When it comes to supplying an entire city with light, and the question of the relative cost of the various systems is considered, it will probably be found that the most economical will be not any one of the systems, but all of them, — two or three stations in the city proper for the direct and storage systems, the latter for localities distant from the central stations. For the suburbs the alternating system could be used, the stations supplying the alternating currents also supplying arc lights.

It should be noticed that in the discussion in England before the Society of Telegraph Engineers and Electricians, Mr. Kapp, who championed the alternating-current side of the question, admitted that a system of distribution by storage-batteries was the ideal system, but he said that he knew of no reliable storage-batteries. Mr. Crompton's system is not a complete storage system: as has been pointed out, he uses the secondary batteries more for converters than for their storage properties. In a complete storage system the batteries should be so arranged that the full capacity of the station is utilized, so that the engines and dynamos are giving their maximum output the whole twenty-four hours. To do this with safety, there should be two sets of cells, one being charged while the other is discharging. There can be no question that storage-batteries have been greatly improved in the last few years, there is no question about the possibility of future improvement: so we may look for developments in this direction.

If the discussions have shown any thing, they have shown that the direct system is the best for crowded centres, the alternating for scattered towns and suburbs, while Mr. Crompton's storage system could be used to at least double the area of economical distribution from a direct-current station.

ELECTRIFICATION OF METAL PLATES BY IRRADIATION WITH ELECTRIC LIGHT. — The influence of light on electric phenomena, which has attracted so much attention in the last year, is being made the subject of numerous researches. Mr. Hallwachs describes some interesting experiments that he has lately carried out. A metal plate was suspended inside of an iron cylinder whose axis was horizontal. The plate was five centimetres in diameter. The cylinder was fifty centimetres long by thirty-seven centimetres in diameter. The surface of the plate was coated with rust except in one spot, where it was brightly polished. It was first connected with the earth. The wire by which it was suspended passed through, but insulated from, an earth-connected brass tube, to an electrometer. In one end of the iron cylinder was a circular aperture eight centimetres in diameter, covered with wire gauze to prevent any inductive influence of the electric lamp used on the plate. The cylinder was electro-negative to the case, so that any transport of electricity by radiation — a phenomenon described by M. Righi — would have charged the plate negatively. If, now, a plate of mica was placed in the aperture in the cylinder, and the plate illuminated by an electric light, there was no indication on the electrometer. If, however, the plate of mica was replaced by a much thicker plate of selenite, the electrometer gave a gradually increasing deflection, indicating positive electricity. This at once ceased when the selenite was replaced by mica. The rise of potential cannot, therefore, be due to an inductive action, nor can it be referred to the action of heat. The metals which were used for the experiments just described were zinc, brass, and aluminium. In all three, positive electricity occurred on irradiation with brightly polished surfaces. Old surfaces no longer showed the phenomenon. The radiation itself lowers the potential to which the plates can be electrified; so that with any succeeding experiment made with the same surface the potential obtained is lower, while the rise to it takes place more rapidly. The maximum potential with zinc amounted to over a volt, with brass to about one volt, and with aluminium to five-tenths of a volt.

ELECTRIC-LIGHTING IN MINES. — For some years past efforts have been made to introduce electric lights in mines, and rewards have been offered in England for the invention of some safe, reliable, and economical system of lighting. The difficulties to be contended with are these: For permanent lights there is trouble in insulating the leads in such a way as to prevent possibility of breaks or grounds, the demand on the insulation being particularly trying, while there is danger that the breaking of the lamps will explode any inflammable gases around them. For miners' lights, the greatest trouble is to get a portable battery that can be easily carried, and which is cheap and simple. In this country no advance has been made in the application of electricity to mine-lighting; but in England much attention has been directed to it, and electric miners' lamps are being extensively introduced. In the National Colliery, Rhondda Valley, no less than eight hundred such lamps are used, while they are being introduced into other mines controlled by the same company. These are on the Swan system. At Cannock Chase the Pitkin system is employed; at Aldwarke, the Sun system. With the excellent primary batteries that have been lately brought out, and with the improvements that have been introduced in miners' lamps, it is probable that they will soon be largely used in mining-work.

BOOK-REVIEWS.

Proceedings of the Society for Psychical Research. Part XII. June, 1888. London, Soc. Psych. Research.

