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ART. I.—*Geology of the Island of Bombay ; with a Map and Plates.* By H. J. CARTER, Esquire, Assistant Surgeon, Bombay Establishment.

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DIFFICULT as it may appear to unravel the geological history of a tract of country which has been overflowed and ploughed up by successive volcanic effusions, and subsequently elevated, depressed, immersed, or denuded, or all four put together, yet, by patient investigation and search, such a knowledge of its structure and composition may be obtained, as to enable the observer to bring back, in his imagination, to their original state and position, the materials of which it was originally composed, and to place before the reader a satisfactory account of the changes which it has undergone during a given geological period,—changes which to him would otherwise be incomprehensible.

The little island of Bombay, just peeping above the waters of a muddy estuary, would seem to offer little or no novelty in this respect, particularly when compared with the great mountainous masses which surround it ; but, when observed carefully, it will be found that what it lacks in size is compensated by amount of excavation, and that the latter has in all probability disclosed the geological type of the whole neighbourhood in its limited space.

Was the island of Bombay, as at first sight appears, composed of one mass of the same kind of dark-looking trappean rock, its geology might be told almost in as many words ; but when it is found to present in its thickness the strata of an ancient lake, or river ; a coal-deposit in miniature, filled with the fossilized debris of animal and vegetable remains, some, if not most, belonging to species now wholly extinct; and that there have been three or four successive effusions of volcanic matter over and into these strata, forming ten times as many different rocks, it naturally suggests the questions—How far did this lake extend ? Was it a lake, or a river, or an estuary ? On what kind of rock were its strata deposited ? Of what material are its strata composed ? To what extent does its coal deposit extend ? What was its geological age ? When was it destroyed and filled up ? What rock first covered it ? What kind of rocks subsequently forced their way into it ? Has the island undergone any elevation or depression, and have any other strata been deposited on it since the period of active volcanic action ceased ? Does the nature of its volcanic effusions, or their relative positions, bear any analogy to similar effusions in the adjoining islands, and on the main land itself?—are all questions which make the little island of Bombay assume a geological importance as interesting as at first it appeared to be unpromising. Let us now see if any of them can be answered.

From the following facts and observations, it will be evident that there have been three distinct periods in the formation of the island of Bombay, viz : 1st, the deposit of the fresh-water strata ; 2nd, the volcanic effusions ; and, 3rd, the deposit of the marine strata.

Of the Fresh-water Formation, which was of course the oldest, we are unable to come to any conclusions beyond the following, viz., that by the absence of marine fossils in it, and the presence of fresh-water ones, it was deposited in a lake or river ; that its upper part is seen entire for 36 feet below the igneous rock which overlies it ; and that below this again its strata have been intruded and broken up by other igneous rocks ; so that, at present, we can neither tell its whole thickness, nor the nature of the rock on which it was deposited. As to its limits horizontally, it can only be at present stated that it extended all over the island of Bombay, and that portions of it may be seen in the volcanic breccia at Ghora Bunder, a little village on the northern extremity of the island of Salsette, thus giving it an extent north and south of at least twenty miles. We shall see also, by the presence of organic remains in this formation, that it must have been the depository of a large quantity of wood, leaves, fruits, &c., and that these are generally in a fragmental state, and jumbled together, as if they had been brought

from a distance; also that plants, having conical bulbous roots, with stems formed of concentric layers, as if made up of sheathing leaves, like large bulrushes, grew in this lake; that it swarmed with the little entomostraco-crustacean animals called *Cypridæ*, and that an abundance of small frogs and marsh-tortoises were also present. Moreover, that the material of which its strata are composed seems from its color and composition to be of volcanic origin, but deposited for the most part in a subtle state, though occasionally granular and coarse-grained, but never gravelly, and always argillaceous. This, from the thin layers of which the formation is composed, must have been deposited very gently, and would therefore come nearer to the sediments of a lake than those of a swift stream. At what geological period these strata were formed is not yet known, because there have been no fossils yet found in them which can determine this; but a time arrived when the volcanic material of which they are presumed to have been formed was no longer transported through the agency of water, but came in a molten fluid, and, filling up the lake, dried up or turned off its waters, and changed the then sub-lacustrine plain of Bombay into one of dry black igneous rock. This brings us to the second epoch. It is most probable that this lake was above the level of the sea at the time this occurred, although the general level of its strata is now below it. One other fact connected with the fresh-water formation is here worth mentioning, viz. that within three inches of the igneous rock which overlies it, there is a stratum three inches in thickness, almost entirely composed of the casts of *Cypridæ*,—not of their valves singly, which they are wont to shed annually, but their entire casts, showing that some sudden alteration of the water in which they were living took place, by which they all as suddenly perished and fell to the bottom. After this occurrence no organic remains are seen, and nothing but the three inches mentioned of a kind of transitional material between the fresh-water formation and the basalt. The amount of coal in this formation will be seen to be very trifling, and that nearly the whole of the wood and other vegetable remains have been replaced by argillaceous material. At the same time, it will also be seen that it is only at one place that the highly carboniferous part has been exposed, and that, too, over an area only of a few square yards, viz. in the cutting of the sluices, where the main drain of the island empties itself into the sea.

2ND PERIOD.—This period commences with the effusion of the basalto-dioritic tract which caps the main ridges in Bombay, and which, it may be presumed, was at first continuous all over the island. How far this tract of lava extended it is not our present object to inquire; it is

enough for us to know that it extended over the then plain of Bombay : originally it was probably much thicker than it is at present, but the weathering of ages has of course much reduced it, though even now it may be seen to measure 90 feet thick on the eastern, and 51 or more on the western side of the island. Immediately after this effusion, we may conceive the site of Bombay to have been part of a black arid plain : how long this continued geologically we have no proofs to show, but after it had become hard, probably, and fixed, there was a second effusion, which, coming up under the first, and not finding a ready outlet, followed the course of the fresh-water strata below it, intercallating them, and breaking them up into all-sized fragments. This effusion was for the most part scoriaceous or cellular, and gave rise to the amygdaloidal structure which is now its chief characteristic ; though in Nowrojee Hill quarry it is compact, which might have arisen from the superincumbent weight of diorite over it at this part. The amygdaloid rock is found invading the fresh-water strata in every part of the island, in one form or another, non-cellular or cellular ; the cavities in the latter instance being filled with laumonite, green-earth, quartz, or calc-spar, according to the locality. The part which this effusion took in raising up the longitudinal ridges in the plain of the first effusion, and which ridges, running about N. by E. and S. by W., now border the eastern and western sides of the island, there is no evidence to show ; but that this, or the third effusion, to which we now come, or both, were active agents in this matter, there seems to be no reason to doubt, for we find those parts of the ridges most elevated where these effusions are thickest, and in the western ridge either one or the other is seen filling up the internal angle of the roof-like elevation formed by the fresh-water strata there. We have, then, a basalto-dioritic effusion, and an amygdaloid effusion ; and now we arrive at another effusion, which we shall term the volcanic breccia. How long an interval elapsed between the amygdaloidal effusion and that which gave rise to the volcanic breccia is as inconceivable as the duration of the interval which existed between the first and second effusions, there being nothing in the island of Bombay to give the slightest idea of either ; but, that the volcanic breccia was formed subsequently to the amygdaloid, is proved by the presence of fragments of the latter among the fragments of the other rocks which form the heterogeneous compound of the former. The principal characters of this effusion are that it is composed chiefly of angular fragments of the fresh-water formation, varying in size from particles which are invisible to the naked eye to pieces some tons in weight ; also that it contains fragments of various sizes of the two

foregoing effusions ; and, lastly, that it is of great extent, forming a continuous tract from Carnac Bunder all long the eastern shore of the island to Sion, and there composing the plain and chain of hills which form the north-eastern part of the island ; also, still further, the principal part of the mountains in the island of Salsette. It is this effusion which I think contemporaneous with the Laterite, and in some parts identical with it in every respect ; but this will be better understood by a reference to the latter part of the detailed description of this effusion,—we are chiefly concerned with it here as an agent in the changes of form which the first plain of volcanic rock has undergone ; and no one can witness the cropping out of this breccia all along the base of the highest parts of the eastern ridge, and its free effusion at the north-east part of the island, with wells extending into it 60 feet deep in Mazagon, and veins and dykes of it bursting through the basalto-dioritic tract in the same neighbourhood, without feeling satisfied, that to make room for such an immense mass, the crusts of the previous rocks must have given way, and have been forced ridge-like upwards, as we now see them, to give vent to the volcanic torrent, which, breaking through the fresh-water formation and igneous rocks that opposed its progress, finally spread their fragments in the manner we have seen them along the eastern shore of the island.

The protean forms assumed by this effusion and its decompositions, passing through so many different rocks, may easily be conceived ; it is therefore white at one part, blue at another, yellow at a third, brown at a fourth, red at a fifth, and black at a sixth, with all the intermediate shades ; composed, as before stated, of fragments of rocks in the immediate vicinity, changed into all kinds of consistences, and more than that indeed, fragments of large-grained diorite, which have come up from a region much below any we are acquainted with in Bombay. As to structure and hardness, it presents every stage, from the coarsest and softest argillaceous breccia, which may be cut with a knife, to the blackest and hardest homogeneous jasper, seen at the hills of Antop and Sewree. Such a destructive agent, then, as this effusion must have been, might be safely allowed to have been the one most active in the upheaval of the longitudinal ridges in the island of Bombay, if not the mountains in the island of Salsette also. Lastly, we have a fourth effusion, and this is proved by the existence of dykes of volcanic breccia through the last mentioned. Of their contents, little can be made out, and they prove nothing further, than that the third was not the last effusion. In the detailed descriptions of the three latter effusions, I may have mentioned some little tracts as pertaining to one which

may pertain to another ; but it is almost impossible to expect accuracy in this respect with effusions which are all more or less alike, and errors of such kind, after all, are of little importance, as they cannot affect the grand facts, and, moreover, the observer may correct them as he best likes himself. That there have been four successive effusions there can be no doubt ; and that the three latter, pursuing a course in the first instance under the basalto-dioritic tract, have all contributed to destroy its horizontality, by raising up the ridges which now exist upon it, is equally obvious. With the dykes, which have been last mentioned, the period of active volcanic action in the island of Bombay seems to have ended ; how far passively the island has since been affected there is nothing to determine.

3RD PERIOD.—*Deposition of the Marine Formation.*—There is nothing in this to make us think that it is of very ancient date geologically : it would seem to belong to the Post and Newer Pliocene Formations. The clay and lower part of the beach, as no remains of human bones or artificial structures have I think been found in either, perhaps belong to the former, while the shells consist of the same species as those which are found on the shore at the present time. That the island has undergone elevation since the period of volcanic action ceased would seem to be proved by the remains of a portion of sea-beach called Phipps' Oart, in the centre of the island, near which no sea now comes ; but this elevation must be very trifling, for the ridge of a beach is always higher than the sea, even at the highest tides, and the summit of this is only eight or nine feet above high-water mark, while the accumulation of detritus poured into the estuary of Bombay from the neighbouring hills is as likely to have produced this, and to have filled up the lagoonal depression in the centre of the island to the level of the sea, as anything else.

At the same time, Bombay could never have been very deep, or long under water, or the deposits on it would have been much thicker than they are, and of more ancient date : as it is, the beaches hardly exceed 20, and the clay 10 feet in thickness. Where there is no clay, as close to the shore, the beaches are thickest, and *vice versa*.

The analogy which the basalto-dioritic tract and amygdaloid effusions bear to those on the main land are most striking, and may be seen by a reference to Colonel Sykes' valuable paper on the Trappean Region of the Dekkan and Konkan, immediately opposite,*—that of the adjoining islands I hope at some future period to show myself.

* Trans. Geol. Soc., 4to, second series, vol. iv. p. 409.

Such is a short summary of the geology of the island of Bombay, and I have premised instead of appended it, in hopes that the reader may be induced to peruse the following descriptions in detail from which these inferences have been deduced ; let us begin with a brief outline of its geography.

The island of Bombay is trapezoidal in figure, having its long axis nearly N. by E., and S. by W., its short parallel side towards the sea, and its long one towards the land. The outer side is six miles long, and the inner one eleven miles ; both are bordered by ridges of hills, scarped towards the east, while they slope gradually towards the west. Between these ridges, which are about two miles apart, there is a level plain, called the "Flats." The greatest width of the island is a little more than three miles.

At the two short sides of the figure there are sandy beaches, which, being above the level of the "Flats," prevent the sea from overflowing them, but on the outer side of the island there is no beach, because the whole is black basalt, probably extending a long distance into the sea ; while on the inner side, which borders the harbour, there is an accumulation of silt, deposited from the back-waters, and the rivers which empty themselves into the estuary, in which the island of Bombay is situated.

The southern extremity of the outer side of the island is called Malabar Point, and the northern Worlee ; while the southern extremity of the inner side is marked by the Light House, which stands on the extreme end of a thin prolongation called Colaba ; and at the northern extremity is a tower called Riva Fort. Between Malabar Hill and the extremity of Colaba is a deep bay, called Back Bay, in which there is a sandy beach, and on the opposite or corresponding side of the trapezoid is a similar excavation, in which there is also a beach, called Mahim Sands. Both of these beaches are a few feet above high-water mark, and they chiefly prevent the sea from overflowing the centre of the island.

The highest point in the lateral ridges (which are interrupted more or less by breaks here and there) does not exceed 180 feet, which is the height of Malabar Hill just above the eastern corner of Back Bay. The southern part of the eastern ridge, called Nowrojee Hill, is 117 feet ; Mazagon Hill, next to it, 162 feet ; Chinchpoojy Hill, 153 feet ; Parell Flag-staff or Colongee Hill 163 feet, above high-water mark ; and Antop Hill, which is in the centre of the little range bordering the north-eastern part of the island, is 85 feet ; while another hill in the

same range, a little to the north of it, is about 127 feet above high-water mark,—the latter has been measured by comparison.

The Flats are but just above the level of the sea, which overflows a small portion of them at the “springs,” and the ridges of the beaches average about six feet above high-water mark.

From this description, it must be evident that a section of the island of Bombay, either longitudinally or transversely, if proportionally given, will have a very insignificant appearance. (See Map.)

With respect to its relations with the main land, Bombay is separated to the northward from the mountainous island of Salsette, which is six or seven times larger, by a channel, narrowing to a point not more than 125 yards wide; while Salsette, again, in like manner, is separated from the main land by a similar channel. To the south and east of Bombay is its harbour, in which are also several mountainous islands and islets, which lie scattered between it and the main land. The harbour, or estuary, is about six miles across in its widest part.

This short geographical introduction will be sufficient to explain the map of the island of Bombay hereto annexed; let us now proceed to its geology.

Insignificant as the elevation of Bombay is from its low hills and general flatness, yet it is by no means so in geological composition, for although its structure is not known for more than 60 feet here and there below high-water mark, which, added to its highest point, gives only a total thickness of 240 feet, yet in this thickness we have from 30 to 50 feet or more of fresh-water strata, covered by volcanic rock, which has been thrown out over them, in some parts 90 feet thick, and pierced by various subsequent effusions even still thicker; together with a marine formation, filling up the lagoonal depression of the island, and consisting of mud, in some parts 10 feet, and in other parts sandy beaches, 20 feet thick. Thus we have abundance in a geological point of view to occupy our attention, although we have little geographically.

But, before proceeding further, it would be as well to consider the general composition of the ridges of the island, and then their mineralogical characters in detail, in order that we may arrive at a right understanding of the relative position of the rocks which compose them, and the names by which we intend to designate their various forms.

The rocks of Bombay, which chiefly form its ridges, come under the class volcanic, and all belong to the trappean system: there are no hypogene rocks, that is igneous rocks which have been formed below the surface, and afterwards raised above it. Besides these, there

is a series of aqueous strata, which comes under the head of fresh-water formations, from the character of its fossils ; and this, as before stated, is overlaid, and intruded by, both the volcanic rocks.

The whole of the upper part of the eastern ridge, from Riva Fort to the end of Colaba, is composed of fine-grained diorite, more or less basaltic towards the summit, while the whole of the upper part of the outer or western ridge is composed of fine compact black basalt. Both of these rocks rest conformably on the fresh-water formation, which is composed of argillaceous and bitumenous shale, broken up by subsequent volcanic effusions, assuming the forms of trappite, aphanite, spilite, amygdaloid, &c.

Such is a brief outline of the general composition of the ridges, and the relative position of the rocks which compose them ; the following are the mineralogical characters of the latter. I should here premise, also, that in nomenclature I shall chiefly follow Alexandre Brongniart's classification and mineral characters of rocks, as given under the article "*Roches*," in the *Dictionnaire des Sciences Naturelles*.

