

which are unquestionably of Secondary age—may through closer investigation be found to be of nearly the same epoch. Associated with the flora are Labyrinthodont and Dicynodont remains, the latter significant of the Poikilitic group in India, Africa, and Europe.

The Economic Summary shows the local value and importance of this Coal-field and the industrial wealth associated with this important fuel.

Estimates as to quantity are assuring for the future of India. Analyses of iron-ores associated with the coal are given and bear comparison with our British deposits.

The surveys of our colonies are looked upon in a different light by the general population when immediate utility is impatiently looked for, or when material gain almost entirely sways the public and official mind. Under these circumstances the usefulness of such a memoir as this by one of the officers of the Indian Survey in keeping alive the interest in the proceedings of our Colonial Geological Surveys cannot be over-estimated.

REVIEWS.

L.—THE EARTH: A DESCRIPTIVE HISTORY OF THE PHENOMENA OF THE LIFE OF THE GLOBE. By ELISÉE RECLUS. Translated by the late B. B. WOODWARD, M.A., and Edited by HENRY WOODWARD, British Museum. Continents:—Sections I. and II. Two vols. 8vo., pp. 666.¹ (Chapman and Hall, 1871.)

JUST as our stage is indebted to French writers for the plot and groundwork of the numerous "adaptations" which form the bulk of the *répertoire* of our actors of light comedy, so are our popular scientific gift-books mostly translations of French compilations, such as the one whose title stands at the head of this article. But there is this difference. While French comedies require for an English audience so much "adaptation" of their ornament and incident that they cease to be sparkling, the compilations of French *savants* can be allowed to retain their brilliancy. The latter possess a sufficiently polished surface, and leave nothing to be desired but a more solid background to reflect their light and irradiate their readers; but the former require the aid of a moral Nemesis to neutralize the artificial attractiveness of their vice. In a word, French science is too poetical, just as French comedy is too prurient.

The book before us well represents a French scientific compilation of the first rank; and its possession of the idealism characteristic of its nationality serves chiefly to invest its theme with a "harmony" and even with a "rhythm" which are not the less attractive because they are inconsequent. Thus, although "the Earth" has been the subject of many books by many writers, from Hutton's "Theory" to Gosse's "Omphalos," and from Strabo amongst the ancients to the Goldsmith of our schooldays, we do not remember any book which has covered exactly the same ground as M. Reclus's "La Terre."

¹ The two remaining volumes are now in the press.—EDIT.

Commencing with a description of the Earth as a planet, the author gives a brief but accurate sketch of its astronomical relations, importing into his description from time to time his views on its past, present, and future condition. He believes that great catastrophes have already occurred, and that a succession of cataclysms will take place before the "vitality" of our globe becomes annihilated. Its rate of rotation is already diminishing in a perceptible degree, and M. Reclus sees in this and some other phenomena sufficient proof that, after a series of internal convulsions, the earth's history will terminate with the fall of our planet upon the surface of the sun as a series of meteorites.

These preliminary chapters will acquire more significance in the mind of the reader after he has mastered a portion of the next division of the work, entitled "The Land." He will then find that the occasional paragraphs about "vitalities," "harmonies," and "rhythms," which at first will strike him, probably, as being mere poetical forms of expression, are really indicative of the ruling idea of the author in his contemplation of telluric phenomena. He will continually find accurate statements of facts unaccompanied by any reference to their cause, but illustrated by comparisons with analogous phenomena which the author regards as either harmonious or rhythmical.

In his description of "The Land," M. Reclus confines himself to the present epoch, and treats his subject as a portion of Physical Geography. This science he rightly regards as descriptive of the earth as it exists before our eyes, and as preparing the way for Geology by collecting and classifying facts which we can now verify, and by their aid discovering the laws of the formation and destruction of strata. Taking this line of argument, and importing into it the idealism to which we have already drawn attention, M. Reclus makes the second portion of his work an elaboration of the truth of the following statement (p. 40):—

"The globe of our earth is in evident conformity to all the laws of harmony, both in the spherical uniformity of its shape, and also in its constant and regular course through space. It would, therefore, be incomprehensible if, on a planet so rhythmical in all its methods, the distribution of continents and seas had been accomplished, as it were, at random. It is true enough that the outlines of coasts and mountain ridges do not constitute a system of geometrical regularity; but this very variety is a proof of a higher vitality, and bears witness to the multiplicity of motions which have co-operated in the adornment of the earth's surface."

