minate in an omnium gatherum of undigested and unconnected scraps of information. The chapters on physical geography usually attached to the school-books are, in many cases, open to the charge, but their authors probably never intended to attempt to convey information of the kind which Prof. Huxley censures them for not giving. What the latter means is, perhaps, best explained by the following quotation from his preface, which we give exactly as it appears: "I do not think that a description of the earth, which commences by telling a child that it is an oblate spheroid, moving round the sun in an elliptical orbit; and ends without giving him the slightest hint towards understanding the Ordnance map of his own country; or any suggestion as to the meaning of the phenomena offered by the brook which runs through his village, or the gravel-pit whence the roads are mended, is calculated either to interest or to instruct." Prof. Huxley, then, considers that physical geography should treat of natural phenomena in general, and to assist in spreading his views he has provided teachers with an admirable textbook of the subject, based upon the lectures he delivered at the London Institution in 1869. In those lectures he endeavored to give his audience a view, in broad but accurate outlines, of the "place in nature" of a particular district in England—the basin of the Thames—treating his subject under such chapter-heading as springs, rain and dew, snow and ice, evaporation, the atmosphere, composition of pure and natural water, the work of rain and ice, of rivers and seas, of earthquakes and volcanoes, and of the slow movements of the land; the formation of land by animal and vegetable agencies, the distribution of land and water, the figure of the earth its movements, and its ruler, the sun. The "geology" is necessarily limited to that of the Thames basin, but that of other districts is introduced in the course of the interpretation of this branch of the subject. There is one great advantage in text-books from the pen of Prof. Huxley—that, although he can never be said to write down to the level of his readers, he is rarely, if ever, above the comprehension of average intelligence. The schoolboy who has learnt to understand what he reads—even if he has not learnt to spell correctly—can take up this volume, and follow its author step by step as he explains natural phenomena and their interdependence. Notes giving the etymology of words that may be new to the reader will afford all the assistance necessary, while the numerous diagrams and plates will instruct and interest. Among the charts are a map of the river basins of the British Isles, and a nyetographical map of England and Wales—a coloured map representing the amount of rainfall in different districts by the shading or depth of colour. This map is reduced from the one prepared for the report of the Rivers Pollution Commission by Mr. G. J. Symons. A tinted lithograph, showing the principal forms of clouds, gives a better idea of what is meant by the terms cirrus, stratus, cumulus, &c., than is usually conveyed by the ordinary wood engravings. The geological map of the basin of the Thames, and the contoured map of the same district, will enable the reader to apprehend the teaching of the author. Plates representing the Grand Canon and the Beehive Geyser of Colorado serve to illustrate phenomena which are not well exemplified in the Thames basin. Several other excellent illustrations are introduced in appropriate places, and it is certain that teachers will find in the book that ground-work to the introduction of a study of nature on which they may be able to build a superstructure adapted to the wants of their classes and the neighbourhood in which the lectures are given. Such a book as this might be used instead of "School-Board Readers"—at all events in the highest classes of our public elementary schools—with great advantage to the scholars, though the punctuation would need some modification to suit the habits of those who are given to "reading by stops;" but that, after all, is a small matter, on a par with the change of name from physical geography to physiography.—*English Mechanic.*

THE PROGRESS OF TELEGRAPHY.

In his address as President of the Society of Telegraph Engineers, Dr. C. W. Siemens managed to touch briefly upon nearly every branch of the subject of electric telegraphy—a feat which is becoming annually more difficult within reasonable limits. After alluding to the great increase in the number of members of the society—now nearly 1,000—Dr. Siemens made some remarks upon the progress of duplex telegraphy, which may be taken to include quadruplex, and may before long develop into a method of using six or eight pairs of instruments independently and simultaneously upon one conducting line. The success of the improved methods depends mainly, if not entirely, upon the perfect insulation and undisturbed condition of the line wire—subjects which are just now receiving much attention from telegraph engineers. Speaking of that great novelty of the day, the telephone, Dr. Siemens said that it owes its origin to the labours of several instigators, for in 1859 Sir C. Wheatstone devised an arrangement by which the sounds of a reed or a tuning-fork could be conveyed to a distance by means of an electric circuit, including at both stations a powerful electro-magnet. In striking any one of the tuning-forks differential currents were set up which caused the vibrations of the corresponding tuning-fork at the distant station, and thus communicated the original sound. It will be remembered that Prof. Dolbear has utilised this fact as a means of calling attention on a telephone circuit. In 1862 Reiss enlarged upon Wheatstone's invention, and was possibly the first to adopt the flexible diaphragm with which we have become familiar. Reiss's instrument, however, transmitted currents only of equal intensity, and was therefore incapable of reproducing the innumerable modulations of the human voice. The defects in the instrument of Reiss were remedied by Mr. Edison, who by establishing contacts with powdered plumbago, has succeeded in transmitting currents varying in intensity with amount of vibration of the diaphragm. Mr. W. H. Barlow also invented a recorder of the human voice, or logograph, which was communicated to the Royal Society in 1874, and, working on the same lines, Mr. Edison has recently produced his phonograph, by means of which the sounds can be reproduced by mechanical means. The beautifully simple instrument of Prof. Bell must, however, in Dr. Siemens' opinion, be regarded as a vast step in advance of all previous attempts in the same direction. The currents transmitted are so minute as to escape observation by the most delicate galvanometer, as the magnetic needle, however light, must be too sluggish to be moved visibly by impulses so rapid, as electro-dynamometer of extreme sensitiveness being required to render them appreciable. The rate of these reversing currents can, however, be accurately determined by means of a high-pitched tuning-fork, and Herr Röntgen, from experiments he has made, concludes that not fewer than 24,000 currents can be transmitted in one second. There is thus disclosed a rapidity of electrical transmission which is far in excess of the most sanguine expectations of telegraph electricians, and which opens out a new field for the cultivation of the ingenuity of the telegraph engineer. Dr. Siemens thinks that the telephone is capable of great improvements, and efforts should be directed chiefly towards increasing the relative amount of vibration of the receiving diaphragm, the object, we presume, being to obtain a great volume of sound. It is not impossible that the speediest way of attaining the desired result would be, not to seek to increase the amplitude of the vibrations of the diaphragm, but to utilise a series of diaphragms each adapted to reproduce its own series of sounds in the best manner. M. Trouvé has already made a step in this direction, and as it is known that diaphragms can be dispensed with altogether, or