Diorite, (syn. greenstone,) is essentially composed of felspar and hornblende, and is either coarse-grained or fine-grained—the former is generally the oldest : that of Bombay is fine-grained, and hardly admits of being recognized by the naked eye ; but, when magnified, the dark green hornblende is easily distinguished from the less colored felspar. It is this compound which forms the upper part of the eastern ridge, and varies in color from green and blue to sometimes black. When it is very compact, sparkling, and sub-granular, its binary compound and crystallization almost undistinguishable, and its homogeneity almost complete, then we shall call it *basalt* ; and in this state, possessed of a blue black, or deep purple color, it forms the upper part of the western ridge. Diorite, when forming part of a trappean effusion, may pass into basalt ; hence we have the upper part of the eastern ridge in some places very basaltic. When the binary compound of diorite has an intermixture of blue earthy matter, it becomes a semi-crystalline rock, and this we shall call *trappite* ; while, when there is no longer any appearance of the crystalline compound, viz. felspar and hornblende, and the whole is an earthy substance, it is called *aphanite*, from ἀφάνισω, to make unseen, in allusion to the felspar. I shall not make use of the term "trap" as a specific appellation here, as it confuses, and trappite and aphanite will, I think, be found sufficient. In this way, then, the distinguishable binary compound of diorite may pass into the undistin-

guishable one called basalt,* or into the semi-crystalline one, trappite, or earthy one, termed aphanite, in which all traces of both the felspar and hornblende in a crystalline state have disappeared. Now, when aphanite is cellular, its cavities being filled with calc-spar in particular, chlorite, zeolites, quartz, amethyst, or calcedony, it is called *spilite*, and the other rocks, too, when cellular, and filled with such substances, are termed amygdaloid, or variolitic. Under the foregoing generic names, then, we have all the trappean rocks in Bombay included. We next come to the fresh-water formation, in which we have argillaceous shale, argillo-calcareous shale, and argillo-bitumenous shale, with small quantities of coal; also chert and jasper, arising from the exposure of the argillaceous strata to great heat. Add to the foregoing a volcanic breccia, composed of fragments of the other formations, bound together by a base of aphanite, more or less fine, more or less coarse; harder or softer, and sometimes passing into a black jasper, as at Sewree, and Antop Hill. Lastly, we have the blue and brown clay of the Flats, containing the calcareous concretions called *kunkur*; and the consolidated sand and sea-shells of the beaches.

Having thus premised sufficient to prevent a misunderstanding in the terms which will be used, and the kind of rocks they designate, let us now trace the different formations mentioned throughout the island, beginning with the diorite, which is the most prevalent, the most prominent, and the most widely-spread of all.

Diorite.—This rock forms the summit of all the eastern ridges, except that bordering the north-east part of the island, and will be found to extend continuously from the extremity of Colaba to Riva Fort, that is the whole length of the island. It is interrupted by breaks or breaches here and there, and diminishes in height towards both extremities; but between the fort and the village of Nagaum, a distance of five miles, it presents points of variable heights, rising to 163 feet above the level of high-water mark. In some of the breaks it appears to be so expended that its continuity is hardly traceable, as at Nagaum, while in other places, as at Nowrojee Hill, where it has been quarried, it is 90 feet thick. Again, the width of this tract varies, so far as it is observed superficially: it forms the whole of Colaba, and the eastern part of the Esplanade and Fort, and, of course, it extends into the harbour on one side, and, obscured by the beach which forms the

* Some basalts may of course be composed of felspar and angite, and, when this is the case, the rock is called "dolerite."

Esplanade, appears in Back Bay again on the other ; but at present it will only confuse us to trace it where it is concealed, and, therefore, we will confine our observations to where it is exposed. It forms also the eastern part of the Native Town, at the northern extremity of which is the quarry of Nowrojee Hill, where, as before stated, it is seen to be 90 feet thick ; here, also, its superficial area is greatly expanded, and extends continuously across the island from Mazagon Hill due west to the Flats, a distance of one mile. This breadth is greater than at any other part, and is prolonged from Nowrojee Hill due north to the Mount, a distance of one mile and a quarter. At this part, also, it has been intersected and pierced in all directions by a subsequent effusion, which we shall come to hereafter. At the Mount, it narrows again, and spreads out on Chinchpoo gly Hill, and thence is continued on over Colongee or Parell Flag-staff Hill to the village of Nagaum ; here it sinks to within a few feet of the level of the Flats, and is continued on in the form of a few boulders for half a mile, and then, rising again a few feet more or less, ends at Riva Fort, the northern extremity of the island. The principal feature of this ridge is, that it is more or less scarp ed towards the east, while it slopes more or less suddenly towards the west ; a feature which, however, it should be remembered, is common to every hill in Bombay, without exception. Its summits and sides are also covered with naked rocks and boulders, from the mode of desintegration of the diorite, which follows the veins with which it is intersected ; hence they are in cuboidal or polyhedral masses, and, when more minutely divided, end in becoming spheroids, throwing off concentric crusts.

The mineralogical composition and structure of this rock varies. Generally, its crystalline structure may be distinguished with a good magnifying glass, but sometimes it becomes so minute, and compact, and tough, that it almost takes on the form of basalt ; still we may infer its composition by seeking out its structure in larger-grained specimens. In these we shall find tabular crystals of white felspar ; amorphous crystals of green hornblende ; a small quantity of green or blue earth, (" green-earth,") with more or less olivine ; also small particles of peroxide of iron, or, probably, titanitic iron, or rutile, from its rich brown red color in some parts ; all of which are caught up by the magnetized needle in their natural state when the mass is pulverized,—this, of course, can only be seen by manipulation under a high magnifying power. The presence of the iron accounts for the decomposition of the rock into greenish blue, then yellow, and lastly red earth, these being the usual colors which iron assumes in passing from its protoxide to its peroxidized state.

Further, it may be observed of this rock, *en masse*, that the upper part is tougher and more difficult to break than the lower part, while the latter, on the contrary, is more cleavable. Cavities are sparsely scattered in it, which contain varieties of scolezite or needlestone, the latter name being derived from its spicular crystallization. In some parts it is blacker than in others, while frequently it presents a spotted appearance, on account of the black portions being circumscribed instead of generally spread throughout the rock. I am unable to explain the latter appearance, except that the hornblende is blacker in these places than in others, probably from the greater quantity of protoxide of iron which it contains; in other words, that the distribution of the iron throughout the rock has been unequal, or has become aggregated in some parts of it more than in others during its crystallization or *ab origine*. In the next ridge I am about to mention, this mottled state prevails very much, and on weathering, the dark portions remain, while the lighter parts wear away, giving the surface a botryodal appearance, in which the spheroids are about the size of bullets. This form seems to answer to that called "*orbicular diorite*" (Bt.)

The next ridge we have to trace, and which is composed of the same rock, is very low, scarcely rising at one or two points more than 50 feet above the sea. It lies on the east side of the latter, and commences close upon the sea opposite Mazagon Hill, from the base of which it is separated by subsequent effusions of volcanic matter. Its rocks, which appear just above the sea at its commencement at Mazagon, rise gradually to Tank Bunder, where there is a high mound of it, after which it sinks below the mud, and subsequently makes its appearance again at Kandlee Battery: there, as at Tank Bunder, it rises to about 50 feet above the sea, and again sinks gradually, as it pursues a direct line northwards to within a hundred yards of the base of Colongee or Parell Flag-staff Hill, where it ends; being separated the whole way from the first ridge by the subsequent effusion to which I have alluded. It does not differ in composition or structure from the diorite of the first ridge, except that its surface in many places weathers into the botryodal form mentioned, particularly a little south of Tank Bunder; this is its great peculiarity. It is very insignificant in height, when compared with the first ridge; but is, in like manner, tilted up and scarped towards the east.

Lastly, we have a third ridge of diorite on the east side of the island, which begins at a point 400 yards N. E. of Kandlee Battery, called Jackaryah's Bunder, and 600 yards east of the first ridge. It pursues a course a little to the eastward of north, and, about a mile from its

commencement, attains a height of 78 feet, after which it gradually gets lower, and finally joins the first ridge about two and a half miles south of Riva Fort, or about half a mile beyond Nagaum. In mineral composition, structure, and physical features, it corresponds with the first ridge, being scarped on the eastern, and sloping more or less suddenly on the western side.

In addition to the main ridge, then, there are two other short ridges of diorite on the eastern side of the island, and all these rest on the fresh-water formation, as we shall see; let us now go to the western side.

Basalt.—The western ridge, which extends from Malabar Point to Worlee Fort, is entirely of black, or blue-black basalt, interrupted by a break or two. Its height, as before stated, in one part, exceeds that of any other hill on the island, being 180 feet above high-water mark, just over the western corner of Back Bay. Like the eastern ridge, it is scarped on the eastern side, and slopes more or less suddenly on the western one, passing off afterwards with a very slight inclination into the sea. In its broadest part it is about 600 yards wide, that is the distance between the scarped side and the sea, and everywhere it appears stratified, the lines of stratification dipping suddenly, in the ridged portion, towards the west. In its scarped portion it presents a columnar arrangement, consisting of large cuboidal masses, arranged one above another; while its surface in some parts presents an hexagonal prismatic arrangement, to wit on the shore at Worlee, and in Back Bay. It is fragile almost to brittleness a little beneath the surface, but superficially, where it presents the hexagonal arrangement, is exceedingly tough. Throughout it is minutely divided by intersecting quartziferous veins, the structure of which, where exposed, is open and cellular, and of a rusty color, while the centre of the polyhedral masses which they surround is firm, black, and compact. Like the diorite of the eastern ridge, it decomposes into spheroids, throwing off concentric crusts; in some parts, however, beneath the surface, it appears to undergo an irregular jointed disintegration, the surface of the fragments presenting a greenish-blue colored argillaceous earth, which afterwards becomes brown, yellow, or red. There is a remarkable absence of cellular cavities in this rock,—I do not know that I ever saw a trace even of any except here and there, where there was a little olivine: its chief difference from the diorite of the eastern ridge lies in its black color, and in its compact structure and minute texture, which defies all attempts at analysis by optical examination; also in its apparent stratification and hexagonal prismatic arrangement on the surface in some places, and in its more rectangular disintegration. Like

the diorite, however, of the eastern ridges, it rests on the fresh-water strata, but is nowhere pierced, to my knowledge, by any subsequent effusion. Thus, with these little differences set apart, it so much resembles the diorite of the eastern ridges that one can hardly consider it otherwise than as a more compact part of one and the same formation, which was once continuous across the Flats, but has been since separated by fracture, upheaval, and denudation. To this effusion, therefore, we will give the name of Basalto-dioritic Tract.

Fresh-water Formation.—Next in succession below the basalto-dioritic tract comes a series of aqueous strata, which, by their fossils, are proved to have been deposited in fresh water. They consist of argillaceous shale, which, so far as it has been exposed, appears to have been formed from the fine detritus of volcanic matter, with which is mixed a quantity of organic remains, both vegetable and animal. In their upper part they are of a light brown color, passing gradually downwards into a greenish or blueish deposit, and then into black bitumenous shale. In no part do they, to my knowledge, present any gravel or large detritus.

At their junction with the basalt, at the cut of the sluices at Lovegrove,—for we will, before tracing these strata over the island, study them at this part, where they are least disturbed, and best seen,—the basalt is decomposing for some distance up, and passing into spheroids, which become more and more divided, until they disappear altogether, and leave nothing but a few traces of their concentric crusts: at this point the basalt rests upon the aqueous strata, and presents a number of vertical tubes, filled with crystalline quartz. These tubes are about five or six inches long, about half an inch broad at the base, and taper towards the extremity: some rise immediately from the surface of the aqueous strata, others a little above it. They are either solid or hollow, and occasionally bifurcated below, and were probably air-cavities in their original state, perhaps produced by the evolution of gases from the vegetable matter over which the fluid basalt had spread itself. These tubes are best seen on the eastern side of Lovegrove Point, under the tomb of Mama Hajanee, near high-water mark; they exist also at the sluices, but I have not seen them anywhere else.

Lying immediately below this is the first stratum of the aqueous deposit, which is only three inches thick, and presents nothing, apparently, but the transitional state of the volcanic into the aqueous formation. Next it, however, comes a remarkable layer, though not thicker than the foregoing, which is compact and siliceous: the peculiarity of this is that it is almost wholly composed of casts of the

shells of the little entomostraceous crustacean animals called cyprides, with which is mixed a variable quantity of vegetable remains, consisting of small short fragments of plants, without any particular shape. It also has another peculiarity, which is, that it is almost wholly composed of siliceous, in the form of amorphous or crystalline quartz, which has either wholly or partially filled the cavities of the shells, the forms of the shells themselves having disappeared. Hence we find this stratum in preference to all others chertified, jaspified, or blackened and basaltified by heat; and thus we have in many places evidence of the existence of the upper part of the fresh-water strata, where the rest have had their stratification destroyed, or have had their structure almost wholly transformed into something else. This stratum is well seen at Lovegrove Point, and on the northern side of the break through which the sluices have been cut. It will be recognized by its whiteness, and its oolitic structure, immediately underlying the black basalt. At the northern side of the sluices it presents a remarkable fold upon itself, which, before it is understood, is very confusing, insomuch that it gives the appearance of two or three of these kinds of strata, instead of only one.

From this deposit downwards, for 36 feet, we have argillaceous shale, which was deposited generally in very thin layers of impalpable powder, but in some instances consisted of coarse grains, which from their blueish, greenish grey, and white colors, seem to be heterogeneous in composition, but are still all argillaceous. The color of these strata throughout would also appear originally to be greenish or blueish grey, which is deepest or blackest where there is most carbonaceous material, although in their upper part they are of a bright brown, or yellow fawn color, which tints on both sides diminish in intensity as the distance from the line of junction between the volcanic and fresh-water formations increases. Throughout these strata there is an abundance of fossilized vegetable remains; and towards their middle those of animals, to wit, tortoises, while at their lower part are found the skeletons of frogs. The vegetable remains consist chiefly of the fragments of plants, which at the upper part appear to have been small, but towards the lower part were much larger. In the upper part they have been nearly decarbonized, and replaced by siliceous or argillaceous material of a white, grey, brown, or bright yellow color, presenting under the microscope in many instances the polygonal or fusiform shapes of their original cellular structures, while towards the lower part they are black and carboniferous. Such as have been found entire, or possessing a recognizable form, will be described hereafter.

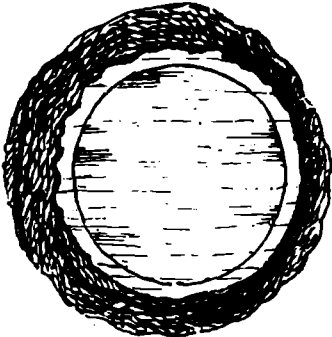
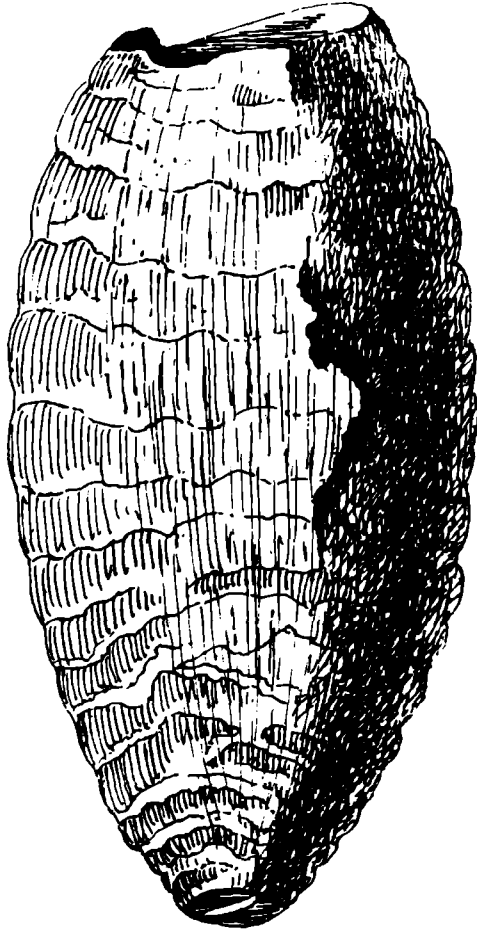
The next stage of these strata presents an interlamination of black

carbonaceous deposits; this occupies about a foot and a half, when it is followed by two and a half feet of shale, without black layers, imbedding a great number of globular and conical nodules, like septaria, which, on being fractured, generally exhibit the forms of bulbous roots or stems in their interior. These strata, which are the lowest of the undisturbed part of this portion, are harder and more compact in their structure than the foregoing.

We have now an intrusion of blueish or greenish grey colored volcanic matter, apparently composed of the ingredients of diorite, but all heterogeneously mixed up together, and in the form of argillo-siliceous material, imbedding large portions of carboniferous shale, and, from its naphthous odour, impregnated throughout with the remains of vegetable matter. This extends down for twelve feet, or to the bottom of the cut of the sluices. It is, of course, unstratified, and presents a venous intersection, like volcanic rock. The upper six feet is of a lighter color than the shale immediately above it, and, although richly charged with small fragments of vegetable remains, contains little, when compared with the six feet below, which are full of large pieces of black argillo-bitumenous shale, bearing the remains of large flat long leaves, pieces of dycotyledonous wood, seeds, seed-pods, and various other fragments of the vegetable kingdom, all of a deep black color, and many sparkling and slightly coal-bearing, though chiefly composed or replaced by argillaceous material.

The coal, which occurs here and there in small granular deposits on the leaves, and about the argillized wood, burns with a bright flame, bubbles up, and leaves a shining black scoriaceous cinder, which lightens a little in color under the blow-pipe. Also portions of mineral resin, resembling "hatchetine" or mineral tallow, are occasionally met with; and invariably calc-spar in company with both these substances. The mineral resin is sub-granular, like bee's-wax, and breaks, but is too waxy to be pulverized; it floats in water, but sinks in alcohol; is translucent, of a weak pearly lustre, and of the colour of bee's-wax; feels greasy, and is inodorous; dissolves readily in turpentine, but not in ether or alcohol; becomes soft at a temperature just below 212° Fahr., but does not melt in boiling water; when exposed to a greater heat becomes very fluid, but does not take fire until the temperature is raised, when it burns away with a bright flame, leaving no residue. Besides vegetable remains, the little cyprides abound in all the masses of this shale; the elytra of insects have been found in it, and the remains of shells something like *Melania*, but all more or less blackened, argillized, and in a carboniferous state.