THIS number of the Proceedings deals almost exclusively with a class of facts towards which it is becoming more and more difficult for the man of science to assume a fitting attitude. The men who vouch for the correctness of the facts are in part drawn from their confrères, eminent in other branches of science. They are apparently on their guard against some, at least, of the many and various forms of deception. They, with some exceptions, set forth their results with much candor, and without conscious bias. And yet one reads their writings with the conviction, that grows as one reads, that all this is premature, that these men do not give evidence of that same comprehensiveness and scientific reserve which they would exhibit in case of a problem touching upon their own specialty. One feels the absence of a sound psychologic insight, such as comes only from years of special training, and the experience of a life dominated by a powerful interest for this kind of phenomena. One longs for the counterpart of such a man as Robert-Houdin, training every sense to its maximum of sensitiveness, and every muscle to the utmost expertness, in order to be a master in the art of deception. In the goings-on of his daily life he is constantly on the alert for some chance combination of events that suggest a new mode of misleading the spectators of his conjuring. Again, the length of the articles; the large proportion of theorizing; the lack of constant reference to the results of others, especially of those not in harmony with their own views, — all this, not to mention occasional serious faults in logic and sad deficiencies in the stringency of the observations, will far postpone the day when these Proceedings will be found on the shelves of a strictly scientific library.

The English Society for Psychical Research, it need scarcely be said, has definitely accepted the hypothesis of telepathy, — of the action of mind upon mind apart from the recognized channels of sense. They accept this not merely as the only satisfactory principle by which their facts can be accounted for, but they are ready to use the theory as a means of explaining other groups of facts. All of the four main contributions to the present number deal with facts of telepathy, and largely with the relation of this power to hypnotism. M. Charles Richet takes up one hundred and fifty pages with an account of a very elaborate and extended series of observations of such transferrence. This paper is to be ranked as among the most serious evidence that has yet been presented, and will be noticed in a future number of *Science*. Messrs. Schmoll and Mabire describe very similar experiments, but conducted with far less caution and insight. Failures are overlooked as unimportant. Just at the point where one desires most accurate information, the account is vague. The percipient is allowed too many trials, is too clearly informed of his success. The series in which the conditions were most convincing "produced only failures." The repeated statement of the percipient after seeing the object he was to think of, that at first this had come to his mind but was rejected, is recorded with great *naïveté*. Such illusory instructions as that the agents must entertain no "secret hope of failure" are seriously recorded. All this renders these observations of little weight.

Mr. Gurney contributes two articles. In the first he describes some curious experiments in hypnotism, in which the subject is given an hypnotic suggestion to write such and such a word, and when awakened is utterly unable to recall the word, not even by an offer of money; but when seated at the planchette he unconsciously, or, as Mr. Gurney prefers, automatically, writes the word without knowing what he has written. The variations on this experiment are more curious than valuable; but the cardinal idea is a happy one, and promises to shed new light on the *rôle* of memory in hypnotic states. Many of the author's deductions from and explanations of his phenomena will not be indorsed by authorities in hypnotism. In his second article Mr. Gurney argues at great length for the admission of two kinds of suggestion in hypnotism, — the first the recognized physical suggestion; and the second a purely psychical suggestion, acting without contact and at a distance. He traces the relations and analogies of the one to the other, and marks off the boundary-lines of the two. All of this is decidedly premature, but it serves a useful purpose in singling out the very point upon which further study should and will be directed. Can the increased sensibility, the astounding subtlety, and the marvellous shrewdness of hysterical hypnotics account for the observed phenomena, taking into account the difficulties of a complete observation and our ignorance of the possibilities of deception, or must we introduce an agency new to the domain of science? Quite relevant in this connection is the footnote of Mr. Gurney's, pointing out that hypnotic subjects easily establish a fashion, and that here is the clew to the differences between the schools of Paris and of Nancy; and it may be added, that an omission of a factor such as this would make a telepathic fact of what, under this view, is only a shrewd and largely unconscious acting-out of a suggestion.

Among the critical notices, Mr. F. W. H. Myers writes a very matter-of-fact account of the work of the Seybert Commission, and describes some observations of Professor Foutan on seeing with the fingers, and hearing with the fingers, the chief feature of which is their incredibility. Mr. Myers overestimates their value, and they must be corroborated before they can rank as facts at all.

What in many ways is the most important and interesting contribution in the number is to be found on the last two pages. Here we are told that the Creery girls, from whom experimental evidence of telepathy had been gained, were detected in the use of a code of signals. They had both a visual and an ordinary code; and, though these codes may not have been used on all occasions, it throws discredit on all results obtained through their agency. If scientific observers can thus be deceived by young girls, — inexperienced, and apparently perfectly sincere girls, — ought not this to impress upon every investigator the profound importance of acquainting himself with the possibilities of deception, and perhaps to conduct his observations on the principle of the detective who held every one to be criminally inclined until proven to be honest?