As an illustration of his ruling idea, we give a short synopsis of his mode of correlating certain terrestrial phenomena as harmonious, merely premising that we select one or two sets as typical of his method, and that the same process is applied to the comparison of all the phenomena which have been made known to us by the researches of travellers and physical geographers.

The dry land of the earth is classified by our author as three double continents, forming three parallel series. Of these double

continents, North and South America form one pair; Europe and Africa another, and Asia and Australia the third. The duality of North and South America is evident to every child who understands "the use of the globes;" but when a comparison is attempted between this and any other pair, the author is constrained to draw more or less on his imagination. He owns that Europe might be looked upon as a mere geographical appendix of Asia; but he disposes of this objection by the fact that "at some previous epoch it [Europe] was separated from Asia by a sheet of water, which stretched from the Mediterranean to the Gulf of Obi, through the present Euxine, Caspian, and Aral Seas." He does not stop to inquire what was the condition of the African continent at that period; whether the Sahara was submerged, and whether the whole face of the sub-aërial land was not so altered in contour that it presented no analogy with the continents of the present day. Again, confining ourselves to the land-surface of the world as it exists to-day, is not the division between the continents of Europe and Asia purely arbitrary? It is not political, because portions of both the Russian and Turkish Empires extend into Asia. It is not philological; for, if it were, the peninsula of Hindostan would be joined to the remainder of the region inhabited by the nations which speak languages belonging to the Indo-European family. And it is neither ethnological nor theological, for similar reasons to those that it is not political.

The author finds little difficulty in pointing out a series of similitudes between South America and Africa; but in comparing them with Australia, he is compelled to exercise his idealism to even a greater extent than in his comparison of Europe and Asia with America, and especially in his attempt to construct an isthmus comparable with that of Suez or Panama. This essential feature he finds represented in the Sunda Islands, which he justly enough regards as "the piles of a demolished bridge."

M. Reclus does not, however, consider his similitudes to be mere fancies. He regards them as the evidences of the action of two sets of forces which have for ages been exerted at right angles to one another. He points to a series of circles of geographical phenomena, such as the "circle of fire," which extends from the chain of the Andes across the southern ocean; to "the circumpolar circle of coasts" around the North Pole; to the "circle of inland seas and lakes" represented by the Mediterranean, the Euxine, the Caspian, the Siberian and American lakes, and the Bay of Fundy; also to the "semicircle of deserts," which is arranged obliquely across the continents of Asia and Africa. All these, with the directions of the axes of the northern continents, show, in his opinion, that they are the result of a set of forces acting obliquely to the Equator.

The other set of forces he considers to have produced the distribution of the southern continents in three lines parallel to the meridian. "To this complication," he observes, "is due the apparent irregularity of the double continents in the Old World; for there the two axes of formation cross, and consequently there, too, is produced

a great diversity in the relief of the land. The mutual resemblances and contrasts exhibited by the two halves of the world can, however, be perfectly well explained if we connect them with one or the other of these two orders of facts. If we look upon the land as forming three parallel double continents, we must then be struck with the similarity which they mutually present both as a whole and in details; if, on the contrary, we admit the usual division of the continental masses into two worlds, we discern the reason of the contrasts, which are only another kind of resemblance. . . . Just as in a woven fabric, we can discern both the warp and the woof in the marvellous texture of the earth's surface."