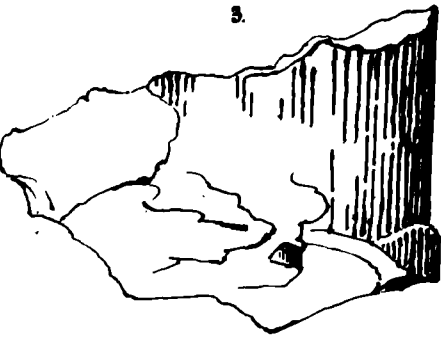
Fig. 1



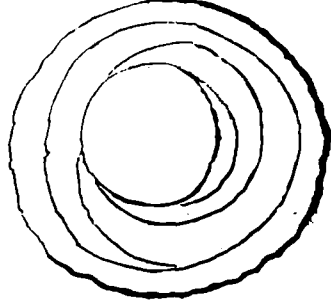
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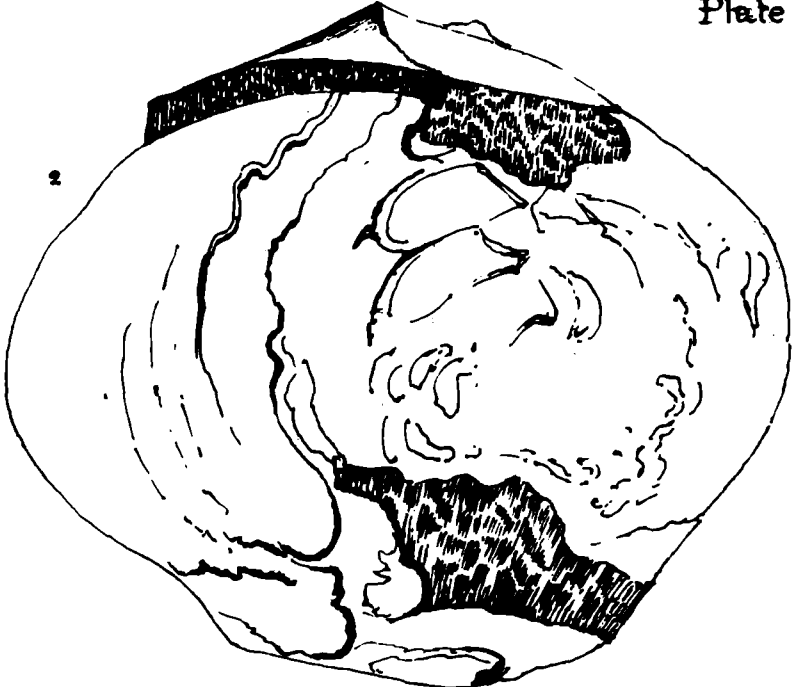
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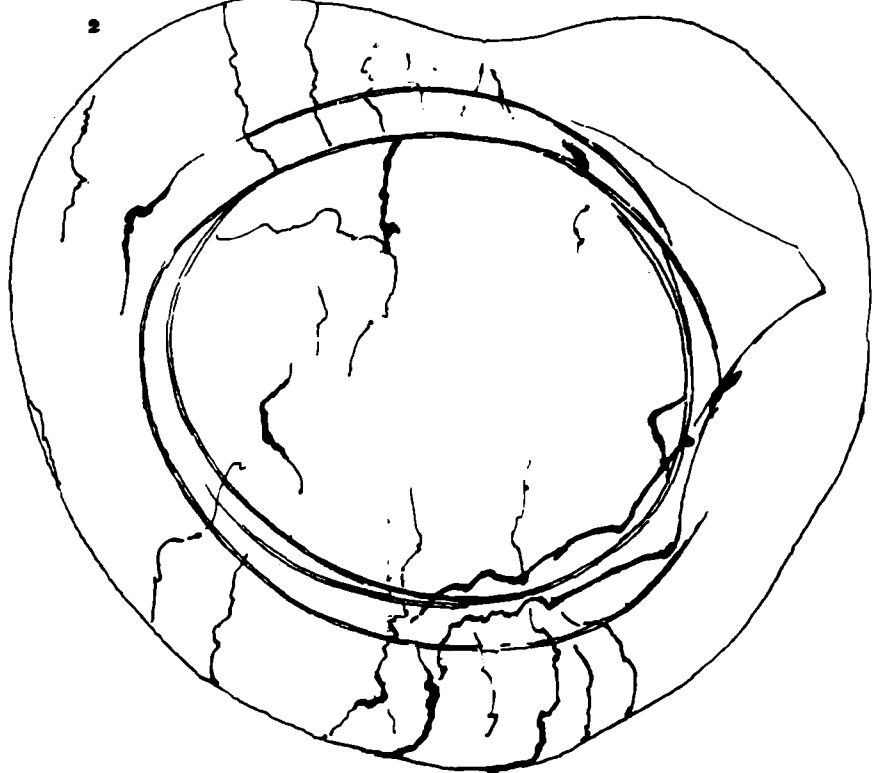
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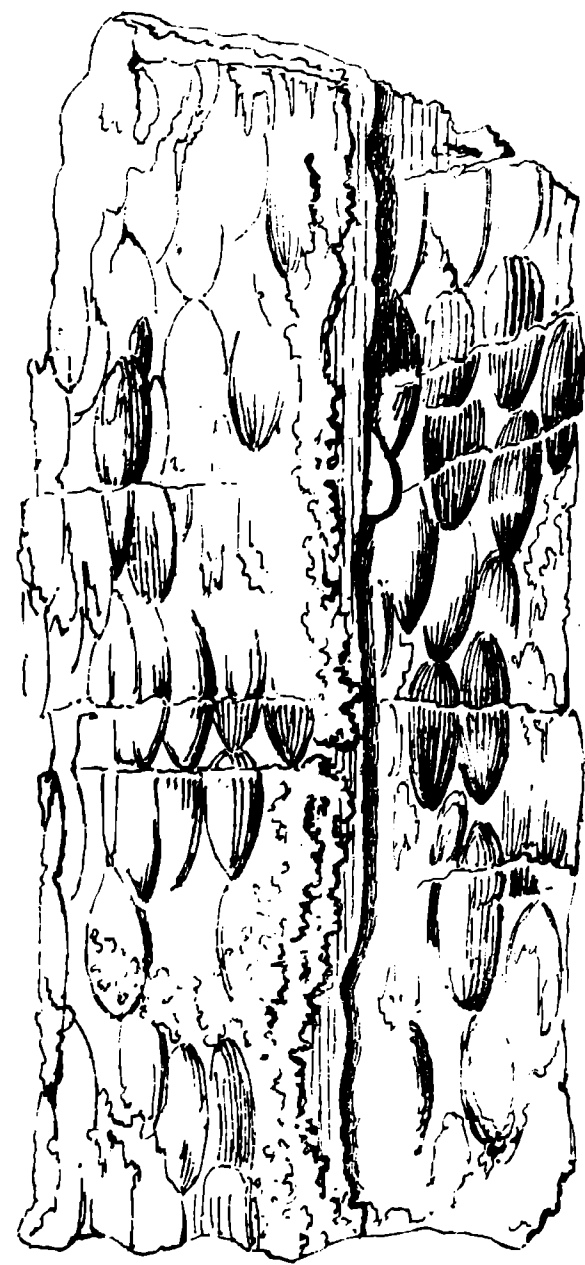
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2.



2.

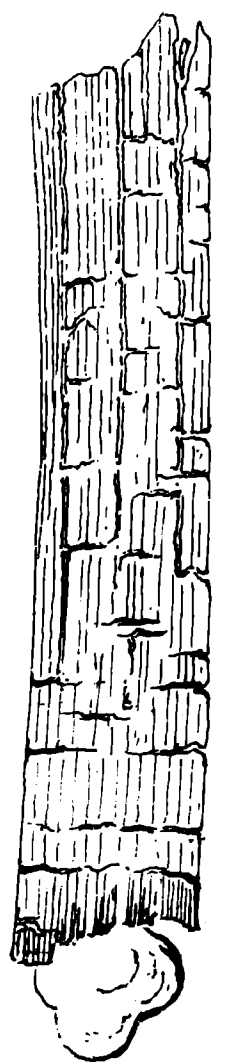
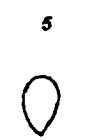


H. I. C

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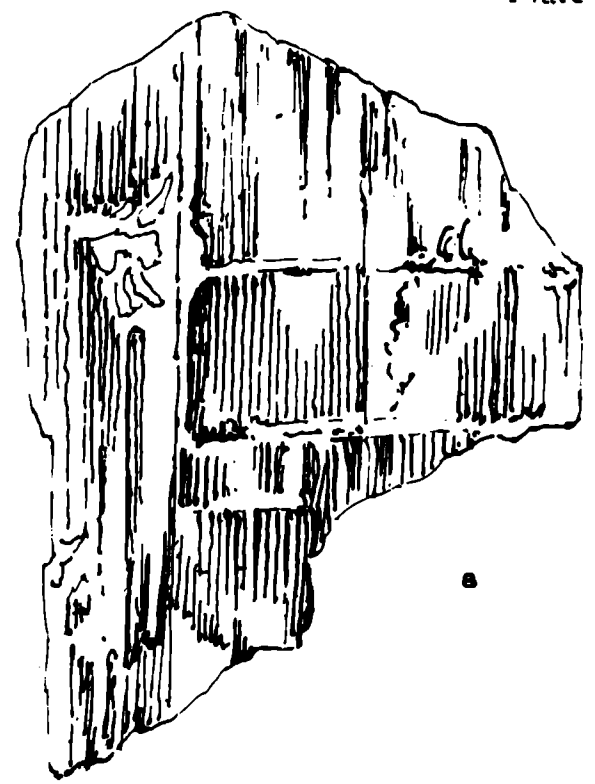
7 a.



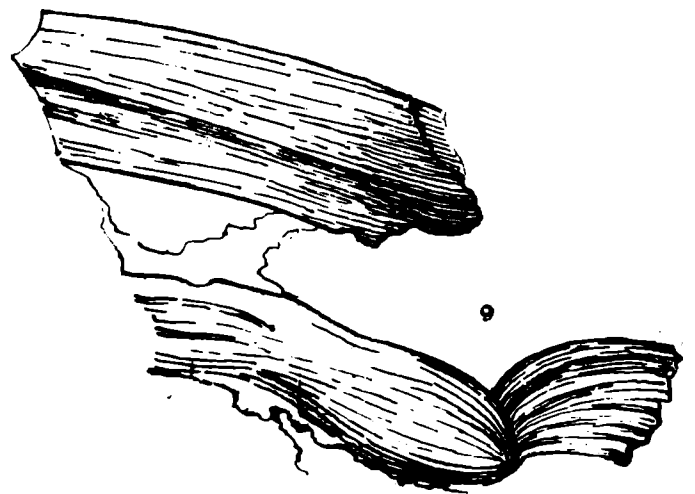
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In no other part of the island has this rich carboniferous portion of the fresh-water strata been observed beyond the depth of a foot or two, affording only a few thin layers of the uppermost argillo-bituminous deposits, viz. those in which the skeletons of the frogs are found. All, therefore, that we know of it, is from what has been exposed by the excavation of a few cubic feet at the cut of the sluices, where it has been broken up into fragments by the intrusion of the igneous rock. In no place has it yet been seen undisturbed, or resting on the formation on which it was deposited, and therefore no conception can be formed of its depth, or the rock on which it rests conformably.

Let us now turn our attention to a description of the fossils which have been found in this formation, beginning first with those of plants.

Roots.

Fig. 1, *a, b*, Plate vii., is bulbous, cormiform, ovoid, elongated; truncated above, pointed below; marked with transverse rows of short vertical parallel striæ, the rows extending more or less round the body, each row tapering towards its extremities, and ending in a point between that above and below it, in the manner of scaly imbrications. Striæ superficial, and sometimes continuous for some way longitudinally. Truncated end presenting concentric lines, like the petiolations of sheathing leaves; pointed end, where fractured, presenting a succession of coats, concentrically disposed. Length of specimen 5 inches; widest transverse diameter $2\frac{1}{4}$ inches. *Loc.* black shale.

Obs.—These roots are almost lapidified, from the compactness of the argillaceous material by which they have been replaced. They are black externally, where the striæ present the only carboniferous part about them; and a little lighter colored within. The rows of striæ shine in the manner of vegetable impressions in clay generally, and the petiolations in the truncated end are marked by delicate white lines of calc-spar. A few cyprides are seen in the interior of these roots, which shows that they must have been widely cellular, or hollow.

Fig. 2, *a*, Pl. vii.—This specimen is of the same description as the foregoing, but appears more globose. The oblique direction of the striæ from above downwards and outwards would also seem to indicate this. Like the foregoing, the striæ are in little bundles, hardly elevated above the surface, and only prevented from being continuous longitudinally by their being raised at one end more than the other. *Loc.* lowest part of the undisturbed shale, and in the intruded igneous matter.

Obs.—These are found in great numbers in that part of the shale just mentioned, and appear very much like septaria. They are less black than the foregoing, thus according more with the color of the strata in which they are chiefly situated. When fractured, they develop a kind of stem or bulb internally, with its largest or rounded end downwards, that is following the position in which they are found; but the accumulation of adventitious material around them makes it almost impossible to arrive at their original size or shape.

Stems.

Fig. 3, *a, b*, Pl. vii., is a section only. Length $1\frac{1}{4}$ inches, and diameter $1\frac{1}{8}$ inches. Sub-round, slightly striated longitudinally. Truncated end presenting circular lines indicative of the petiolations of sheathing leaves, with the external one of the latter broken off towards the bottom of the specimen. *Loc.* lowest part of the undisturbed shale.

Obs.—This, or rather these pieces of stems, for there are many of them, would appear to belong to the bulbous roots last mentioned. There is very little appearance of a more consolidated portion having existed at their circumference; and internally the presence of cyprides shows that they must have been widely cellular, like the so-called roots; also the lines of petiolations before mentioned, that they must have been formed of sheathing leaves.

Under this head also comes *fossil-wood*, of which there appears to be a considerable quantity and of various kinds, chiefly dycotyledonous. One specimen met with measured two feet long, and six inches broad: it appeared to be a segment of a small trunk; the bark is on it, and, from the infiltration of a lighter substance between this and the wood, and the latter being deficient towards the centre, the whole was probably undergoing decay when immersed. The grain of the latter is distinctly seen, but the soft argillaceous matter which has replaced it, as in most other specimens of the kind, does not admit of a sufficiently fine polish to examine it more minutely. The bark presents externally a number of small projections, and is guttered into large irregular lozenge-shaped divisions.

In one part of the bark was growing a fungus, or portion of adventitious wood, which, on falling out, brought away a part of the trunk-wood itself. It is of a compressed circular shape, about $1\frac{1}{2}$ inches in diameter, and constricted at the base. Many of these kinds of bodies occur in this black carboniferous deposit, and will probably be found to have had the same origin.

No pieces of palm-wood have to my knowledge been found, with the

exception of one unsatisfactory specimen; but many small short fragments of wood which possessed a tubular structure, and present a segmental form, like pieces of the common bamboo. The latter occur here and there in almost every part of the fresh-water formation; above, where the vegetable remains are decarbonized, they are of a brown or grey color, and lower down, where they are carboniferous, of an intense black color. Besides these, the upper strata present innumerable fragments of small plants, many of which appear to be portions of the stems of grasses. They are all very nearly decarbonized, and replaced by siliceous or argillaceous material, of a white, grey, brown, or yellow color. Those which are grey present under the microscope a number of polygonal grains or crystals, like the polygonal cells of vegetable structures, while those which are brown and yellow often present the fusiform cellular structure. The crystals representing the former average $\frac{1}{271}$ inch in length, and $\frac{1}{37}$ inch in breadth; and the argillaceous bodies representing the latter $\frac{1}{27}$ inch in length, and $\frac{1}{2150}$ inch in breadth. Amongst the thousands of little fragments that I have seen towards the upper part of the strata, where they abound in layers, and seldom exceed an inch in length, I have not been able to discover, with the exception of a compressed stem and globular root of some wide grass or bulrush, and two small roundish leaves, which will be presently mentioned, one single fragment possessing a form that could be recognized.

Leaves.

Figs. 4, 5, Pl. viii., are the impressions of the two leaves last alluded to. The largest is oblong and oval, length $\frac{1}{17}$ inch, breadth $\frac{1}{17}$ inch. The smallest sub-round; length $\frac{1}{17}$ inch, breadth $\frac{1}{17}$ inch. *Loc.* upper part of brown shale.

Obs.—These leaves were found among the fragments just mentioned, where there were thousands of other portions, possessing the parenchymatous form of cellular structure mentioned, and, as before stated, without any recognizable form. They look more like leaflets of an accacia, perhaps, than anything else.

Fig. 6, Pl. viii., is the compressed remains just mentioned of part of a long narrow leaf or stem, cracked into fragments, with a tuberos root at the end. Length of specimen $4\frac{1}{2}$ inches, breadth $\frac{1}{4}$ inch; structure fibrous, parallel, longitudinal. *Loc.* brown shale.

Obs.—Three or four specimens of this stem or leaf were found together, but only one with the remains of the root. They are very common, and their cracked state, as well as the cracks which are seen

in the flat grey portions of the parenchymatous structure in these remains generally, seems to throw some light on the origin of the infinitude of small formless fragments which pervade these strata, viz. that while the plants from which they were derived were undergoing decomposition, either at the margin or the bottom of the fresh water in which they were deposited, these cracks took place, and, when there was no superincumbent material to keep them in their original position, they floated off, or were otherwise scattered about, and at length finally became stationary in the places where they are now found.

Fig. 7, Pl. viii.—This is a carbonized impression of a scaly leaf or stem in the black shale. It is very thin, and presents elliptical scales, which have their long axes longitudinally; also the transverse cracks to which I have just alluded. Specimen about $4\frac{1}{2}$ inches broad, and 1 foot long. The scale, (Fig. 7, *a*.) or division, consists of an arched elliptical projection, $\frac{1}{4}$ inch long, and $\frac{1}{8}$ inch broad. It is striated longitudinally, and seems to be surrounded with a very narrow flat rim or base, by which it is united to that of the adjoining scales. *Loc.* black argillo-carboniferous shale, in the intruded igneous rock.

