and those intrusted with their use should be informed of their properties, that all necessary precautions may be taken.

"There is, however, one process of disinfection with corrosive sublimate to which this objection may with some reason be made. I refer to its use for the disinfection of streets, for which purpose it has been employed by the Board of Health of Boston for the past two years or more. If its use for this purpose is continued, the time cannot be far distant when the beds of the streets will become saturated with various compounds of mercury. All of these, so far as we have any knowledge of them, are violent poisons. Is any danger to be apprehended from continually inhaling or swallowing, month after month, dust loaded with compounds of mercury? This is a question deserving serious consideration at the hands of the Board of Health. While not claiming that the process is positively a dangerous one, I believe it is one which involves some risks, and one which it is advisable, therefore, to discontinue."

DEPENDENT CHILDREN. — We commend to our readers a paper presented to the Prison Congress by Mr. C. H. Reeve of Plymouth, Ind., entitled 'Dependent Children.' He says, "The mass of dependent children is largely made up of foundlings, illegitimates, children abandoned by worthless parents, orphans of the very poor, with a few better born who become waifs from various causes. In the cases of nearly all of them except the last, there is more or less mental deficiency, or deformity in the brain substance, or the conformation or arrangement of brain ganglia. Statute law makes marriage a civil contract, — a matter of dollars and cents. No matter who comes for a marriage permit, — the strong or the weak-minded; the sound and healthy or the deformed and constitutionally diseased; the millionnaire or the hereditary pauper; the moral and orderly, or the vicious and confirmed criminal; the progenitor of statesmen or of idiots; the sane, or the hereditary insane if favored with a lucid interval; the temperate or the besotted, — all are given a permit alike. The revenue is collected, the ceremony authorized, the record made, and this civil contract is fully completed by sanction of law. If a man wants to run a locomotive-engine, or practise medicine (elsewhere than in the United States), or plead in the courts, or stand in the sacred desk and talk theology, or teach a school, or run a pilot-boat, or even to secure a petty clerkship under government, he must submit to a rigid examination as to his fitness for the position and its duties, and be able to pass one. But one comes forward to get a permit to enter into a contract that places him under obligations, and demands of him duties, that are the most important, the most responsible, the most sacred, that can be assumed anywhere between the cradle and the grave, that vitally affect the bodies social and politic as well as corporal, now existing and hereafter to exist, directly and indirectly, not a word is said. All are licensed." In his paper he criticises the Church in the following language: "It regards marriage as a holy, sacramental covenant. By permission of law, its ministers ceremonially aid the parties in making this holy covenant, which at the same time involves the statutory civil contract. It makes little or no inquiry as to the candidates (one organization may as to belief in a creed). It looks only for a license, and the fee in prospect. Even in the shadow of the prison-wall and of the gallows, its ministers, in sacerdotal robes, have united criminals. Thus is it sanctioned by the Church!" He believes that human foresight and legal provisions can prevent these marriages.

BALDNESS. — We have from time to time given our readers the views held by the medical profession and the laity as to the causes of baldness. The view which has seemed to us as being the best supported by both facts and theory is that baldness is especially liable to follow the wearing of a tight-fitting hat, the band of which constricts the blood-vessels, and thus diminishes the blood-supply to the scalp. In the *Popular Science Monthly* is a communication from a writer who has spent a considerable time in India, which controverts this explanation of the cause of baldness. The Parsees are compelled to keep the head covered during the day by a high hat, which is so tight as to crease the scalp, and, the writer thinks, possibly the skull, and at night by a skull-cap. He has never seen or heard of one of them being bald.

