followed.

I do not believe that engineers and capitalists in charge would prove less public spirited than others if their attention were properly directed to this matter; and if geologists and others actively interested would persistently present these facts to the proper persons, great good might result. The main point to be carried is the substitution of the plane table for the transit in making preliminary surveys.

Without a systematic method of accurate field-sketching, which is the essential principle of the plane table, topographic mapping on any extended scale is impossible. Properly handled, with triangulations to check locations, and level bench-marks to check elevations, and with stadia to assist in sketching, plane table work may be entirely accurate within any scale adopted, and serve not only for preliminary information upon which to locate routes for canals, railroads, etc., but is a permanent record of comprehensive information to guide all future engineering operations in the country included, so that ordinarily at least two or three times as much might be advantageously spent on the construction of contour maps as would be required for running preliminary lines, and still the company would profit by the substitution. If the labor expended upon the tremendous mass of material now on record in the great engineering offices throughout the west had been judiciously supplemented by field-sketching on the plane table, a very great addition would have been made to our topographic knowledge, and I believe that such results could be brought about by well-directed efforts on the part of the proper persons.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Pseudoauroræ.

DR. HATCH'S description of "Pseudoaurora Borealis" in your issue of Dec. 2, 1892, calls to mind a peculiar phenomenon which I once witnessed here, and which may have some bearing on pseudoauroræ in general if not on the particular species observed by Dr. Hatch.

About three years ago, as I was returning from the business part of the village of Plattsburgh, N. Y., my attention was taken by two long, white, brilliant, quivering streamers in the south-west, which at times seemed to shoot up and nearly reach the zenith. This was an unusual direction for such a display, and I at once turned toward the north to note its character there. Buildings prevented a good view, but I saw several streamers though none so brilliant as those in the south-west. Hastily taking the phenomenon for a true display of the aurora, I hurried home, only noting on my way that the streamers were brighter now in one direction, and now in another. It was not until I had called others out to witness the display, and remained quiet myself for a moment, that I discovered that one very brilliant streamer seemed to be situated directly back of the known position of one of our arc lamps, and what was still more curious it refused to move from that suspicious position. This streamer varied remarkably in brightness, now being short and faint, and again long and brilliant. Along with these greater changes in intensity there were more rapid and lesser changes, and in addition to these a constant shimmering of the light. There were also slow wave-movements of brighter portions which ran from below upward, or crossed the streamer from left to right. It was movements of this nature, so like the curtain movements of the true aurora, that led me for the moment to refer the phenomenon to the aurora itself, and the many beams, which sometimes ran so high as to suggest a corona overhead, and which varied in relative intensity if one was moving about, only helped to confirm the error. Plattsburgh has had electric street-lamps for seven years or more, yet this one display stands practically alone by itself. The streamer which I studied most was over a lamp something more than a thousand feet away, and was viewed across some village lots with many buildings clustered around the position of the lamp. The lamp itself was thus hidden from view, though it hung over the centre of the street and could cast no high shadows save alone those of the top of the lamp and its wires. These, of course, helped to cut up the beam of light. I do not think that a dark arch was present, though I can conceive that one of Professor Hazen's shadows might have been thrown by a group of trees or buildings in such a manner as to produce one, had some convenient cloud been situated in the background. I attribute the phenomenon to the peculiar condition of the atmosphere at the time. We were in a very light frost-fog and the vertical and lateral movements of brighter waves were probably due to denser portions of this frost-cloud, drifting along with the air-currents. The varying light of the arc lamps served to make these movements seem the more complex. I think it very probable that color was in many places present, due to a halo encircling each lamp, although I do not recall having noticed it. From Dr. Hatch's description it would seem that the two phenomena are not the same, as when he retired from the lamps the "aurora"