Obs.—Only one specimen of this kind has been met with: it was discovered by Dr. Leith, and presents a thin layer of sparkling coal on its surface.

There are many other fragmental impressions of flat long leaves, both large and small, (Fig. 8, Pl. viii.,) with longitudinal striæ more or less perceptible on them, and more or less coal-bearing, in the black argillo-carboniferous shale or deposit; also impressions of large and small cordate leaves, and an imperfect impression (Fig. 9, Pl. viii.) of two lanceolate leaves, like those of the bamboo, except that they appear to be opposite instead of alternate. Dr. Leith, to whom I am indebted for most of these specimens, also sent me an impression (No. 10, Pl. viii.) closely resembling the stem and flower or seed of a cyperaceous plant, something like *scirpus lacustris*.

In no instance, to my knowledge, has the impression of any fern been discovered, though I thought at one time I had found the *sorus* of one, which afterwards fell off the specimen, and was thus lost. This was in a portion of the upper light brown-colored shale, from the tank north of the Horticultural Gardens.

Seeds and Seed-pods.

Fig. 11, Pl. ix., is a small flat capsule, circular, or horse-shoe shaped, with a pedicle rising in the centre, and passing off by the incomplete

portion of the ring. It presents a single row of seeds, arranged round the circumference of the disk. Diameter $\frac{1}{16}$ inch. *Loc.* light brown shale.

Obs.—These little discoidal bodies, looking like the magnified ringed capsules of a fern, are not uncommon among the accumulated fragments of vegetable remains in the upper part of the fresh-water strata.

Fig. 12, Pl. ix.—This seed, like that of *Artabotrys odoratissimus*, presents the ruminated appearance of the albumen peculiar to the natural order Anonaceæ. Length $\frac{1}{8}$ inch, and breadth $\frac{1}{16}$ inch; compressed, elliptical, and slightly pointed at one end. The ruminated albumen is in transverse lines across the seed, and in radiating ones towards the circumference of the round end. *Loc.* upper brown shale.

Obs.—This specimen was found by Dr. Leith, who pointed out its analogy to the seed mentioned.

Fig. 13, Pl. ix., is a siliquose pod; length $3\frac{1}{4}$ inches, and breadth $\frac{1}{8}$ inch. It is long, sub-round, slightly enlarged towards the apex, which is also round; narrowed towards the stem. *Loc.* black argillo-carbonaceous shale.

Obs.—Close to it lay two other apparently one-seeded pods, of the same description.

Fig. 14, Pl. ix., is another siliquose pod, broken off towards the stem. Length of specimen 3 inches, breadth $\frac{1}{4}$ inch. Long, lanceolate, narrowing a little backwards; angular laterally, presenting a ridge on each side, not opposite; slightly concave on each side the lateral ridge; flat along the sutures. *Loc.* black argillo-carbonaceous shale.

Obs.—For both of these specimens, as well as others of the same kind, I am indebted to Dr. Leith: a vertical section, parallel to the line of suture, has been made in one, but it fails to show anything definite in the interior.

There are a great number of large seed-like bodies throughout the whole of these strata, particularly in their lower part; but they are too undefined to admit of description.

No Gyrogonites have yet been met with.

Insecta.

Fig. 15, Pl. ix.—*Cypris semi-marginata*. (H. J. C.)—Length $\frac{22}{400}$ inch, breadth $\frac{14}{400}$ inch. Ovoid, sub-reniform, compressed laterally at the small end, dilated laterally at the large one; presenting a wide rim round the margin of the valves at the large end, which gives the cast an expanded appearance. This rim is obliquely striated externally, the striæ

passing from the convex or posterior border of the shell downwards and forwards. *Loc.* throughout the whole of the fresh-water strata.

Obs.—The obliquely striated rim round the large end of this fossil was pointed out to me by Dr. Leith; and since that I have observed that the prolongation of the valve in this direction is common to the few recent specimens I have yet met with in Bombay. It is likewise striated in them, but the striæ are short, and radiate from the circumference of the valve, instead of passing off obliquely from it, as in the present instance. Neither is the prolongation of the shell in this direction so wide, nor does it extend so much round the valve in the recent as in the fossil specimens. If we look into the interior of the valves of the former, (Figs. 18, 19, 20, Pl. ix.,) we shall see that the inner margin of the border is extended inwards more or less all round the valve, but more particularly at either end, and, of the two, most at the larger or posterior end, where there is left between it and the outer margin a thin lunate expansion. Beyond this comes a prolongation of, or appendix to the valve, in which there is a lunate fossa, or depression, separated from the general cavity of the shell; and this appears to be the portion which is so extensively developed in the fossil species under consideration, on the back or outer side of which are the oblique striæ mentioned. The segment enclosing the fossa or depression, however, in the recent species, instead of being one of a larger, is one of a smaller circle, while that of the fossil species is the contrary, the latter extending round the whole of the posterior or larger half of the shell, and expanding it dorso-ventrally. There does not appear to have been any papillæ on the surface of this fossil species, as is the case with most recent cyprides, but these may have been very minute, and may have disappeared during fossilization, or have been rendered imperceptible by the opacity of the object. I have named this species *Cypris semi-marginata*, from the character which I have just described.

Fig. 16, Pl. ix.—*Cypris cylindrica?* (Sow.)—Length $\frac{25}{400}$ inch; and breadth $\frac{11}{400}$ inch, sparsely papillated. *Loc.* lower part of undisturbed shale, among the frogs' bones.

Obs.—This appears to be *Cypris cylindrica*, which is also found in the chertified lacustrine deposits of the basaltic district of India. (See Malcolmson's Fossils of the Eastern Portion of the Great Basaltic District of India. Geol. Trans. 2nd Series, 4to, vol. iv. Pl. xlvii., fig. 2.) It is a little more than twice as long as it is broad.

Fig. 17, Pl. ix.—*Cypris* ————? Length $\frac{10}{400}$ inch, and breadth $\frac{19}{400}$ inch. *Loc.* upper part of fresh-water strata.

Obs.—Of this specimen I have never seen the shell, but an appearance in the mould, as if its surface had been closely and minutely papillated. It is distinguished from the cast of *Cypris semi-marginata* by not having the impression of the rim mentioned, and is therefore not so expanded dorso-ventrally; nor is it so prominent transversely, towards the large end, as *Cypris semi-marginata*.

The three fossil cyprides above described swarm throughout the fresh-water formation. I have already stated that within three inches of the overlying basalt there is a stratum of their casts three inches thick, not of one valve only, but of the whole shell, and the probability that this was occasioned by some sudden alteration of the water in which they lived. When most abundant, their shells are found in thin layers, which, being frequently separated from each other, would seem to point out that they had been deposited in great numbers at particular periods. In the upper part of the strata they are always more or less mixed up with small remnants of vegetable matter, while lower down the fossil skeletons of frogs are sometimes found upon the flat surface of the black carbonaceous shale on which they have been deposited. They are also found abundantly throughout the woody deposits, and entire in the interior of the roots and stems mentioned; in short, as I have stated, they almost swarm throughout the whole of this formation.

They would appear to have their corresponding forms in the three most common cyprides now found in the fresh-water accumulations of Bombay to which I have just referred, but the latter are much larger, as will be seen by comparing their relative sizes in the drawings, all of which have been delineated upon the same scale. Fig. 18 is sub-globular, tetraedral; prominent laterally; flat ventrally; sub-pyramidal dorsally; covered with minute papillæ, supporting short spines or hairs. Length $\frac{30}{400}$ inch, breadth $\frac{22}{400}$ inch. Fig. 19 is elongated; cylindrical; slightly incurvated ventrally; sparsely covered with large, and thickly beset with minute papillæ. Length $\frac{36}{400}$ inch, breadth $\frac{15}{400}$ inch. In both these specimens the borders of the valves present a substriated or milled appearance, particularly over the prolonged portion of the posterior or large end. Fig. 20 is sub-reniform, and covered with large papillæ, almost touching each other. Length $\frac{26}{400}$ inch, breadth $\frac{14}{400}$ inch. This has also the prolongation of the valve posteriorly.

Fig. 21, Pl. ix., is the right wing of a small coleopterous insect, one of two specimens found by Dr. Leith. It is $\frac{1}{16}$ inch long, and

presents parallel longitudinal ridges, with rows of puncta along their course, and transverse wavy lines across the ridges. *Loc.* black shale.

Obs.—This fossil is carbonized, and under it was found a layer of calc-spar, apparently the remains of the transparent wing; beneath which again were the ridged impressions of the under part of the elytra.

Fig. 22, Pl. ix.—This is the remains of a shell like *Melania*, which was conical, elongated, composed of five whorls, the latter costated transversely. Length $\frac{1}{4}$ inch, and breadth $\frac{1}{8}$ inch; total length of the impression $\frac{1}{4}$ inch; the additional length does not appear to have been caused by a part of the shell, though by something belonging to it. *Loc.* black shale.

Obs.—The specimens of this fossil are very indistinct, and formed of the same material as the black carboniferous shale in which they are imbedded. There are other impressions of a smaller shell of the same kind, but with a rounded apex, like that of *Pupa*: all were found by Dr. Leith.

In the chert of the upper strata, containing an abundance of cyprides, with fragments of plants, the section of a roundish shell, something like *Paludina*, was found.

Reptiles.

Rana pusilla.—This is the name which has been given by Professor Owen to the fossilized remains of the skeletons of the frogs to which I have had occasion to allude. The following is Professor Owen's description of them, which will be found in the Quart. Jl. Geol. Soc., vol. iii., p. 224, taken from specimens given to Mr. Clarke by Dr. Leith, who was the first person that discovered them:—

“The portions of shale transmitted by Mr. Clarke contain delicate, but for the most part distinct, traces of the generally entire skeleton of small anourous *Batrachia*; the osseous substance is black, as if charred.

“The number of vertebræ, atlas and sacrum inclusive, is nine; the caudal vertebræ are fused into a long, slender cylindrical style, as in most anourous *Batrachia*.

“In the specimen (Fig. 1) which lies on its back, the posterior convexity of the vertebral bodies is shown.

“The short, sub-cylindrical, and very slightly expanded lateral or transverse process of the sacrum, and the absence of ribs or their rudiments in the dorsal vertebræ, with the proportional expanse of the skull and length of the hind legs, show the specimens to belong to the family of Frogs (*Ranidæ*).

18



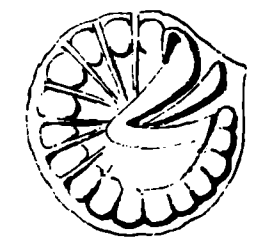
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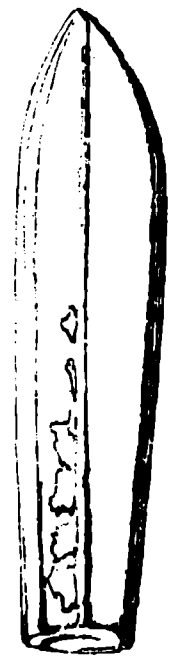
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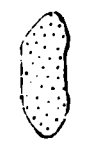
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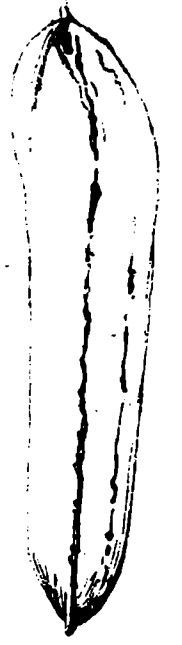
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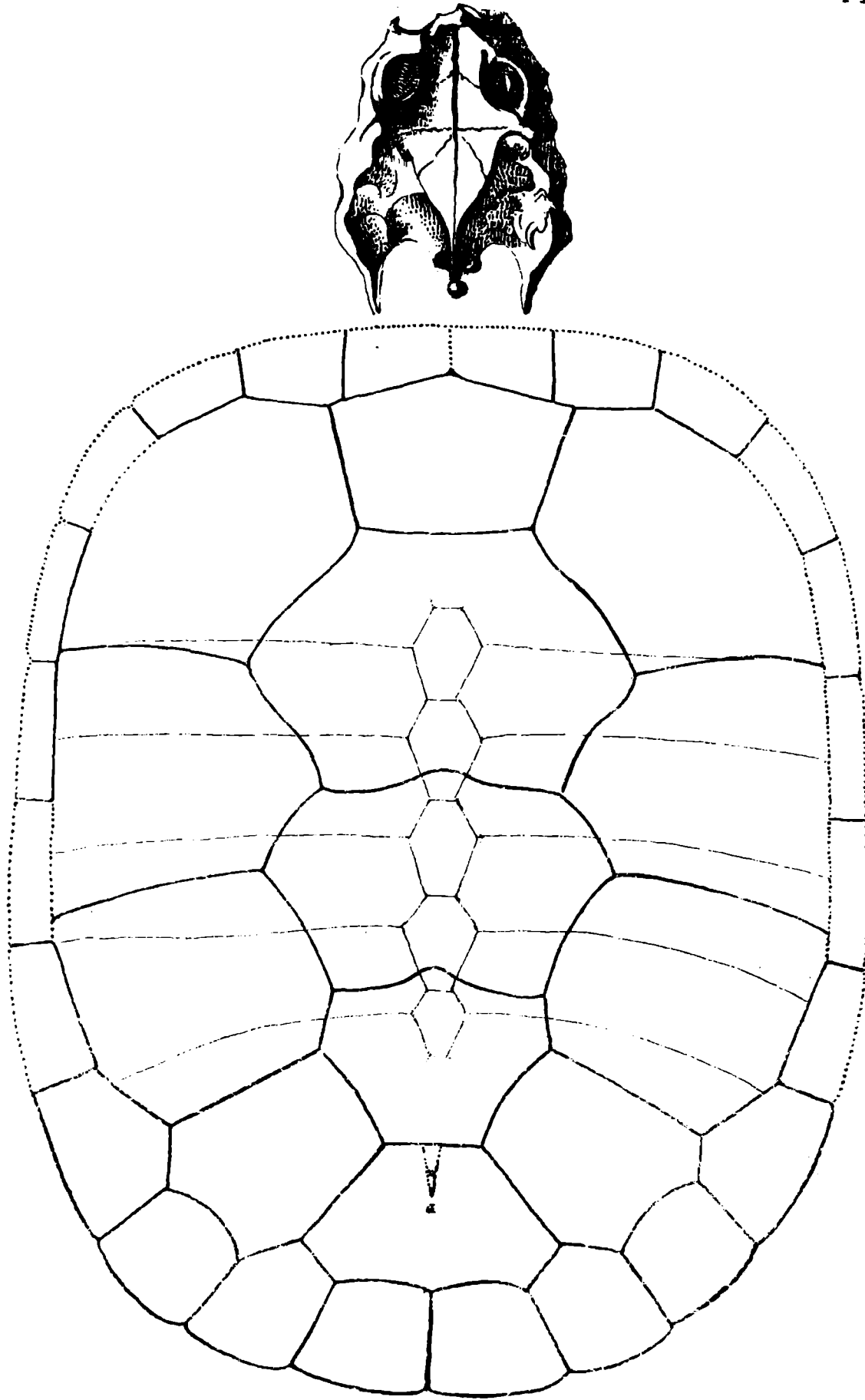


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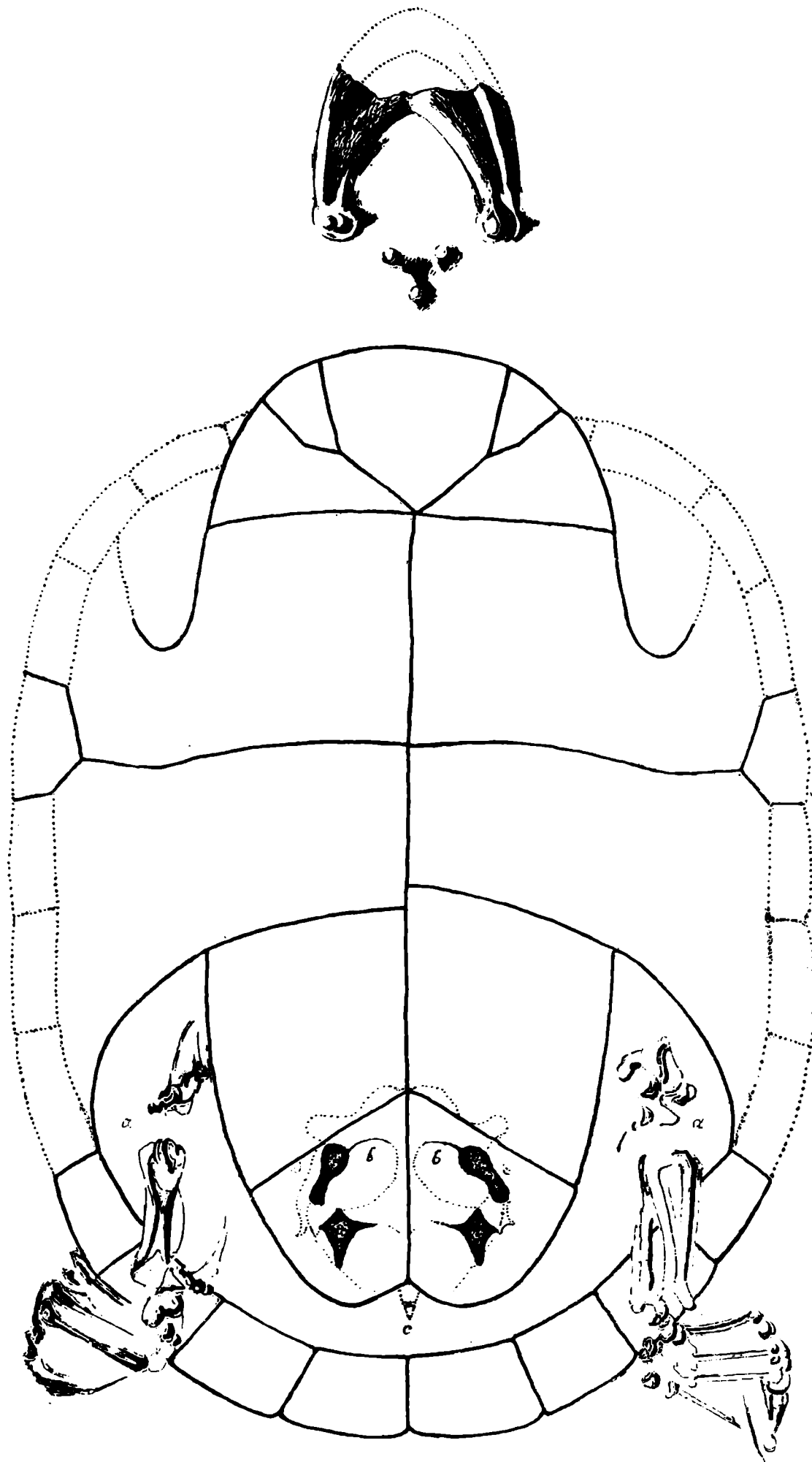
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Plate X.