TREATMENT OF YELLOW-FEVER. — Regarding the treatment of this disease, Dr. George M. Sternberg, U.S.A., in the *Therapeutic Gazette*, Aug. 15, reports the favorable results obtained in a series of twelve cases treated on the alkaline plan. His recent researches in Havana have led him to think it very probable that in yellow-fever, as in cholera, the specific micro-organism causing the disease is located in the alimentary canal. While this is not proved, it is demonstrated, that, as a rule, no micro-organism capable of development in the culture-media usually employed by bacteriologists is present in the blood or tissues of those recently dead from yellow-fever. This view naturally suggests intestinal antisepsis as a mode of treatment. It is well known that in yellow-fever the urine and the vomited matters are highly acid. He has also found the intestinal contents to have usually a more or less decided acid re-action. A microbe, therefore, capable of multiplying in the stomach and intestine in this disease must be able to grow in an acid medium. But aside from this theoretical reason for prescribing alkalies, the highly acid condition of the secretions furnishes an indication for such a treatment, and the writer has long desired an opportunity to see a thorough trial of a decidedly alkaline treatment. These considerations induced him, during his recent visit to Havana, to propose a formula, which was adopted by Dr. Raphael Weiss, house physician at the Garcini Hospital, and he has just received from him a record of twelve cases treated by the director of the hospital, Dr. Francis Cabera, and himself. They all recovered, and he adds that every case so far treated at the Garcini by that method has recovered. While these twelve cases were being treated, and a little before, eight cases were treated in the same institution by other methods, and five of the eight died.

DIPHTHERIA CARRIED BY TURKEYS. — Some time ago we reported several cases of diphtheria which had been contracted from a turkey. The following case, which is taken from the *British Medical Journal*, is another contribution to this subject: "A fowl with diphtheria was brought to the house of a veterinary surgeon on April 24, and died on the 29th. The feeding and nursing of the bird devolved on a lad, aged fourteen, who was assisted by his brother, aged five. On the evening of May 11 the writer was called to see the little boy of five, who had been poorly for a day or two. He had enlarged cervical glands on the left side, which had come on rapidly. He was a delicate little fellow, with fair hair and anæmic aspect. The temperature was 103° F.; pulse, between 120 and 130. The fauces were more or less covered with diphtheritic membrane, the left tonsil more especially. Under the administration of biniodide of mercury and iron, the throat symptoms cleared up, and the child made a good recovery. On the day after this case was first seen, the boy who fed the fowl was very feverish, and had similar patches over his fauces, but not to the same extent as his brother. His throat was painted with boroglyceride. A sister, aged nine, had also a similar explosion on the fauces. Bark and acid and boroglyceride was the treatment. On the 18th the mother, who had nursed them, was attacked, and was similarly treated. They were all kept well up with beef-tea and stimulants."

CIGARETTE-SMOKING. — Dr. W. L. Dudley has been conducting some experiments with cigarettes in order to determine their effect upon smokers. His conclusions are, (1) that carbonic oxide is the most poisonous constituent of tobacco-smoke; (2) that more injury results from cigarette than cigar or pipe smoking, because, as a rule, the smoke of the former is inhaled; (3) that cigarette-smoking without inhaling is no more injurious than pipe or cigar smoking; (4) that the smoke of a cigar or pipe, if inhaled, is as injurious as cigarette-smoke inhaled; and (5) that the smoke from a Turkish pipe, if inhaled, is as injurious as that of a cigarette inhaled.

ELECTRICAL SCIENCE.

Electric Lighting in America.

THE following is an abstract of Prof. George Forbes's paper on the above subject, read at the recent meeting of the British Association. Professor Forbes has been in the United States, and has paid especial attention to the alternating-current system of electrical distribution. He first sketched the rapid advance of electric lighting in the United States as compared with its slow progress in England, — a result which he considered partly due to the acts of

Parliament regulating electric distribution in the latter country. The rapid progress in this country he ascribed partly to the fact that capitalists here have sufficient technical knowledge to cause them to take up and actively develop new scientific discoveries. Professor Forbes called attention to the fact that storage-batteries have not found favor in America, all of the lighting being done directly from the machines. The objection against depending on moving machinery entirely is the possibility of a break-down putting a district in darkness, but experience has shown this fear to be groundless. The Edison station in Pearl Street, New York, has only stopped once in seven years, and it has been working night and day.

