that the public demands a much brighter illumination than formerly, and this increase of illumination has by no means reached a maximum.

A NEW INSULATING COMPOUND. — The following, from the *Electrical World*, is taken from the *Chronique Industrielle:* "The compound is composed of one part of Greek pitch and two parts of burnt plaster by weight, the latter being pure gypsum raised to a high temperature and plunged into water. This mixture, when hot, is a homogeneous viscous paste, and can be applied with a brush or cast in moulds. It is amber-colored, and possesses the insulating properties of ebonite, and can be turned and polished. Its advantage is its endurance of great heat and moisture without injuring its insulating properties."

SPECIFIC RESISTANCE OF MERCURY. — Since the absolute unit of electrical resistance has been defined in terms of a column of mercury of one millimetre cross-section and of a given length, a number of determinations of the specific resistance of mercury have been made. The latest is by Messrs. Glazebrook and Fitzpatrick, and gives for a result that the resistance of a column of mercury one millimetre in cross-section and one metre long is $r = 0.95352$ B. A. units. The other results that have been obtained are —

| Observer. | Date. | Value for $r$ in B. A. Units. | Value of Ohm in Centimetres of Mercury at 0°. |
|---|---|---|---|
| Lord Rayleigh and Mrs. Sidgwick | 1883 | 0.95412 | 106.23 |
| Mascart, Nerville, and Benoit | 1884 | 0.95374 | 106.33 |
| Strecker | 1885 | 0.95334 | — |
| L. Lorenz | 1886 | 0.95388 | 105.93 |
| Rowland | 1887 | 0.95349 | 106.32 |
| Kohlrausch | 1888 | 0.95331 | 106.32 |
| Glazebrook and Fitzpatrick | 1888 | 0.95352 | 106.29 |

ELECTRIC TRAMWAYS IN SALT-MINES. — In the new Stassfurt mine an electric tramway has been in operation since January, 1884. It was built by Siemens & Halske, and was a success from the start. The engine is of 20-horse power, and is placed above ground at the mouth of the shaft. The dynamo is compound wound, and gives about 40 ampères at 300 volts. The current is taken through cables to the tram-line, a distance of 410 metres. The motor is supplied from overhead iron conductors, insulated from the ground. The motor is simply one of the well-known type of Siemens dynamos, placed horizontally on a car to economize space. The dynamo supplies about 20-horse power of energy; the motor gives about 10-horse power, — an efficiency of only fifty per cent. The weight of the wagons to be drawn is about 2,500 pounds, and there are sixteen in a train. The mean speed is about six miles per hour. This line is not in any way so efficient as those that can be put up to-day, but some figures as to the cost of working are of interest, especially as the road has been long enough in operation to allow an accurate estimate to be made. In 1884, 176,196 trucks were handled; and the working cost, including all items, wages, fuel, etc., with fifteen per cent for interest and depreciation, was 10.1 pfennig (about 2½ cents) per truck, while the cost before had been 20 pfennig (5 cents). In 1887 the figures are still more favorable, as the underground electric way had been considerably increased. The cost was 8.3 pfennig (about 2 cents) per truck, or 12.92 pfennig per kilometre ton, as compared with 34.2 pfennig per kilometre ton by human labor, which the electricity displaced. If the few electric tramways in mines that are now in operation in this country were investigated as to cost, it would be found that their economy is as great as that given above. It is only a question of a few years when mule and man power in mines will be replaced by electric motors.

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MICHEL EUGENE CHEVREUL, the chemist, entered his hundred and third year on Aug. 30. He is still active, and a few days ago was able to visit the Sanitary Exhibition at the Palace of Industry.

## BOOK-REVIEWS.

*Eclectic Physical Geography.* By RUSSELL HINMAN. Cincinnati, Van Antwerp, Bragg, & Co. 12°. $1.

"THE aim of this book is to indicate briefly what we know or surmise concerning the proximate causes of the more common and familiar phenomena observed at the earth's surface. Even thus restricted, the field of inquiry encroaches to a greater or less extent upon the domains of all the branches of science. Since the study of physical geography precedes that of the sciences in most of our schools, it has been thought advisable to present, in the form of an introductory chapter, a condensed statement of the more important and fundamental scientific conceptions regarding the properties and phenomena of matter and energy, such as inertia, gravitation, cohesion, affinity, and heat, light, magnetism, and electricity."

This passage, taken from the preface, shows the scope and object of the volume under review. The different parts of the subject are treated in the order used in all books of this character. Mathematical geography forms the first part. This is followed by meteorology, oceanology, geophysics, and biology. The book is illustrated by many maps, in which the most recent discoveries and researches have been made use of, and which, considering their smallness, are quite satisfactory, and undoubtedly superior to those defacing most American text-books of geography. In a number of maps the author has preferred to omit the system of meridians and parallels; it seems to us, not to the advantage of these maps. The great number of maps, and the fact that they are copied from the best authorities available, make the book very useful to the student. The chapters on meteorology and geophysics are the best parts of the book, while in that part treating of the oceans we find many statements that are not entirely in accord with the views held by the best writers. We particularly object to the method of the author of describing theories advanced by individual authors, but not generally accepted, — for instance, Murray's theory of the origin of deep-water deposits, and Ferrel's theory of ocean-currents, — as firmly established facts. A book of the character of this 'Eclectic Physical Geography,' if giving as much theory as the present one does, ought to give the views of opposing parties, and not favor one to the exclusion of another. In Part IV. the author gives first an outline of the topography of the earth, which is generally not treated in books of this character. After a brief treatise on weather and climate, the forms of life are discussed. It seems to us that the author, in this the last part, does not do full justice to his subject, his treatment being too brief, and his views not quite clear in all respects. Evidently it is his opinion that the principal part of geography consists in the study of geophysics. The book is, on the whole, well adapted to be used in the higher grades of teaching geography, although it might have been better to treat theories less dogmatically.

*The Chemical Analysis of Iron.* By ANDREW ALEXANDER BLAIR. Philadelphia, Lippincott. 8°. $4.

IN this book Mr. Blair describes those methods of analysis which, in his extended experience, he has found to be of most value to the iron-chemist. The first twenty-two pages of text are devoted to the description of the necessary and most suitable apparatus; twenty-one pages treat of the re-agents; then follow detailed methods for the analysis of iron and steel, iron ores, limestone, clay, slags, fire-sand, coal and coke, and furnace gases; tables to facilitate the calculation of analyses follow; and the book ends with a very complete index.

The work is well done, the arrangement good, the descriptions clear and to the point, the illustrations excellent. It forms a manual which must prove of the greatest assistance to those entering this field of work, while those who are already familiar with this branch of technical analysis will find it a convenient reference-book, and doubtless gain from it a number of valuable suggestions.

In Fresenius's 'Quantitative Analysis' (sixth German edition) fifty-two pages of the 'Special Part' are given to methods for analyzing iron and iron ores, and Bolley's 'Handbuch' contains seventy-seven pages on the same subject; but this is, so far as we are aware, the first complete work containing between its covers not only all the best methods for the analysis of all materials directly