H. I. C.

Testudo Leithii. (H. I. C.)



“There are seven abdominal vertebræ, with long and sub-equal transverse processes, that of the second (third vertebræ including the atlas) being the longest. The humerus is cylindrical, not expanded, as in *Cystignathus*. The head is a little larger relatively than in *Rana temporaria*, *Rana esculenta*, or *Hyla viridis*; and still larger therefore than in the Toads and Natterjacks, (*Bufo*idæ,) or than in the *Pipa*; the expansion of the sacrum removes the genus *Pipa* and the *Bombinator*es from that of the present fossils. The following are admeasurements of the more perfect specimens:—

	Inches.	Lines.
Length from front part of head to symphysis pubis.	0	6½
„ of the head.....	0	2¾
„ of the dorsal vertebral series	0	2¾
„ of os innominatum.....	0	2½
„ of femur.....	0	2¾
„ of anchylosed tibia and fibula.....	0	2¾
„ of tarsus.....	0	1¾
„ of whole foot.....	0	4½
„ of whole anterior limb.....	0	4

“All the specimens belong to individuals which had completed their metamorphosis, and they are similar to one another in size; they may have belonged either to a not quite full-grown brood, or to an unusually small species, of *Rana*.

“They conform in all respects as closely to the typical organization of the Frogs of the present day, as do the fossils discovered by Goldfuss in the tertiary lignites of the Siebengebirge, and referred by him to *Rana diluviana*; but the Bombay batracholites differ not only in their smaller size, but also in their proportionally larger skulls.”

In most of these skeletons the teeth may be seen, and the bones are found (as Professor Owen has stated) in a charred state, in the black shale, which at the Sluices exists in separate layers, towards the lower part of the undisturbed portion of the fresh-water formation. They have not, however, yet been found *in situ*; but their position is inferred from the character of the shale in which they are imbedded. Generally the skeleton is entire, with the extremities more or less flexed, as they would be in a dead frog; and they lie flat on the black mud on which they have been deposited, alone, or amidst layers of cyprides. They abound at the Sluices, and in black shale excavated from wells on Malabar Hill, three miles off; and appear to be confined to the part of the fresh-water deposits mentioned; but are there found in different layers. In one specimen of black shale, which is 7¼ inch thick, and

composed of six layers, they appear on every layer; in another specimen, belonging to Dr. Leith, they are on layers an inch apart, a deposit of brown shale half an inch broad intervening between the black carboniferous layers; and, in one instance, in and around a disturbed and broken up portion of black shale, I have met with their bones scattered with *cypris cylindrica*, in the heterogeneous-looking argillaceous deposit, probably of igneous origin, intercalating and surrounding that shale; while in the unbroken part of the shale itself the skeletons are entire, and the disposition of the bones the same as that in parts where they have been undisturbed. That the enveloping material here is of igneous origin is proved by its bluish or greenish-grey color, its heterogeneous-looking appearance, its argillaceous nature, its massive and unstratified form, and effervescence with acids. Hence it seems probable that in breaking up the black shale it swept off the loose bones of the skeletons, and carried them into the positions mentioned. Had it been otherwise, viz. that the igneous matter had flowed into the fresh water, and killed these animals, then there would have been no broken up black shale present, with the undisturbed skeletons entire in it; for the former would have overflowed the latter, and not have intercalated it. But this will be better understood when we come to consider the igneous effusion which has intruded these strata.

Testudo Leithii. (H. J. C.)—(Plates x. and xi.)—The remains of nine specimens of this tortoise have been found by Dr. Leith, and the following description has been taken from them:—

Carapace. (Pl. x.)—The 1st dorsal plate is pentagonal, almost quadrilateral, with two irregular sides in front, meeting at an extremely open angle, and behind a border slightly concave anteriorly; its lateral boundaries are rectilinear and divergent. 2nd dorsal plate about twice the size of the first; hexagonal; half as broad again transversely as it is antero-posteriorly; posterior border suddenly convex forwards in the centre, and longer than the anterior border; lateral borders undulous, and meeting at an obtuse angle outwardly. 3rd dorsal plate one-tenth less than the second; hexagonal; nearly twice as broad transversely as it is antero-posteriorly; posterior border abruptly convex forwards in the centre; much less in length than the anterior border; anterior lateral sides convex outwards; posterior lateral sides convex inwards, both meeting at an obtuse angle laterally. 4th dorsal plate a little more than half the size of the third; hexagonal; contracted posteriorly; posterior border straight; antero-lateral sides also straight, and short; postero-lateral convex outwards, both meeting

in an obtuse angle. 5th, or last dorsal plate, heptagonal, triangular, with the apex truncated; contracted in front; presenting posteriorly four sides, which unite with the two supra-caudal, and half the two first femoro-marginal scales; lateral sides rectilinear.

Antero-costal plate tetragonal, sub-triangular. 2nd costal pentagonal, its two inner sides forming an obtuse angle upwards. 3rd costal quadrilateral. The last pair of the costal ranges are broader above than below, and present six sides, by the three smaller of which they articulate with the marginal plates which correspond to them.

Marginal scales 24. Marginal collar and first brachials sub-quadrilateral, longer than broad; second brachial pair trapezoidal; supra-caudal sub-square, trapezoid; first and third margino-femoral pairs pentagonal, the latter longer than broad; the intervening ones square; fifth margino-lateral oblong, broader behind than in front. Of the other margino-lateral scales there are no specimens.

Plastron. (Pl. xi.)—Plane, elliptical; round anteriorly, and notched in the centre posteriorly, but not deeply; intergular plate four times larger than the gular, and pentagonal, sub-triangular, the two posterior sides meeting at an obtuse angle; gular plates resemble isosceles triangles, with their posterior edges a little bent outwards, towards the apex. These three anterior plates are locked in between the brachials, which resemble scalene triangles; they are not so large as the intergular plate. The portions of the pectorals and abdominals which cover the sternum present square figures. The femorals are quadrilateral, having their internal lateral border less than their external lateral one, which is slightly convex on the outer side. The anal plates are triangular and rounded exteriorly, and cover that part of the sternum to which the pelvis is soldered. (See plate.)

Where the axillary and inguinal scales might have existed the parts are imperfect, but there do not appear to have been any.

The head appears to have been triangular and flattened, unless this arises partly from pressure, and the nostrils obtuse; there is a deep gutter extending from the muzzle backwards, becoming superficial as it approaches the superior occipital bone. The orbits themselves are directed upwards.

The pelvis is soldered in front to the sternum, and the tail appears to have been so short that it only just extended beyond the ilia. Fortunately the point of it remains in one specimen in that position.

Dimensions.—Length of carapace $7\frac{1}{2}$ inches, breadth in its flattened state 6 inches. Length of plastron 7 inches; breadth at inguinal angles about $2\frac{1}{2}$ inches, and breadth in the centre about $4\frac{1}{2}$ inches.

Head.—From the nasal extremity of the anterior frontals to the basilar bone $1 \frac{1}{4}$ inch; distance between the posterior angles of the orbits $\frac{1}{4}$ inch; distance between the anterior angles of the orbits $\frac{1}{4}$ inch; distance between the posterior angle of the orbits and the extremity of the mastoid process, which is prolonged blackwards, $1 \frac{1}{4}$ inch; width between the condyles of lower jaw $1 \frac{1}{2}$ inch. *Loc.* The remains of these tortoises were found in the shale excavated from the undisturbed part of the fresh-water formation at the Sluices. Dr. Leith, however, is under the impression that one of the specimens came from a pit in the eastern side of the Flats just opposite. They have not been found *in situ*, but appear to have come from the middle of the undisturbed strata.

Obs.—Thus, it will be seen, from the pelvis being soldered to the plastron, that this tortoise belonged to the *pleuroderal elodians* of Dumeril and Bibron, none of which are now found in Asia; and from the absence of the nuchal plate, that it belonged to one of their first five genera. Also from the form of its scales generally, as well as the shortness of the tail, that it came nearest to the genus called *Sternotherus*, and of the species of this genus nearest, in the form of its scales, to *S. castaneus*. (Dumeril et Bibron *Erpétologie Générale*, vol. ii. p. 401.) It differs, however, from the latter species in the anterior lines of the pectoral scales of the plastron being parallel with those of the abdominal scales, instead of meeting at an angle backwards. In size it agrees exactly with the length of the carapace of *Sternotherus niger*; the plastron is also very nearly as large as the carapace. In the specimen from which the drawing has been chiefly taken, the plastron has been probably pushed forwards out of its original position, by the pressure to which these parts have been subjected during fossilization: in all the specimens both carapace and plastron are in contact. The horny parts of both, marked externally with their intricate network of grooves, as well as the outer layers of the bones themselves, are all charred, while the cancellous structure of the internal parts, being filled with calc-spar, presents its original appearance. Above are described all the parts of this tortoise which admit of it: the remains of nine individuals, as before stated, have been found, all very nearly of the same size, and all by Dr. Leith, after whom I have named it, and to whose rare attainments and acute perception we are indebted, not only for bringing to light the existence of the remains of this animal in the fresh-water strata of Bombay, but for almost every other valuable specimen that has been obtained from them, thus claiming, in fact, the merit of having first directed the attention of the public to this interesting formation.

Having described the upper strata of the fresh-water formation where they are best seen, and a few of the fossils which have been found in them, let us now trace them throughout the other parts of the island. I have already stated that they are overlain by the basalto-dioritic tract, and that this tract in the first instance was probably continuous all over the island, but that it has since been broken up into the ridges already described, and much of the parts which intervened carried away by denudation. Hence, it may be conceived, that the same agent which threw up these ridges also threw up at the same time more or less of the fresh-water strata which lay beneath them, and that therefore the latter will be found to be exposed on the scarped sides of, as well as in the plains between, these ridges, where the basalto-dioritic tract has been uplifted or removed. That such are the facts will presently become evident.

Beginning with the ridge on the outer side of the island, called Malabar Hill, we naturally look, in its scarped or eastern side, for the strata in question, and there we find them overlaid by the basalt, which in some parts is 50 feet thick ; while they are completely hid on the other, or western side, where the basalt, which at first slopes suddenly over them, afterwards, as before stated, extends outwards into the sea at a very small angle of inclination. If we commence, then, from Malabar Point, which has been stated to be the southern extremity of the outer ridge of the island, we shall perceive these strata on its eastern side appearing just above the water's edge about 50 yards in : they are easily distinguished by their light brown or fawn color, which contrasts strongly with the black basalt above them. Following them northwards, we find that they gradually increase in thickness as the ridge rises ; but after two-thirds of a mile suddenly become contorted and twisted into all kinds of shapes, indicating that at this part, which extends for about 300 yards, they have undergone more disturbance than at any other, and a short search shows us that it has been caused by the intrusion of an igneous rock. It was from the contents of a well excavated at this spot that the specimen of black shale and igneous matter, containing the bones of the frogs in a scattered state, was obtained. After this disturbed portion, the strata again resume their parallelism, and may be traced along the whole of the eastern side of Malabar Hill to Mahaluximee, where there is a break in the ridge of 1000 yards, extending from the place last mentioned to Lovegrove Point or Mama Hajanee, from whence the ridge is again continued on to the Sluices, where there is a second break, about 250 yards wide, and where the cut of the Sluices, which extends from the Flats to the sea,

exposes the section from which the foregoing description of this formation has been chiefly taken ; and from which the principal part of the fossils mentioned have been derived. From this break on to Worlee Fort, or the northern extremity of the outer ridge, the fresh-water strata may be again traced, cropping out from the scarped portion of the basalt, and at the latter place may again be seen to be intruded by igneous matter.

Throughout the whole of this ridge they present an anticlinal elevation, one side of which dips more or less to the west, the other to the east, becoming almost horizontal again at the base of the ridge, where they extend, concealed under the basalt, into the sea on one side, and, exposed, over the Flats on the other. At the Sluices the dip of most of the strata on the west side of the anticlinal axis is more than 45° , and on the east side would appear to be the same, but is obscured by the Sluices ; while the intruded igneous matter is seen filling up the angle of the arch thus formed, as if it had been the disturbing agent.

We now come to the Flats, and here the fresh-water strata are not continuous any more than the basalto-dioritic tract, both having, apparently, been broken up together, and suffered a like denudation : it is only here and there that a portion of the fresh-water strata is seen entire, being for the most part mixed up with intruded igneous matter, or entirely transformed by decomposition ; but, on passing across the Flats, we again find them here and there, overlaid by the diorite, and hence we may expect to find them exposed again in the scarp of the eastern ridge in a similar manner to that we have seen on the western ridge, for, tracing them where they are yet entire on the eastern side of the Flats, viz. at the end of the Grant Road, we find them 600 yards further due east, viz. in Baboola Tank, underlying the diorite, as before stated ; and again, 650 yards still further, in the scarp of the quarry on the eastern side of Nowrojee Hill, but here in a thin line, either on account of the intruded igneous rock having merely separated a foot or two of the upper part of this formation from the rest, or from the pressure of the incumbent basalto-dioritic tract, which is here very thick. In Baboola Tank these strata, which are only five feet thick, are seen to have only four feet of diorite left above them, while in Nowrojee's quarry they have 90 feet. Again, after tracing this formation across the Flats opposite Parell to the eastern side of Parell Tank, we find its strata appearing in the wells there, also, with only a few feet of diorite above them ; and, if we cross over the hill, we shall find them cropping out again on its eastern side. Thus they are seen to pass across the Flats, and to appear again on the scarped side of the eastern ridge,

proving that they have been everywhere superposed by the basaltodioritic tract.

Let us now go to the scarp of the eastern ridge, and follow these strata northwards, from Nowrojee's quarry, where, as before stated, they are reduced to a thin line. For some distance after this the state of the hills, from being covered more or less with grass, does not permit of our seeing them satisfactorily, but when we come to the southern extremity of Chinchpoo gly Hill, the thin stratum, composed of the casts of cyprides, with fragments of plants, which I have before stated to mark the upper boundary of this deposit, is again recognized, immediately underlying the diorite, and not more than 30 feet above high-water mark. This stratum, in a broken, black, basaltified state, may thence be traced for 900 yards, rising all the way, until it is elevated by a subsequent igneous effusion to the crest of the hill itself. From this, we may trace these strata on to Parell Flag-staff Hill, and thence to a tank beyond the Gardens, where they exist in very thin layers, making in all 16 feet thick; wavy from disturbance, and dipping, as usual, greatly towards the west. They are here richly charged with fragments of plants, and the casts of cyprides, but do not present a single black carboniferous lamina; although immediately on the other side of the ridge opposite Parell Tank there are portions of interlaminating black bitumenous shale which have been excavated from the wells there, just like those which are obtained from the wells at Malabar Hill and the Sluices, in which the frog-skeletons are found.

From the former tank the fresh-water strata are continued northwards through a valley, over an area of upwards of a mile long, and from two to three hundred yards broad, uncovered by the diorite, as in the Flats, and forming a horizontal plain between the first and third eastern ridges, already described, until they reach the village of Nagaum, on the road to Siou, where they join the strata on the Flats, and the main ridge of diorite is for a certain distance reduced almost to a few boulders.

This formation may again be seen in the valley between Kandlee Battery and Jackaryah's Bunder, that is between the second and third eastern ridges, passing up to the tank at north of the Gardens, and in its way exposed in a large excavation to the depth of 16 feet, dipping, as usual, towards the west. Lastly, this formation may be seen again on the eastern side of the third ridge, extending northwards from Jackaryah's Bunder, more or less broken up, to Sion, at the northern end of the island.

From what has been stated, then, two facts are now evident, viz., that there is a fresh-water formation, and that it is partly overlaid by a

basalto-diorite tract, which was once continuous, and probably horizontal. After this, a third fact becomes evident, viz. that there must have been some subsequent cause to throw up these two formations, at first parallel to each other, into their present ridges. The consideration of this cause brings us to the description of the intruded igneous matter, or second effusion.