The greater part of the author's paper was spent in describing the Westinghouse alternating-current system. At the end of last year this company had 153,285 incandescent lamps installed, fed from 152 stations: at present the number of lamps in use exceeds 300,000. The greatest trouble the Westinghouse people have had to encounter has been from the short-circuiting of their overhead mains from falling telegraph and telephone wires. This difficulty is overcome by subdividing their dynamo power and the circuits. Some of the stations are worked by natural gas, the fire under the boilers being automatically regulated so that one man can attend to a station of 1,000-horse power. At first the hydrogen in the gas attacks the iron of the boilers, but after a time the metal gets into a condition in which no further deterioration takes place. Instead of using a small number of large engines, it has been found economical to drive the dynamos from a number of comparatively small-power, high-speed engines. This subdivision has the additional advantage of guarding against a break-down. A commendable feature of practice in America is the adherence to a few types of dynamos and converters. This allows them to be made cheaply; and all of the parts are interchangeable, so any damage can be repaired quickly and with little cost. The following tables give particulars of the construction of converters and dynamos: —

Dynamos.

	I.	II.	III.
Number of lamps	650	1,300	2,600
Current	35	65	130
Armature resistance	0.76	0.37	.95
Field resistance	14 5	7.0	3.6
Pounds of wire in armature	17	30	60
Pounds of wire in field	420	—	—
Total weight	4,800	9,000	—
Volts	1,050	1,050	1,050
Revolutions per minute	1,600	1,000	1,009

Converters.

	1	2	4	6	8
Number of lights	5	10	20	30	40
B. and S. gauge, primary	25	22	19	17	16
B. and S. gauge, secondary	11	8	8	8	7
No. turns of primary	900	700	560	480	400
No. turns of secondary	45	35	28	24	20
Resistance of primary	48	21 9	9.9	7	5
Resistance of secondary	0.04	.043	0.0197	0.0176	0.0107
Pounds weight finished	50	60	95	-	160

Thickness of iron plate used in construction	0.006 in. to 0 0065 in.
Thickness of paper insulation	0.0025 in.
Number of plates in No. 8 converter	1,350

Great care is taken in the insulation of the dynamos and converters. The insulating materials used are mica, fibre, and a superior kind of varnish made of copal varnish and linseed-oil. The period of alternation used is 8,000 complete alternations per minute, and the efficiency of transformers is very high, even when not fully loaded. Tests have been made showing an efficiency as high as ninety-five per cent at half-load. The transformers are fixed outside the houses, either against the walls or on posts. The total efficiency from the engine to the lamp is very high, and 600 watts of energy have been supplied to the consumer for every brake horse-power (746 watts) at the engine.

Electric Lamps for Mines.

There are very few applications of electricity in which England leads this country, but one of them is in portable batteries and lamps for mining-work. These are being rapidly and successfully introduced in the collieries of England and Wales; and the following are the details of the most successful of them, taken from a paper of Mr. Nicholas Watts, read before the British Association at its last meeting: —

The Swan Lamp. — Secondary battery: four cells grouped together in a block of gutta-percha, which is enclosed in a wooden case. Luminosity, 1 to 1⅛ candles for ten hours' duration; weight, 7 pounds; price, $6.25; cost of maintenance, 7 cents per week. In extensive use in South Wales.

The Schanschieff Lamp. — Single-fluid primary battery: four zinc-carbon cells in a solution of basic sulphate of mercury, about 36 per cent of the salt being in solution. The solution is sold at $1 per gallon, and 89 cents is allowed for the same quantity of spent liquid with its solid residue and free mercury precipitated by the cells. Luminosity (with reflector), 2 to 3 candles for nine hours' duration; weight, about 5 pounds; price, $7.50; cost of maintenance, 7½ cents per week. Tested at Cannock Chase, Mardy, Merthyr, and elsewhere.

The Pitkin Lamp. — Secondary battery: four cells. Luminosity (with reflector), 4 to 5 candles for ten hours' duration. The lamp is fitted with a switch and resistance to regulate the electro-motive force. Weight, 8 pounds; price, $10.50. Used at Llwynypia, Ocean Colliery, Trevicky, and elsewhere.

The Walker Lamp. — Primary battery: three carbon-zinc cells in a strong brass cylinder attached to an outer case of brass or copper. The fluid is a mixture of bichromate of potash, nitric acid, and sulphuric acid. Luminosity (with reflector), sufficient to enable newspaper-print to be read at a distance of 12 feet; duration, ten hours; weight, 7 pounds; price, $8; cost of maintenance, 14 cents per week.