It is fortunate for M. Reclus that his ideas of harmony and rhythm are so plastic; for in his next attempt—which is the last to which we shall draw attention—their elasticity is put to even a more severe test. After drawing attention to the similarity in the shape of the terminal points of the three southern continents, and to the existence of an island, or a set of islands, on the southern side of each, he proceeds to show that these three continental promontories are represented by three peninsulas in each of the three northern continents—another evidence of harmony and rhythm of the highest order. Thus, commencing with Europe and Asia, Spain corresponds with Arabia; Italy with Hindostan (even to the existence of an island near the southern extremity of each), and Greece with India beyond the Ganges. "With regard to Greece and the Transgangetic peninsula, the seas which bathe their eastern coasts are dotted over with innumerable islands and islets, like a brood of young birds nestling under the wing of their mother. The two other eastern peninsulas, which are also thrown off by the great Asiatic continent, are each of them likewise accompanied by an archipelago." But the European representative of these last is not mentioned.

The author's ideas of harmony, however, suffer the greatest wrench during his comparison of the two trios of northern Old-World peninsulas with their North American representatives. Can our readers trace the harmonious analogy between California, Spain and Arabia, between the Isthmus of Panama, Italy and Hindostan, or between Florida, Greece, and Transgangetic India? M. Reclus manages to sustain his theory in this last effort; but, to our mind, his success speaks more of his ingenuity than of his philosophy.

Pursuing a similar method, M. Reclus discusses the relations of the Plains and Deserts, the Mountains and Valleys, and the other features of "The Land," and in subsequent chapters treats of "The Circulation of Water" and "The Subterranean Forces." The latter portion of the work is also strongly marked by idealism, like the chapters which we have selected as being most appropriate for discussion in a Geological Magazine. All his statements are interesting, all fresh, and all readable, although it must be said that they contain little or nothing true that is not "familiar in our mouths as household words."

Not even M. Reclus, however, can find "harmony" in all the phenomena of the globe. Indeed, he signally fails in the case of

the ages of geological strata in the various countries of the world. "Nowhere do they present absolute harmony." His conclusion takes the form of a question, and he asks, "How much [of this want of harmony] is owing to a difference of epoch, and how much to a diversity of climate? The solution of this problem is one of the great tasks of science." (p. 31.) We are of opinion that De la Beche, Edward Forbes, and Professor Huxley have taught us in England to reduce this "want of harmony" to a principle, which we know as Homotaxis; and we believe that some way has been made in the endeavour to ascertain the value of each factor in the numberless equations which Comparative Palæontology presents to us. But would M. Reclus be "surprised to learn" that this geological variation is harmonious with an astronomical one described by himself? "The attraction of the moon and the disturbances caused by the vicinity of certain planets are incessantly modifying the curve described in the starry fields of space by the earth's axis, and complicate it with a multitude of spirals, the various periods of which do not coincide with the great period of the swaying of the axis. The successive undulations form a continuous system of interwoven spirals. 'It is a manifestation of the Infinite.'" (p. 12.) Just as the moon and the planets modify the path of our globe round the sun, so have volcanic, meteorological, and other terrestrial phenomena modified the climate, the depth of the sea, and the distribution of land and water, which have produced the "want of harmony" in geological strata in different parts of the globe. The geologist of the present day who believes in the philosophy of his science looks forward to the time when the history of all these perturbations may be as clearly read by him as the ancient path of the world can be calculated by the astronomer.

The two volumes which we have received do not complete M. Reclus's work; but we have refrained from consulting the complete French edition, as we hope on a future occasion to resume our discourse on the sequel, and to show, if possible, how the author gathers up his lines of harmony and rhythm, and connects them by means of a scientific theory with the laws which are known to have produced the varied phenomena which he has hitherto compared with each other.

The translation to which we have confined ourselves was made by the late Mr. B. B. Woodward, M.A. (Queen's Librarian), and it has been edited by his brother, Mr. Henry Woodward, F.G.S., etc., of the British Museum. The volumes are very well got up, excellently illustrated by twenty-four page-maps printed in colours, as well as by more than two hundred woodcut figures inserted in the text. As a gift-book on Popular Science, we can strongly recommend it, especially to those who expect such publications to interest their friends if opened at random and read for a spare half hour. We cannot say that it is faultless; but when the work is completed we expect to find a table of *Errata*, in which, for instance, the editor will assure his readers that the word "Crustaceæ" is a misprint, and not meant, as a double plural, to be a philological illustration of the author's theory of double continents.—H. M. JENKINS.