Second Effusion.—I have already alluded to the presence of igneous rock among the contorted strata, a short distance in from Malabar Point; that it is seen again at the cut of the Sluices, and again at Worlee, the northern extremity of this ridge; also in different parts of the Flats, &c. But as yet I have designated this effusion by no particular name; and when we remember that it has flown in between the aqueous strata, breaking them up into fragments, bruising them into powder, and more or less amalgamating with them, we cannot wonder that in one place this effusion should have assumed one form and in another another, depending upon the quantity of foreign material with which it has become mixed. Hence it will be necessary to go to that place, or places, where it is most pure, first, and ascertain its original character. For this purpose, let us begin with it at Nowrojee Hill, where it is 40 feet thick, and apparently as pure as when it first came from the volcano. Here it underlies the thin line of fresh-water strata mentioned, and in the form of trappite; differing so little from the diorite above, that until we compare the two together, the points of difference do not appear. When, however, this is done, we observe in the trappite that there is a great addition of blue argillaceous earth to the binary compound of felspar and hornblende of the diorite; also that the former is of a darker blue color, more earthy in structure, and more soft and yielding to the hammer; the color and breaking of this rock alone will enable the experienced observer while in the quarry to say directly from what part it came, still to the ordinary observer the two are one and the same. This is the state of this effusion, I presume, where it is seen intercalating the aqueous strata below Dr. Buist's house, or nearly opposite Sewree, but the part exposed there is decomposing into spheroids, and too far advanced to satisfactorily exhibit by fracture its original state. In Baboola Tank, and at the tank north of the Horticultural Gardens, it is an amygdaloid aphanite, with a greenish colored base, the cavities being filled with laumontite, which is surrounded by green-earth, and which substance in many places seems to become a pseudomorph of laumontite. On the Chinchpogly part of the eastern ridge, just behind the house called Lowjee Castle, where there has been an outburst of a still later effusion, the cavities of the former, which

is decomposed where it remains on the upper side of the latter, are partially or wholly filled with quartz crystals; large crystals of hyalin and amethystine quartz from crushed geodes are also seen in it; while on the lower side of the dyke the cavities of the amygdaloid are filled with green-earth in a fresh green, and decomposing brown, rock. They are also filled with quartz in the neighbourhood of Sindu Para; in an area of about half a mile square, on the western side of Ghorpadevi, towards the Flats, where the rock is brown colored; and, further north again, with green-earth, that is to say in the neighbourhood of the house called Lowjee Castle. On the eastern part of the Flats, nearly opposite Parell, the cells are filled with calc-spar, and for several feet down the rock is a brown spilite, (base aphanite, filled with crystals of calc-spar,) imbedding pieces of the aqueous strata towards the surface, which become less downwards, and the rock, becoming blue, at length passes into trappite. In some parts this rock is veined with calc-spar, and in others presents geodes or large cavities, filled with large lenticular crystals of the same, resting on their edges. Still further north, again, at Dharavee, this effusion is of a light yellow or fawn color, and is commonly called "White Trap." There is a large tract of it here, and in many parts, where it is amygdaloidal, the cavities are filled with a soft fine white clay, like white green-earth, which seems to be an ultimate pseudomorph of laumonite here. In the museum of the Asiatic Society there is a radiated mass of scolezite, passing into a fine flesh-colored greasy pseudomorph, very like pagodite; and also several massive varieties, which have lost their crystalline appearance, and have assumed a compact structure, which is opaque, white, and greasy to the nail; so that this passage of a zeolitic mineral into fine soft clay seems not to be uncommon. Crossing to the western ridge of the island, we have this effusion, as before stated, amidst the aqueous strata, apparently possessing all the ingredients of the blue trappite seen in the quarry at Nowrojee Hill, but without the semi-crystalline structure. The blue earth is evident, but the rest of the ingredients have taken on an earthy, argillaceous state, and have become more or less impregnated with calc-spar, which causes this rock to effervesce when touched with nitric acid. From the wells on Malabar Point it comes out partly in the form of a clay rock of uniform fine structure, and blue color, still effervescing with nitric acid. In some portions of this there are small angular fragments of a white color, which seem to be parts of the fresh-water strata, and thus identify this breccia with an effusion which by-and-bye we shall find widely spread on the other side of the island. At Worlee, where this rock is exposed, it is of a bright red brick color, and filled

with fragments of the preceding formation ; and at the Sluices it is of a bluish color, and envelopes large masses of carboniferous shale, besides being impregnated throughout with a naphthous odour ; while between these two places it is found in a decomposed amygdaloidal state. Where it appears on the sea shore, at Malabar Hill, pieces of open scorix are imbedded in it—the only instances of the kind I have met with in the island of Bombay. At the cut in the Sluices the rock is seen filling the internal angle of the anticlinal elevation of the aqueous strata ; appearing, as before stated, to have been the agent by which the whole of this ridge has been elevated. It is seen in many parts of the Flats much in the same state as in the western ridge, having, in short, intercalated and broken up the fresh-water strata more or less throughout the island. North of a line extending from Parell to Worlee the whole of the Flats under the clay is covered with the thin stratum, composed of the casts of cyprides, which has been chertified, and rendered more or less jaspideous by heat ; thus affording a serviceable material for forming the surface of the railway in this part of the island.

Hence we have seen, that the second effusion in its purest form at Nowrojee Hill is a trappite, and that this trappite passes into aphanite, —the latter may be seen taking place within a few yards, in some small tanks and excavations on the eastern side of the railroad, towards the middle of the island. We have also seen the trappite in other places passing into an amygdaloid, the cavities of which are filled either with laumonite, quartz, green-earth, calc-spar, or fine white clay, (decomposed laumonite ?) according to the locality ; also that in some places it contains more or less fragments of the aqueous strata ; is sometimes a blue compact hard clay ; sometimes a breccia ; and, last of all, that it may have an earthy or semi-crystalline base, colored blue, green, brown, yellow, or red.

We do not see the trappite or amygdaloid form of this effusion anywhere breaking through the basalto-dioritic tract ; at the same time we see it interlaminating to an extreme degree the fresh-water strata ; from which it may be inferred that it was thrown out under a great weight, and that this superincumbent weight was the basalto-dioritic tract. But for this extreme interlamination, it might have been doubtful whether it had not been thrown out while yet the aqueous strata were in process of being deposited, and that there was then an interval again, during which more aqueous strata were deposited ; and, last of all, the basalto-dioritic tract poured forth over the whole. It is, however, almost impossible that in such loose soft strata as those composing

the fresh-water formation, an interlaminating intrusion of the igneous rock should take place to such an extent as we see it, without the presence of a superincumbent weight, such as the basalto-dioritic tract must have formed; it would rather have burst through the whole of the thickness of these strata in the form of a great dyke, and then have overflowed them. On the other hand, its amygdaloid form chiefly distinguishes it from the basalt and diorite of the basalto-dioritic tract. The late Capt. Newbold has observed (Jl. As. Soc. Bengal, vol. xiv. p. 204) that in the Southern Mahrata Country, "both these rocks [old and new greenstones] are distinguished mineralogically from the tertiary or overlying traps, by their rarely assuming an amygdaloid character, and their freedom from agates, opals, calcedonies, zeolites, green-earth, olivine, &c. so abundant in the latter."

Thus the third fact becomes evident, viz. that the second effusion was one cause, if not the first and principal, of the displacement of the fresh-water formation, and the basalto-dioritic tract.

Third Effusion.—We have now a fourth fact to establish, and that is the occurrence of a third volcanic effusion, by which the strata of the fresh-water formation and other rocks have been thoroughly broken up, and converted into a volcanic breccia, forming a large tract. This tract extends from Carnac Bunder to Sion Causeway, and forms the entire of the chain of hills bordering the north-eastern end of the island, from the Fort of Sewree to Sion, inclusive. It would be difficult to prove that it was a subsequent effusion to the last mentioned, were not large portions of both the basalto-dioritic tract and the amygdaloidal effusion mixed up with the fragments of the aqueous strata. But the presence of the amygdaloid alone, places this beyond a doubt.

Let us now trace this volcanic breccia throughout its whole extent; but, before doing so, it would be as well to premise that the igneous matter binding together its fragments is aphanitic, and for the most part of a white color, speckled with brown, but passes from blue, which is probably its original color, to green, yellow, brown, red, and, lastly, black, varying according to its compactness, and extent of decomposition. It is generally earthy, sometimes where decomposed sandy, and in some parts hard or wholly jaspideous.

Commencing from Carnac Bunder or its southern extremity, we find this effusion for the most part white, and extended over a large area, which is covered by the sea at high tides. Large fragments of the fresh-water formation are here seen imbedded in it, as well as fragments of the other rocks, some of the former six feet long, and still retaining their thinly laminated appearance, and so plentiful that the whole mass

assumes a dark color from their presence, but this will be found to be confined principally to the surface. Tracing this volcanic breccia northwards, we find it passing under Mazagon Hill, the base of which it forms; and the wells in it on the northern side, extending downward for 60 feet without passing through it, show how thick it is. Here, also, we see that the brecciated part is chiefly confined to the surface. The newly excavated contents of these wells also show that some way down this effusion is extremely white, like lime, but it is chiefly composed of siliceous matter: when I was examining them some people were taking portions away to white-wash their houses. In some parts also it is mottled blue and green, or red, and in structure is granulo-pastic. We now find it bordered on the eastern side by the second dioritic ridge, which probably overlies it; and in the neighbourhood of Tank Bunder its brecciated form appears in perfection. All the rocks of which it is composed are here seen in large masses, or in comminuted fragments, varying in size with the locality, and with the coarseness of the breccia; but what is most remarkable is its separation in some parts into polygonal or prismatic divisions, at once proving that it is of volcanic origin. From Tank Bunder it may be traced on to Chinchpoogly Hill, keeping principally to the shore, and thence to Jakaryah's Bunder, where it assumes the form of sand of a yellow color, imbedding large fragments of the aqueous strata in a red or black jaspideous state. From thence to under Dr. Buist's house, nearly opposite Sewree, it may be seen passing in between the less disturbed aqueous strata which here lie beneath the second effusion, and on arriving at Sewree itself we come to the tract of it which extends uninterruptedly to the northern end of the island, forming every hill and mound between Sewree and Sion; thus covering an area of about three and a half miles long, and in its broadest part three-quarters of a mile wide. It will surprise the observer at first to find that it assumes the appearance and structure of a coarse black homogeneous jasper at Sewree; but, if he examines this carefully, he will see in parts of it which are washed by the waves, large fragments of diorite and amygdaloid rock; and when he comes to approach Antop Hill from the west, which is still more homogeneous and jaspideous, he will find that he walks over the light-colored volcanic breccia first, and then over a blacker and blacker colored, until the fragments of stratified rock become mingled more and more with the igneous effusion, and at length disappear altogether, giving place to the homogeneous composition mentioned. It was here, in the plain between the village of Wadalla and Antop Hill, that Dr. Leith pointed out to me, in a semi-jaspideous group of black rocks, a large piece of

coarse-grained white crystalline diorite, looking at first sight like granite or syenite, also other portions of diorite, all of which are larger grained than any which is to be found on the surface of the island of Bombay. These, then, must have been brought up from a depth by the igneous effusion, and it may be questionable whether they are not portions of the rock on which the fresh-water formation rests. Striking as the gradual passage just mentioned of volcanic breccia from one state into another may appear, the sudden transition of the black jasper of Antop Hill into the light colored breccia of the one adjoining it is much more remarkable, for in the latter instance you may almost put one foot on one and the other foot on the other, though they belong to the same effusion. After Antop Hill all the others in this neighbourhood, some upwards of 130 feet high, are composed of a light reddish-colored breccia, compact externally, that is where it is not decomposing. In some parts the fragments composing it are all small, and in others large and small, but all sharply angular. Here and there, also, may be seen polygonal divisions on the surface, indicative of the prismatic form common to basaltic rocks. I am led to believe that this breccia forms a great part of the mountains in Salsette, and have seen it myself there forming those both of the northern and southern extremities of this island.

Let us now return to the neighbourhood of Mazagon, where the diorite remains continuous over a larger area than in any other part of the island; and here we shall find that almost all the wells pass through it into this white brecciated effusion. Where this is not the case, they are more or less veined or dyked with it, and in several places we may observe that it has broken through the diorite, and spread itself for a short distance over its surface, showing clearly that it must have been a subsequent effusion to the diorite at least. Indeed, when we come to consider that the diorite overlies the aqueous strata, we can easily conceive how it should be underlaid by the second and third igneous effusions, which have followed the course of these strata; but it is only the latter effusion which seems to have burst through the diorite.

We have now traced this effusion coming from under the base of the eastern ridges throughout its whole length; and we have seen it forming the plain and hills in the north-east part of the island; we have also seen it forming the lower part of the wells in the dioritic tract of Mazagon, and we have seen it veining and dyking, and at last bursting through this rock in the same locality; but we have still another place left to examine it, where it forms half the ridge between Chinchpoojly

and Parell Flag-staff Hill. Here it begins to issue 600 yards south of the latter from a dyke, which descends rapidly on the eastern side of the ridge, separated from the diorite above by about six feet of amygdaloid, belonging to the second effusion, to which I have already alluded, (page 192,) and below by the same amygdaloid, partly in a fresh and partly in a decomposed state. The volcanic breccia here is chiefly composed of the white powdery aphanite before mentioned, with brown specks, the former melting into a white porcelain globule with borax, the latter attracted by the magnet after exposure to heat. It contains but few fragments of the other rocks, and its chief peculiarity—that, indeed, which distinguishes it from all other effusions of the island—is that it is filled with cells which are elongated horizontally, as well as large and small geodes, which contain crystals of hyalin or amethystine quartz, calcedony, or agate. The geodes are for the most part compressed vertically, and some are a foot in length, and contain crystals an inch long, and proportionally thick; the rock is decomposing, and the cells and geodes, which have been filled by infiltrated agate or calcedony, are lying about the neighbourhood, affording a good example of the way in which the so-called agate and cornelian mines are formed. This rock, which issues at the point mentioned, is continued on, forming the eastern side *only* of the ridge for some distance, when it crosses it diagonally to attain the western declivity of Parell Flag-staff Hill, down which it extends for a short distance, and there ends. Just at this part the road from the Horticultural Gardens to Parell passes over it.

One observation only remains for me to state respecting this effusion, viz. there is a dyke of it seen passing up through the westernmost of the hills at Sion, through the base of which the railway has been cut, and by which its existence has been made evident. It contains portions of the fawn-colored amygdaloid of the second effusion, (“White Trap,”) which, it will be remembered, exists close by in a large tract at the village of Dharavee. The cellular cavities of the fragments are also filled with the fine white greasy earth which I have stated to be a pseudomorph, if not a decomposed form, of laumonite. This dyke, which is 16 feet wide, and rises at an angle of 80°, is inclined towards the south, but, from the red color of the breccia through which it passes, it is fast becoming discolored, and in a short time will be undistinguishable on the surface from the rest of the rock. There is another dyke of it in a cut of the road towards Trombay, just on the other side of the Causeway, in the island of Salsette, which is two and a half feet wide: it has a nearly vertical direction, and passes between the diorite on one side and the red breccia on the other. These dykes, then,

constitute a *Fourth Effusion*, from their passing through the third effusion.

In all the effusions subsequent to the basalto-dioritic, calc-spar abounds more or less, which is not the case with the latter, in which it is rarely if ever seen. In the blue amygdaloid aphanite at Baboola Tank it is common in large cavities, with laumonite, occurring massive or in pyramidal crystals; and in a fragment of the fresh-water strata about a foot in thickness, and many yards square, which was cut through in sinking a well at the south-eastern corner of the tank, the calc-spar especially abounded in the cavities following the line of the stratum. This was the case, too, in a well which was excavated at Paidhonee, in the centre of the Native Town. Throughout the more brecciated portion of these effusions it is disseminated in small masses, or veins, or mixed up with the rock generally, and, indeed, wherever there are portions of the fresh-water strata present there is almost sure to be more or less calc-spar, though the former are essentially argillaceous; while the opposite is the case in the other parts of the igneous rock, which are not mixed up with the fresh-water strata. With the exception of a little pyrites here and there, calc-spar is the only accessory mineral worth mentioning in these effusions.

The compactness of the volcanic breccia varies very much: in some parts it is exceedingly hard and tough, as at Carnac and Tank Bunders, especially towards the surface, where the mass is in polygonal divisions; but towards the interior it becomes soft. In a well which was excavated into it through the dioritic ridge nearly opposite Sewree, it cut like cheese, and so similar in consistence was the whole, that but for the fresh smooth section I could not have distinguished the angular fragments. In other parts, again, where it is exposed, it is loose and sandy, but, from the presence of argil, always of sufficient consistence to keep together.

From the protean nature of these effusions, then, it is not unlikely that some of them should resemble the rock called *Laterite*, which is so widely spread throughout the basaltic district of Western India, and such is the case. It may not be uninteresting, then, to compare the two; but, before doing so, let us shortly review the opinions and descriptions that have been given respecting *laterite*, and for this purpose I shall quote largely from Mr. Cole's interesting paper on this rock, published in the Madras Journal of Literature and Science, vol. iv. 1836, p. 105.

Characters of Laterite.—Dr. Buchanan, (Gleanings of Science, May 1831,) who first described and named this formation, states that "it is

full of cavities and pores, and contains a very large quantity of iron, in the form of red and yellow ochres. In the mass, while excluded from the air, it is so soft that any iron instrument readily cuts it," but after exposure becomes "as hard as brick." He never observed any "animal or vegetable exuviae" in it, but had heard of such having "been found immersed in its substance": it blackens externally on exposure, and is found universally overlying granite. Dr. Buchanan nowhere mentions its association with trappean rocks. But Dr. Christie (*Mad. Jl.* vol. iv. p. 468) states that "it is found resting in different situations, on granite, transition rocks, trap, and sandstone." We see it at Mahableshwar capping all the trappean mountains upwards of 100 feet thick, as well as I can remember, and giving them flat tops; and I am informed by Mr. N. A. Dalzell that in the cliffs on the Malabar Coast about Rutnagherry it may be seen even overlain by basalt.