The Portable Electric Syndicate Lamp. — Secondary battery. Luminosity (without reflector), 1¼ candles for 1¼ hours' duration; weight, 4½ pounds; price, $5. The lamp is fitted with an automatic arrangement, whereby, if an outer casing of toughened glass be broken, the current is cut off to prevent explosion of fire-damp.

The Vaughton Lamp. — Secondary battery. The plates are wedged tightly in the cell, making the battery so compact that it may be subjected to much rough usage without injury. Weight, 5 pounds; working cost, 14 cents per week; price, $6 to $7.

The advantages of these lamps are, that they do not consume or vitiate the air, they give a steady and more powerful light than the ordinary miner's lamp, and the danger of igniting fire-damp is reduced to a minimum. With the rapid improvements in secondary and primary batteries, they will soon come into universal use.

ELECTRIC ABSORPTION IN DIELECTRICS. — A. Wullner, in *Wiedermann's Annalen* (xxxiii. p. 19), has studied the effect of time on the potential of a charged condenser. It is well known, that, when the specific inductive capacity of a substance is obtained by determining the capacity of a condenser of which it forms the dielectric, different values are found, according to the time that elapses between the charge and the measurement. Wullner has attempted to find some law that governs this 'absorption' of electricity by the dielectric. His method of experiment consisted in observing, by means of an electrometer, the variations of potential of a condenser which has received a determinate charge; the first readings being taken at intervals of twenty seconds, the rest at intervals of from one to two minutes. He experimented on a glass Leyden jar, and on disks of glass, ebonite, gum-lac, paraffine, sulphur, and mica. The results are, that the potential cor-

responding to a determinate charge diminishes rapidly during the first few seconds, and then varies almost as the terms of a feebly convergent geometrical progression. The law of variation varies with the substance, and is not always the same for disks of the same substance. The values of the specific inductive capacity obtained after as short a charge as possible are different for substances which are apparently identical, but are always sensibly the same disk.

BOOK-REVIEWS.

The Law of Equivalents in its Relation to Political and Social Ethics. By EDWARD PAYSON. Boston and New York, Houghton, Mifflin, & Co. 12°. $2.

THE title of this book is forbidding, and as inappropriate as it is forbidding. The author's 'Law of Equivalents,' which he announces in such a formal manner, is nothing but the familiar truth that if we wish to attain any end, no matter what, we must use the means appropriate to that end; and that if we use the wrong means, we shall not attain the end, even with the greatest exertions. The truth is one of great practical importance; but its announcement in such a form, and as if it was a new discovery, is not fitted to attract the reader. The author's style, too, though generally clear, is too dithyrambic for a philosophical work, passages like the following being not infrequent: "Family — the very word itself is redolent of sweetness. It is a holy, yea, a wholly divine word. It fairly outtops every other word in the language. It is not so much an apothegm as a treatise, not so much a treatise as a text, not so much a text as a sermon, not so much a sermon as a poem," with much more of the same sort. The defects of style are aggravated by the too frequent use of interrogative sentences where declaratory ones would be more appropriate. But when these deductions are made, there is much in the book that is good, and may prove useful. Mr. Payson's special concern is moral improvement; and he insists that men are prone, and Americans especially so, to use the wrong means for this purpose; as, for instance, when they try to make men good by legislation, or to make them learned by simply establishing libraries and schoolhouses. In such cases, he says, we do not offer nature the right equivalent, we do not use the right means to reach the desired end. He rightly insists, also, on the importance of time as a condition of moral and intellectual improvement, reminding us that such improvement must necessarily be slow, and that changes in the beliefs and practices of a nation can only take place when the progress of events has prepared the way. He finds in the American people a tendency to look for some great spiritual movement as wonderful in its way as the great material advance of the past hundred years, and resulting in the regeneration of society; and he maintains that such expectations are unwarranted. Mr. Payson's views are in the main in accord with those of most judicious thinkers; but his work would have been more interesting and more useful if it had been written in a soberer and more philosophical style.

Lectures on Geography. By Lieut.-Gen. R. STRACHEY. London and New York, Macmillan. 12°. $1.25.