Looking Backward. By EDWARD BELLAMY. Boston, Ticknor. 16°. 50 cents.

THE preface to this work is dated in the year 2000, and its object is to show the state of society which in the author's opinion is destined to prevail at that time. The author, being a novelist, has written the work in the form of a story, the principal actor in which, Mr. West, tells his own tale. He goes into a trance in the year 1887, and awakens in the year 2000, when he finds himself in a society so different from that he had been accustomed to, that it took him some time to get acquainted with it. This society is based on State socialism in the most extreme form. All industry is controlled by the national authorities at Washington, the individual States as well as all private corporations and capitalists being done away with. The authorities are almost exclusively occupied with managing the national industry, but little legislation being needed; for the people are all so very good, that they have no disposition to wrong each other, the few cases of crime that occur being regarded as examples of 'atavism.'

This amazing moral improvement, our readers will understand, is entirely due to the equal distribution of property. Every individual has an equal share with every other in the national industry, so that there is no check on the increase of population. On the other hand, every one is required to work according to his abilities; yet the men of the new era are represented as loving each other so very much that they are perfectly satisfied with this arrangement. Moreover, the wealth of the world is so enormously increased, that everybody lives as luxuriously as the richest folks do now. In short, the book depicts the usual socialistic Utopia, with many refinements of detail.

The absurdity of the whole thing is evident from various considerations. Besides the difficulty of managing such a colossal industrial system in the way supposed, — a difficulty which the author of the book fails entirely to appreciate, — the social order here exhibited assumes such an increase of wealth as could not possibly take place without mechanical or other inventions such as have not yet been even dreamed of, and which Mr. Bellamy does not even hint at. For, not only are all men to be rich under the coming *régime*, but they are not to work more than five or six hours a day, and are to cease work entirely at the age of forty-five. The idea advanced by the author, that such a vast increase in the production of wealth will result from a mere change in the mode of distribution, is preposterous.

Again: Mr. Bellamy's scheme assumes the possibility of a moral improvement such as cannot be made in less than some thousands of years, if indeed it ever can be. The theory that all wickedness and crime are due to the unequal distribution of wealth is contradicted by every man's personal consciousness and of all that we know of human nature. It should be added, that Mr. Bellamy's ideal of human happiness is any thing but a high one, for it consists mainly in 'easy and agreeable relaxation:' and he expressly says that 'bread and games' are the prime necessaries of life. In short, the book describes a state of society and of human life that is not only impossible, but in many respects as undesirable as it is impossible.

Memory and its Doctors. By Dr. E. PICK. London, Trübner. 12°.

Memory: What it is, and How to improve it. By DAVID KAY. London, Kegan Paul, Trench, & Co. 8°.

"Loisette" exposed, together with Loisette's Complete System of Physiological Memory. By G. S. FELLOWS. New York, The Author. 8°. 25 cents.

ALTHOUGH the search for the philosopher's stone has been abandoned, and men have come to agree that there is no royal road to knowledge, still one can often detect in many a mind a lurking fondness for the belief that there may possibly be some undiscovered short cut to mental attainment which a modern Raymond Lully or Ponce de Leon may reveal in a few lessons under the inspiration of a proper fee. It seems not a rash assumption to make, that, of the many thousands who within a few years have paid tribute to a certain 'American memory professor,' not a few came with the secret hope of emerging from the five lessons with their entire mental furniture put into perfect order and vastly improved. While these people lend a willing ear to the physiologist when he explains to them how mental acquisition is related to organic growth; how everywhere normal growth is a gradual, assimilative, and digestive process, not to be hurried by overdosing and cram; yet they have not the necessary faith to apply this knowledge to the particular case in which they are interested. This, together with a successful advertising machinery and production of testimonials, must largely account for the phenomenal success that has attended this professor of memory.

Remarkable memories have from ancient times attracted a good deal of attention. Especial attention seems to have been given to the subject of artificial memory throughout the sixteenth, seventeenth, and eighteenth centuries. Dr. Pick gives a convenient sketch of the history of the topic. Petrus de Ravenna is said to have played a game of chess, and to have dictated two letters on stated topics at the same time that dice were thrown and the throws recorded. When the game was over, he recited all the moves of the game of chess, all the words of the two letters backwards, and each throw of the dice in order. System after system of mnemonics was proposed, each promising more than its predecessor, and all painfully artificial. The association of dates and items to be remembered visually with the compartments of an imaginary house, or orally with the names of the letters, with numbers and harsh com-