Mr. B. Babington considered *laterite* to be composed of the detritus of syenitic rock, and to be alluvial, "formed from the washings of the Ghaut mountains." He states that "the hornblende uniformly decays into a red oxide, [of iron ?] and the felspar into porcelain earth"; that it forms rounded hills below the Ghauts; and, between Tellichery and Madras, he accounts for its cellular structure by the rain washing away its white parts, and leaving the red.

Dr. Voysey, who seems to have had the clearest conception on these matters of any Indian Geologist with whose writings I am acquainted, made the following statement in a letter to General Cullen, dated 5th November 1820, copy of which appears in Mr. Cole's paper:—"The indurated clay you mention is very probably the result of those muddy eruptions so common, and of such extensive occurrence, in South America. Indeed, I am convinced that the greenstone, [diorite?] basalt, wacke, [aphanite?] iron clay, or laterite, and the indurated clay, have all a common origin, from the insensible degrees by which they pass the one into the other; and they only differ as to the degree of pressure to which they have been subjected when under fusion."

Again he mentions, (*Jl. As. Soc. Bengal*, Aug. 1833, p. 400,) when alluding to the passage of basalt into wacken, [aphanite?] and then into iron clay, [laterite?] that the latter takes place "in the space of a few yards."

Dr. Christie (*loc. cit.*) calls the laterite of Buchanan a "clay-stone conglomerate," (pp. 462 and 468,) and states respecting its position in the district of Dharwar that it is found "principally in its western parts, and on the summits of the Ghauts."

Mr. Cole states of a specimen of laterite from Nellore, given him

by the late Dr. Malcolmson, that "it was filled with innumerable minute pebbles of quartz, rarely larger than half the size of a pea, sometimes pellucid, generally much rounded; together with yellow and ochraceous earths." These would seem to have been the miliary contents of an amygdaloid,—whether *in situ*, or in a decomposed or altered rock, or forming foreign substances in a subsequent effusion, I cannot pretend to decide, but I should think the former.

Mr. Cole also quotes Mr. Coulthard, (*As. Res.* vol. xviii.) whose observations appear to favor this supposition, viz. that "the iron clay" about the Sagar district, and which is easy to be met with everywhere there, "is for the most part amygdaloidal."

Lastly, Mr. Cole himself states of the "Red Hills" at Madras, in the banks (15 feet high) of the old channel, leading into what is termed the lake, that "They are composed of a dark ferruginous stone, arranged in a stratiform manner, presenting seams or partings, two or more feet asunder, parallel to each other, and nearly horizontal. Vertical fissures intersect the seams at right angles, and thus produce prismatic masses of rock." The rock is a "conglomerate," consisting of nodules of various sizes, imbedded in a "clayey paste," which is hard and tenacious: they are "water-worn," but present a "considerable angularity of surface, yet still sufficiently rounded to indicate their having undergone attrition"; in size they range from "a filbert to masses a foot or more in diameter. Their fracture exhibits the structure of a coarse-grained sandstone, or grit, of a deep chocolate or claret hue." "Small masses of white earth-like lithomarge and mica are sparingly scattered in the sandstone nodules." On ascending the hill on the side of the lake, the conglomerate disappears, and changes into the more characteristic laterite, red and cavernous, with "tortuous cavities"; still, however, containing fragments of the sandstone, seemingly united "by the *debris* of the sandstone itself, of iron ores, and lithomargic earth." (Pp. 110 and 111, *op. cit.*)

How much, then, do all these descriptions approximate the subsequent effusions in the island of Bombay to *laterite*! The external surface of the hills at Sion, and the cuttings of the railway in them, show that they are composed of a red argillaceous and ferruginous base, filled with cavities, containing white or yellowish lithomargic earth, this lithomargic earth principally consisting of decomposed laumonite, or its pseudomorph in the form of white green-earth; the masses hard superficially, and soft or sectile internally; with more or less fragments of the fresh-water strata, diorite, and amygdaloidal rocks. Nor is it strange, if these subsequent effusions should be identical with the *laterite*, that in the latter should,

under certain circumstances, be organic remains ; for in the former we have masses of black shale, as at the Sluices, consisting almost entirely of organic remains ; and a hundred other instances might be adduced in the second and third effusions, where the organic remains are not only in masses of shale, but entirely isolated from it, and alone in the igneous rock,—to wit the scattered pieces of wood, &c. &c. found in it at the Sluices, and the frog-bones at Malabar Hill.

The late Captain Newbold has observed that at Pondicherry the *laterite* “occasionally possesses a distinctly stratified and conglomerate character, and passes into a loose coarse sandstone, imbedding silicified wood ; and at Beejpoor, on the Malabar Coast, it passes into loose sandstone, imbedding layers of lignite”: also that General Cullen had discovered “lignite and carbonized seeds in the laterite of Quilon and Travancore.” (Jl. As. Soc. Bengal, vol. xiv. p. 299.)

And the following description of the rock, which forms the upper part of the hills in the “Rajmahal Coal Formation,” about 130 miles N.W. of Calcutta—which would very nearly do for that of the subsequent effusions in the island of Bombay—is another illustration of it:—

“151. The higher ridges of these mountains consist of scoriform masses of red earthy vesicular conglomerate, (laterite,) containing angular and other fragments of altered coal-measure shales, ferruginous and micaceous sandstone, imbedded in a semi-vitrified and vesicular matrix. These ridges are without any signs of stratification, except where detached masses of altered coal formation occur ; while the upper portion of their declivities, as well as all the lower and intermediate ridges, are composed either entirely of amygdaloidal trap, containing zeolites and calcedony, or altered coal-measure sandstone and shale, the latter passing into the small isolated patches of coal-measures which are found in some of the narrow valleys and ravines mentioned.” (*Report of the Geological Survey of India, for the Season of 1848-49*, by J. M’Clelland, Surgeon, Bengal Service, p. 45.)

Thus we have the *lateritic* effusion—for such Dr. M’Clelland evidently conjectures that of the Rajmahal Mountains to be—at the three points of the great triangle, formed by Madras in the south, the Rajmahal Hills in the east, and the island of Bombay in the west.

Again, we may see at Dharavee, in Bombay, the light fawn-colored aphanitic rock, called “White Trap,” and which I presume is equivalent to Dr. Voysey’s wacke, decomposing, and passing, as he has described the latter, within a few yards, into a mottled white and red decomposing rock, with cellular cavities, filled with the soft greasy white clay

mentioned, thus confirming what this acute observer has so clearly stated in his letter to General Cullen, viz. "that the greenstone, [diorite?] basalt, wacke, [aphanite?] iron clay or laterite, and the indurated clay, have all a common origin"; and I need hardly now add that this is volcanic,—to illustrate which by analogy, I might state, that as a stream of water passing from a clear lake to the sea becomes discolored by the kind of detritus which it takes up on its way, still remaining pure at its source, so a volcanic stream, on its way to the earth's surface, may, from the nature of the rocks through which it passes, be converted into the various forms met with in the *laterite*. I do not mean to assert that such effusions are in the same state now as when they were first poured forth; for we know from every-day experience that the most compact rocks, like all other things, have but a stated time to go through their different phases; that a re-arrangement of particles is continually taking place in them; that some are carried away, and replaced by others; that others are carried away, and leave nothing but their empty cavities,—color, substance, form, all is sooner or later changed and dissipated. But in the volcanic matter which has become *laterite*, the presence of foreign material does seem to have curtailed to a certain degree its vitality, so to speak, and to have caused it to decay sooner than it otherwise would have done; and I think, when among the trappean rocks we do not observe the common forms of structure and colors peculiar to them, both in their compact and decomposing states, we may infer the presence of this foreign material, though it is not demonstrable to our senses. Why the *laterite* should be so impregnated with iron, and the red color so developed in it, seems not less inexplicable than that of the New Red Sandstone,—the Rothliegendes or Exeter Conglomerate of which it so closely resembles. Mr. Logan's hypothesis, that when the red color has extended into other rocks the agency of "volcanic steam, gases, or fluids charged with iron," may be called into account for their red disintegration, seems very tenable—that is where they have not enough iron in them otherwise. Indeed, his hypothesis throughout will be found hardly less applicable to the island of Singapore than it is to that of Bombay. (Jl. As. Soc. Bengal, vol. xvi. part 1, p. 534.)

The very genuine pieces of *laterite* only differ from the rock of the hills at Sion in being more ferriferous, and in presenting a cavernous structure, composed of sinuous instead of irregular spheroidal cavities; such differences bearing no comparison with those which exist between the red brecciated hills at Sion and the black jaspideous hills of Antop and Sewree, though they are both parts of the same formation.

Thus the subsequent effusions in Bombay would appear to be identical in origin, and almost so in structure and composition, with the *laterite*, though the latter has been stated not to come further north than the Bancote River, which is 60 miles south of Bombay. And it should be remembered that this breccia is not confined to the island of Bombay—that, indeed, we only have a specimen of it here; but that it forms the principal part of the mountains in Salsette, and may be seen at the northern extremity of that island, viz. at Ghora Bunder, which is 18 miles from Bombay, containing there, as in Bombay, large pieces of aqueous strata, apparently identical with those of the fresh-water formation in Bombay. How far further north or south it may extend is not yet known; but if the masses of aqueous strata in it be really identical with the fresh-water ones of Bombay, their existence at Ghora Bunder not only proves that the volcanic breccia extends so far, but that the lake or river in which these fresh-water strata were deposited must have also extended this distance.

There is one fact more which I forgot to mention, and which is still further confirmatory of Dr. Voysey's opinion respecting the common origin of greenstone, basalt, wacke, and laterite, viz. that much of the third effusion or volcanic breccia, which I think we must now regard as *lateritic*, if not genuine *laterite*, is in the state of kaolin, and when pieces of it are well washed with a brush in water, they present, in like manner, the angular parts of the undecomposed grains, possessing the same greenish tint and appearance as those of the fine-grained diorite of the basalto-dioritic tract.

Having now gone over the *fresh-water formation*; the first effusion, or *basalto-dioritic*; the second, or *amygdaloidal* effusion; the third effusion, or *volcanic breccia*, and the *dykes* of the same, which constitute the fourth effusion,—indeed all the ancient formations,—let us now go to the modern ones, viz. those of the Pliocene Age, the geological age of the others being as yet undeterminable.

This modern series merely consists of the *clay* which fills up the central or lagoonal depression of the island, and the *shell-beaches* which overlay it in Back Bay, the neighbourhood of Mahim, and at Sewree.

Clay.—This is a stiff plastic deposit, of a fine uniform structure, not effervescing with acids: the color is brown above, blue below, and then yellowish, where it rests upon or mingles with the decomposing igneous rock, or the remains of the fresh-water strata. Its thickness of course varies with the irregularities of the igneous rock beneath, but it diminishes also gradually towards the sea, or where it passes under the shell-beaches. Thus, at the southern part of the island, within three

quarters of a mile of Back Bay, it is 10 feet thick ; after this it diminishes in thickness towards the sea in Back Bay, and 600 yards from the latter, where it is yet overlaid by the shell-beach, it is only $4\frac{1}{2}$ feet thick, and of a blue color: still nearer the sea it seems to disappear altogether, for it was not met with in a well 20 feet deep in the Girgaum Road, about 300 yards from it.

The same thinning out probably takes place under the shell-beach of Mahim, at the northern end of the island ; but there I have not had the same opportunity of examining it.

This clay is also met with at Sewree, where Dr. Buist, who has paid much attention to the formation, pointed it out to me. There the sea is exposing it, and scarping the shell-beach which overlies it, by which one might infer that this portion of the island was undergoing elevation.

Like most argillaceous deposits, it contains very few organic remains : the shells are almost all confined to the beaches which overlap it—still here and there it does present a few scattered ones. At Sewree, at Mahim, and under the beach at Back Bay, it contains a good deal of wood, probably the stumps of mangrove trees, which originally grew in it. This wood seems to be chiefly confined to the parts mentioned, and presents a number of calcareous tubes, which are straight or undulous, and from a half to three quarters of an inch in diameter. They are more or less filled with calcareous infiltrations, and originally were formed round the borings of some pholadine animal. The wood itself is in a spongy expanded state, and contracts remarkably on drying ; assuming a compact solid form, which breaks with a smooth or resinous fracture, and presents a semi-carbonized appearance of a deep black brown color, very much like coal. It burns, however, more like wood, readily, and with a bright flame, emitting a great deal of smoke, and woody odour ; also leaving a white ash. In different parts of the lower clay, oyster shells are found, adhering to boulders and loose stones, the same as those now found on the shores. Pholadine tubes, infiltrated with calcareous matter, also abound throughout the clay, and here and there the remains of crab-shells, &c. I have not met with any remains of man, or any other animals, in the clay, and no pottery, or anything resembling an artificial construction, I believe, has been found in it.

There is a feature of this clay, however, which is very remarkable, viz. the *Kunkur formation*. This, which consists of concretionary limestone, occurs massive, or scattered throughout the clay in small isolated portions. In its massive state it is found in large boulders, or in continuous tracts, reposing on the fresh-water strata or igneous rock beneath, and in this state is compact and cavernous, enclosing portions of

the clay in its cavities, &c. in which it has been formed, or as a conglomerate with sandy or gravelly detritus from the igneous rocks, and the remains of small shells, assimilating it to the sandy beaches. Those portions which are scattered throughout the clay are more or less round, like septaria; very uniform in structure, and some so pure that they wholly dissolve in nitric acid. They are generally of a blue color, but sometimes quite white, and identical with chalk. Like septaria also, they are irregular, and almost invariably envelope the remains of some organic matter, such as pieces of reeds, wood, the remnants of crab-shells, &c. &c. which are very frequently removed, and leave nothing but their moulds in the centre of the concretions. This substance also accumulates in the interior of shells, and almost always fills the cavities of pholadine tubes which have been formed in the clay. It does not always, however, envelope organic remains, but may be seen appended to them in a globular form—to the pincher of a crab-claw for instance. Occasionally it may be seen in a vertical section of the clay, in the state of a number of isolated particles or concretionary nuclei round a piece of wood, as if in process of forming a nodule, not by successive layers, but by the increase of substance round different centres. It will hardly be asked where this lime comes from, when we have seen so much of it in the igneous rocks, and in the laumontite filling their cellular cavities, which mineral contains twelve per cent. of lime.

Beaches.—Lastly, we come to the sandy beaches, which are chiefly found on the northern and southern sides of the island, and not on the western or eastern sides: not on the western, because the whole is composed of black basaltic rocks, extending probably for a long distance into the sea; and not on the eastern side, because there are no waves to throw it up, since wave-action, combined with the presence of sand, &c. is of course absolutely necessary for this purpose. Hence it is at the mouths of estuaries such as these, emptying themselves into the sea on the north and south of the island of Bombay, that we chiefly find such beaches: the sand is brought down by them, and, when flowing into the sea, is there turned back by the waves upon that part of the shore which by its form and position is best adapted to receive and retain it. Thus we see the chief accumulation of this sand in Back Bay and at Mahim, the former on the north, the latter on the south side of the island; and each of these beaches presenting their concavities to the N.W. and S.W. respectively, from the inner side of the island being so much longer than the outside. At Sewree, also, which presents a short shore with a southerly aspect, there is a

small beach-accumulation, which seems to have been thrown up by the swell of the South-west Monsoon, as it falls almost point-blank upon this bit of shore on its way up the harbour. Also, in the centre of the island, there is a patch of beach six feet thick, called Phipps' Oart, from which the railroad contractors have obtained sand for the surface of the railroad. At first it appears thoroughly isolated, and difficult to account for, but when we observe a breach in the eastern and western ridges of the island immediately opposite it, and see the remains of shells and sand, scattered over the surface of the clay in a line between these two breaches, we no longer hesitate in applying the same reasons for its occurrence here that we have in other places, viz. that through the breach in the eastern ridge came sand from the harbour, and through the breach in the western ridge, viz. that at the Vellard, came the waves from the sea which ponded it back, and formed the mound mentioned. At that time the island must have been divided into two parts, and the cause of this being discontinued would seem to be sought for in its subsequent elevation; but the summit of the mound of sand and shells called Phipps' Oart not being more than about nine feet above the sea at high-water, and the latter kept from overflowing a great part of the Flats by embankments, the drying up of the island would seem to be more from the accumulation of detritus brought down from the hills on the main land than from anything else.

At Mahim, the beach is two miles and a half long, and extends 1000 yards inland, and at Back Bay it is two miles and three quarters long, and extends about 600 yards inland, forming segments of large circles at each place. The thickest part of the latter appears to be its western end, where the South-west Monsoon swell beats most upon it, for about its centre, viz. 300 yards from the sea, it is 20 feet thick, 18 feet on the Esplanade opposite the Sanatarium, and towards the southern extremity of the Esplanade 15 feet thick, where it rests on the igneous rocks, and large spheroidal masses of coral (*Cellastrea* Bl.)

With the composition of these beach-accumulations we are perfectly acquainted from the wells that have been dug through them. As before stated, the clay thins outwards under them, and they, in return, inland, thin out upon the clay, but have of course always that ridge above the clay which is common to beach-accumulations.

Not having had the opportunities of examining the beach at Mahim that I have of that in Back Bay, though they are both probably alike, I must take my description from the latter. It is composed of beds of yellow sand and small shells, resting on the clay, or on the igneous rocks of the locality, according to that portion of it which is nearest

the sea, and *vice versâ*. The sand is chiefly confined to the upper part, but a few feet down begins to present beds of small sea-shells, for the most part entire. These increase in quantity, and take the place of the sand, while they become cemented together by calcareous matter, and form a concrete mass, which furnishes a rough building stone. The shells for the most part chiefly consist of small bivalves, *Cardium* and *Tellina*; also of small univalves, *Turbo*, *Cerithium*, and *Nerita*; a large *trochus* and *turritella*, and a thin pearly *placuna*; in short species of all the genera which are now found on that part of the beach which is in process of formation. As before stated, these materials rest on the clay or the igneous rock, and probably in some places on the lacustrine strata, where the latter have not been carried away by denudation. I have frequently looked among the portions which have been quarried for bones of the human skeleton, and for remnants of pottery, but have never met with either.