THE University of Cambridge, about a year ago, accepted the proposal of the Royal Geographical Society to provide a lecturer on geography with the aid of funds to be supplied by that society. As an introduction to the lectures on this science, new to the Cambridge University, the council of the society was requested to arrange a course of lectures illustrative of the general character and scope of the instruction in geography suitable for a university course. In compliance with this request, a course of four lectures was delivered by Gen. R. Strachey, president of the Royal Geographical Society, which have now been published in the form of a book. Strachey designates as the aim of geographical science, to investigate and delineate the various features of the earth; to study the distribution of land and sea, the configuration and relief of the surface, position on the globe, and so forth, — facts which determine the existing conditions of various parts of the earth, or which indicate former conditions; and to ascertain the relations that exist between those features and all that is observed on the earth. On account of this point of view, the book is especially valuable. Since the importance of physical geography has become recognized, the tendency has been to underestimate the value of topography, in the same way in which systematic botany and zoölogy became neglected when biology became the favorite study. Strachey first discusses the astronomical relations of the earth, its form and magnitude, and the history of its measurement. Appended to this is a chapter on map-making, in which he dwells upon Tissot's projections, the principles of which are unfortunately not yet sufficiently known either in England or in America. After a brief historical sketch of the development of our geographical knowledge, he passes to a brief review of physical geography and to considering the relations of vegetable and animal life to terrestrial features. He concludes with some remarks on the influence of geographical conditions on man. The book is clearly written, and we hope it will be widely read, as the author, by his terse and interesting treatment of the subject, impresses the reader with the importance of disseminating and promoting the science of geography.

Les Formes du Terrain. By G. DE LA NOË. Paris, Imprimerie Nationale. 4°.

LIEUT.-COL. D. DE LA NOË, of the geographical service of the French army, has prepared, with the collaboration of M. Emm. de Margerie, an elaborate treatise on the forms of the ground. It is of both geological and geographical interest. Under the first heading we should place the argument for the derivation of land-relief by sub-aerial denudation, the evidence for the origin of valleys by stream-erosion essentially independent of fractures, and other discussion of processes; under the latter heading we should include the description of plateaus, valleys, and other topographic elements, in connection with the conditions of their origin and development. The deductive considerations are fully supplemented with illustrations in a large volume of plates, many of which are reproductions of excellent topographic maps, chiefly of French localities. The relation of the activity of streams to their controlling base-level receives much more explicit attention than is common with European authors, and the sections in which this large problem is discussed are very profitable reading. The same may be said of the explanation of cross-valleys such as occur in the Jura Mountains. They are shown to traverse the anticlinal ridges where the structural arch, if complete, would be lowest. The list of authors quoted is remarkably full, and American writers receive a large share of notice.

Leibniz's New Essays concerning the Human Understanding. By JOHN DEWEY. Chicago, S. C. Griggs & Co. 16°. $1.25.

THIS work is the latest issue in the series of 'German Philosophical Classics for English Readers,' now publishing under the editorship of Prof. G. S. Morris. The plan of the series does not contemplate the complete exposition of any philosopher's views, but only of some one of his masterpieces. This plan has some advantages, but also some disadvantages; and these latter are specially prominent in the case of Leibniz, whose mental activity was so multifarious. He was by no means a mere philosopher, and even in philosophy the 'New Essays' present but a small portion of his views. Professor Dewey has seen this, and endeavors, so far as his space permits, to remedy it. He remarks that "Leibniz, like every great man, absorbed into himself the various thoughts of his time, and in absorbing transformed them. He brought into a focus of brilliancy the diffused lights of truth shining here and there. He summed up in a pregnant and comprehensive category the scattered principles of his age." Some of us will regard this encomium as a little extravagant, yet, at all events, it shows what Leibniz attempted to do, and hence Professor Dewey has found it necessary to enlarge his plan a little, and give some account of those doctrines of his author not presented in the 'New Essays.' He has, we think, given too much attention to the theories of monads, and pre-established harmony, which are products of imagination rather than of reason; while, on the other hand, he has taken no notice of Leibniz's attempt to reconcile Infinite Goodness with the existence of evil. In dealing with the 'New Essays' themselves, which were written in reply to Locke, Professor Dewey has to present the views of both philosophers to a considerable extent; and in doing so he clearly reveals his own philosophical standpoint. He is a disciple of Kant and Hegel, and looks upon Leibniz as their forerunner, while Locke's work is in his eyes little