This concludes all that I have to offer on the Geology of the Island of Bombay, with the exception of the few following "practical observations."

Building Materials.—The most durable stone is that which caps the basalto-dioritic tract, viz. at Nowrojee Hill, &c. but it is very tough; the next is a more crystalline form, which lies below it; this is much more cleavable, and is found all along the eastern ridge. After this comes a more earthy form, (trappite,) which is found at the base of Nowrojee Hill Quarry; also the so-called "white trap" (aphanite) at Dharavee, a modification of which (spilite) is again met with on the eastern side of the Flats, about the middle of the island, near the railroad, made up partly of carbonate of lime, in the form of calc-spar, &c. It is with this that the principal part of the stone-work of the railway is built; and although not so durable as any of the foregoing, is sufficiently so for economical purposes. Last of all comes the volcanic breccia, in the neighbourhood of Sion, which furnishes a very rough stone, but from its soft argillaceous nature when fresh hewn, and subsequent hardening, it serves very well for troughs, for which it was formerly much used.

Lime.—The concretionary limestone called kunkur, lying at the bottom of the clay in the Flats, in detached masses, or in continuous tracts, together with the nodular forms in the clay itself, furnishes an abundance of lime, the purest coming from the nodules. Recent shells, however, are collected and burnt for this purpose, from their furnishing a still purer material.

Sand.—This comes from the shell-beaches, and, being chiefly com-

posed of the detritus of small shells and argillaceous matter from the disintegrated trappean rocks and fresh-water strata, hardly contains any siliceous sand; hence it makes very bad mortar: much of it being taken from the sea shore also, it is more or less impregnated with salt, which after a while makes the mortar crumble, and, where this is covered with plaster, the latter to fall off. It has always appeared to me a great defect in the plastering of this part of India, not to mix hair, or tow, or straw, with the material. All who have had anything to do with new buildings in Bombay must have seen the plaster frequently falling off from the circumstances I have mentioned, and that no secondary plaster ever stays long on such surfaces. Hence the necessity of taking sand from parts which have been long exposed to the percolation of fresh water, and which is free from salt, and mixing some fibrous material with the plaster, to make both it and the mortar more durable. It is no light matter this in the construction of a building, for without it the expense of repairs will ever be as it is now, endless, and the appearance of the buildings squalid and disgraceful, although an unlimited amount of money may be expended upon them annually.

Wells.—The only rule that can be laid down for digging wells is that the basalto-dioritic tract must be pierced through to the fresh-water strata, and even then there may be no water: for a foot or two below this there may be an intrusion of the igneous rock, and then this must be pierced until arriving at another layer of the fresh-water strata, and so on until water is reached. Sometimes the meeting with a rent in boring through the basalto-dioritic tract, or a dyke of the subsequent igneous effusion, may, by communicating with water below, yield the latter before it could otherwise be expected; but from the manner in which the fresh-water strata and superincumbent basalto-dioritic tract have been broken up and intruded throughout the island, by the subsequent igneous effusions, it is plain that none of these springs can be inexhaustible. Last year proved it, for nearly all the wells were dry from the scarcity of rain the year before. There is another fact, viz. that many of these rents and dykes let in a spring of brackish water: this is particularly the case in the neighbourhood of Byculla. Experience there has often exemplified the proverb, that “you may go further and fare worse.” This was the case in a tank enlarged by Sir Jamsetjee Jejeebhoy on the north side of the Grant College. In sinking a well at the south-western corner of Baboola Tank last year, too, the workmen came upon a thin line of the fresh-water strata, accompanied by an oozing of saltish water, and of course were ordered to cease further operations directly. How it comes to pass that this

water should be brackish I can only conjecture ; for it is not owing to the presence of the white rock, (or subsequent effusions,) since at Mazagon there is a well 60 feet deep, entirely excavated in the latter, and yet yielding excellent water. Again, the tank mentioned, which was enlarged by Sir Jamsetjee Jejeebhoy, does not extend into the white rock, and yet the water in it is so brackish that it is hardly fit for anything but watering the roads. Two tanks or wells shall be found within a few yards of each other, the one containing drinkable the other undrinkable water. As I have before stated, all that I can offer in explanation of this is conjectural, viz. that when the basalto-dioritic tract and aqueous strata were broken up by the subsequent effusions, the sea water may have run into the crevices, and there, becoming vapourized, have left its salt behind it ; or, otherwise, the sea at the present time may be sucked up by these rents and dykes, which by their intercommunication may carry it here and there throughout that part of the island where the brackish wells are most common. If the former opinion were entertainable, then the constant emptying of these wells should at last make them yield fresh water ; but this is not the case, for they are emptied yearly for watering the gardens, and still continue to be salt. At the same time, those which are never emptied are decidedly the most brackish. If, on the other hand, the latter be the explanation, then there is no remedy for it.

Coal.—The quantities of this mineral found at the cutting of the Sluices, where the fresh-water strata containing it have only been excavated for a few cubic yards, is very trifling, although the fossilized wood and debris of vegetable remains is very considerable. The nature of the coal is described at page 176. It hardly ever occurs in grains larger than a pea, and for the most part in layers over compressed flat long leaves or stems ; although the whole of this part of the fresh-water deposit is highly carboniferous. At the same time it should be remembered that in the only place where these strata have been exposed they have been broken up by the intrusion of the igneous rock, and that although the wood and other vegetable remains in them here are principally replaced by argil, yet that they may be more coal-bearing in other parts. A further examination, then, of this part of the fresh-water formation in different localities would be highly interesting, if, even after all, it should not prove useful.

List of Rock-Specimens, Minerals, and Fossils, from the Island of Bombay, illustrative of the foregoing Paper.

Presented by Dr. LEITH, and the Author.

[Those marked with a † were presented by the former, and those with an * by the latter; the † and * together denote that specimens of the same object have been presented by both.]

No.

- 1 * Tough bluish-grey basaltic diorite, containing olivine, and grains of magnetic iron ore, from the upper part of Nowrojee Hill.
- 2 * Fissile and more compact, from ditto lower down.
- 3 * Fine-grained crystalline diorite, from the ridge extending northwards from Jakaryah's Bunder.
- 4 * Mottled blue and brownish grey diorite, from the ridge extending northwards from Khandlee Battery.
- 5 * Orbicular or botryoidal diorite, from the same ridge a little south of Tank Bunder.
- 6 * Tough black fine granular basalt, from hexagonal prisms at Worlee.
- 7 * Fissile black or dark fine basalt, from beneath the surface Malabar Hill.
- 8 * Tubes, formed of crystalline quartz, from bottom of basalt Mama Hajanee.

FRESH-WATER STRATA.

- 9 * Portions of the upper part of the fresh-water strata, from different localities: the light brown from the tank north of the Horticultural Gardens, and upper part of Baboola Tank; the blue from the well (see p. 199) in Baboola Tank; the brown from the spilite on the eastern side of the Flats, nearly opposite Parell; the greenish or bluish grey or brown from the Sluices; the blue and brown from a well on Malabar Hill.
- 10 * Portions of the stratum composed of the casts of cyprides, from the northern side of the breach at the Sluices; ditto from the northern end of Chinch-pogly ridge.
- 11 * Greenish grey or brown shale, from the Sluices.
- 12 * Ditto, with interlaminated black shale, from ditto; also from a well on Malabar Hill.
- 13 * Black bituminous shale, from ditto, and from a well on Malabar Hill.
- 14 * Chertified aqueous strata, bent.
- 15 * Basaltified ditto, with organic impressions.
- 16 * Jaspified ribboned ditto.
- 17 * Chertified portion of cypris-stratum.
- 18 * Ditto jaspideous ditto.
- 19 * Coal from the Sluices.
- 20 * Mineral resin from ditto.

VEGETABLE REMAINS.

Roots.

- 21 † Corniform, conical roots? from the Sluices, (several specimens and sections,) (p. 177).

No.

- 22 † Corniform, globular, from the Slulces (several specimens and sections).

Stems.

- 23 *† Cylindrical, (two specimens,) (p. 178).
 24 *† Wood, dycotyledonous, several specimens of, large and small,—and monocotyledonous, (bamboo?) (p. 178).
 25 *† Ditto with bark, two specimens (p. 178).
 26 *† Fungoid or adventitious woody excrescences? in the bark (p. 178).

Leaves.

- 27 * Oval, small,—like leaflets of an acacia (p. 179).
 28 *† Long, flat,—like bulrushes, large and small (p. 180).
 29 † Scaly, long leaf, or surface of a stem? (p. 180).
 30 † Lanceolate leaves, like those of bamboo (p. 180), also cordate leaves.
 31 † Impression of *Cyperus*?

Seeds.

- 32 *† Small, flat, lenticular capsule, with a ring of seeds arranged round the internal margin (p. 180).
 33 † Seed like *artabotrys odoratissimus* (p. 181).
 34 † Siliquose seed-pod (p. 181), with sections (several specimens).
 35 † Ditto, (p. 181).

ANIMAL REMAINS.

- 36 † *Cypria semi-marginata* (H. J. C.) (p. 181).
 37 * *Cypria cylindrica* (Sow.) (p. 182).
 38 * Another species, *C.* —————? (p. 182).
 39 † *Lymnadia*?
 40 † Elytra of a small coleopterous insect, right wing (p. 183).
 41 † Impressions of fresh-water shells, *Melania*?
 42 * Do. do. do. *Paludina*?
 43 † Do. do. do. Pupa?
 44 *Rana pusilla*, (Owen,) Skeletons of, several specimens (p. 184).
 45 Do. do. do. large and small. (In these specimens, though one skeleton appears larger than the other, the thigh bones are all of the same length.)
 46 Do. do. do. in different layers an inch apart, (two specimens,) (p. 186).
 47 * Do. do. do. on a layer of cyprides.
 48 * Do. do. do. bones of, scattered in intruded igneous matter (p. 186).
 49 † *Testudo Leithii*. (H. J. C.)—*a* carapace and plastron; *b* ditto with head; *c* head alone; *d* left half of the carapace and plastron; *e* fragment of ditto; *f* ventral part of pelvis and sternum opposite; *g* fragment of carapace, with margino-collar scales; *h* fragments of marginal scales; *i* ditto; *k* ditto; *l* right two-thirds of carapace and plastron.

2ND EFFUSION.

- 50 * Greenish blue and black trappite, from Nowrojee Hill, below the line of aqueous strata.

- No.
- 51 * Amygdaloid trappite, from Baboola Tank ; cells filled with crystals of laumonite.
- 52 * Laumonite and dog's-tooth calc-spar, from a geode in ditto.
- 53 * Rhomboidal calc-spar in mass, from ditto ditto.
- 54 * Ditto ditto following a line of aqueous strata ; from do. do. (p. 199).
- 55 * Ditto ditto in a minute imbricated form, separate, and covering dog's-tooth crystals, from ditto ditto.
- 56 * Prehnite from ditto ditto.
- 57 * Amygdaloid trappite, from a tank north of the Horticultural Gardens.
- 58 * Black fine-grained crystalline diorite, from Baboola Tank.
- 59 * Compact blue amygdaloid trappite, from Baboola Tank ; cells elongated, and filled with massive laumonite.
- 60 * Greenish grey amygdaloid trappite, cells filled with green-earth, from the neighbourhood of the house called Lowjee Castle.
- 61 * Ditto decomposing, cells filled with quartz crystals, from upper side of dyke in Chinchpoojly ridge.
- 62 * Hyalin and amethyst quartz crystals, from crushed geode in ditto.
- 63 * Amygdaloid with brown earthy base, and cells filled with quartz crystals, from neighbourhood of Sindu Para.
- 64 * Brown aphanite, the so-called white trap, from Dharavee.
- 65 * Ditto amygdaloid, from ditto ; cells filled with fine white clay-earth, (decomposed green-earth or laumonite,) (p. 193).
- 66 * The same decomposing into a mottled red and white material, like laterite, of a granulo-plastic nature (pp. 196 & 202).
- 67 * More earthy aphanite, spilitic, with fragments of organic remains, and calc-spar, from the eastern side of the Flats opposite Parell. Forms a good stone for building, and is easily hewn.
- 68 * Blue spilitic, (aphanite and calc-spar,) calc-spar, disseminated, from ditto.
- 69 * Brown ditto, with calc-spar in small masses (amygdaloidal) from ditto.
- 70 * Brown ditto, with calc-spar in veins, from ditto.
- 71 * Unsymmetrical, compressed, lenticular crystals of calc-spar, standing on their edges in a geode of ditto, from ditto.
- 72 * Blue spilitic, with small crystals of calc-spar, passing downwards into trappite, from ditto.
- 73 * Fine blue clay aphanite, from a well on Malabar Hill.
- 74 * Coarse aphanite, from ditto ditto.
- 75 * Brecciated aphanite, from ditto.
- 76 * Coarse aphanite, intruding fresh-water strata, from the eastern side of the Flats.
- 77 * Aphanite bearing fragments of vegetable remains, from ditto.
- 78 * Ditto black ditto, from a well on Malabar Hill.
- 79 * Ditto bitumenous ditto, from the Sluices.

3RD EFFUSION.

- 80 * Coarse breccia, from the neighbourhood of Tank Bunder.

- No.
- 81 * Blue breccia, with white fragments, from a well on Malabar Hill : *b* ditto from Sion ; *c* ditto brown from ditto ; *d* ditto red from ditto ; *e* ditto white and red decomposing ; *f* ditto red compact.
- 82 * Ditto black jaspideous from Antop Hill.
- 83 * Ditto jaspideous, black, from Sewree.
- 84 * Blue breccia, passing into red clay, from Sewree.
- 85 † Ditto, containing a large fragment of large-grained diorite, near the village of Wadalla (p. 196).
- 86 * Ditto, containing amygdaloid diorite ; *a* ditto containing amygdaloid trappite or aphanite, from ditto and Sewree.
- 87 Ditto, containing portions of aqueous strata.
- 88 * White amygdaloid aphanite ; cells very much elongated, and filled with calcedony or quartz crystallized, from Chinchpoo gly ridge.
- 89 Geode from ditto, containing crystals of quartz and amethyst.
- 90 Ditto from ditto, containing agate.

4TH EFFUSION.

- 91 * Portion of amygdaloid aphanite, from the dyke at Sewree ; cells containing fine white clay-earth.

GHORA BUNDER, IN SALSETTE.

- 92 * Specimens of amygdaloid aphanite, and volcanic breccia ; also specimens of aqueous strata from the latter.

MARINE FORMATION.

- 93 * Blue clay of the Flats.
- 94 * Massive kunkur, from lower part of ditto.
- 95 * Small kunkur-conglomerate, resembling transformed sea-beach, from ditto ditto.
- 96 * Nodular kunkur, from ditto.
- 97 * Charred wood, from ditto.
- 98 * Infiltrated pholadine tubes, from ditto.
- 99 * Concrete sea-beach, coarse.
- 100 * Concrete sea-beach, fine.
- 101 * Shells from ditto.
- 102 * Spheroidal masses of calcareous coral (*Cellastrea* Bl.) beneath ditto, Esplanade.

EXPLANATION OF THE PLATES.

PLATE VI.

Geological Map of the Island of Bombay.

PLATE VII.

Fig. 1.—Cormiform root of aquatic plant ? natural size.

- a Upper end, truncated.
 b Lower end, broken.
 Fig. 2.—Globular root of aquatic plant ? natural size.
 a Lateral view.
 b Upper end, showing lines of petiolations ?
 Fig. 3.—Lateral view of a portion of a stem, natural size.
 a Lower end, showing lines of petiolations ?

PLATE VIII.

- Fig. 4.—Oval leaf, natural size.
 Fig. 5.—Round leaf, natural size.
 Fig. 6.—Compressed stem or leaf of aquatic plant, with root, natural size.
 a Magnified view of longitudinal striæ on its surface.
 Fig. 7.—Scaly impression of leaf or stem, natural size.
 a Two scales, well preserved.
 Fig. 8.—Form of the end of a flat, long leaf, which is very common, natural size.
 Fig. 9.—Impressions of leaves, like those of bamboo, natural size.
 Fig. 10.—Impression of a cyperaceous plant ? natural size.

PLATE IX.

- Fig. 11.—Small lenticular seed, magnified.
 a Natural size.
 Fig. 12.—Oval, compressed seed, with apparently *ruminata* albumen, magnified.
 a Natural size.
 Fig. 13.—Seed-pod, broken off at one end, natural size.
 Fig. 14.—Seed-pod, natural size.
 Fig. 15.—*Cypris semi-marginata*.
 Fig. 16.—*C. cylindrica*.
 Fig. 17.—*C.* ————— ?
 Fig. 18, 19, 20.—Valves of recent cyprides, from the fresh-water deposits of Bombay.
 Fig. 21.—Elytra of coleopterous insect, magnified.
 Fig. 22.—Cast of shell, natural size.

PLATE X.

- Testudo Leithii*.—Carapace, and upper part of head of, natural size. a Point of tail.

PLATE XI.

- Testudo Leithii*.—Plastron, and inferior aspect of lower jaw of, natural size.
 a Impressions of posterior extremities. b b Union of pelvic bones with posterior part of sternum. c Point of tail.

ART. II.—*Recent Investigations in Zend Literature.* By the Revd.
J. MURRAY MITCHELL, A.M.

Presented March 1849 and February 1852.

THE first of the two following papers was read a considerable time ago, soon after the appearance of the articles to which it refers, in the *Zeitschrift der Deutschen Morgenländischen Gesellschaft*; but I have hitherto declined to comply with the request of the Society that it should appear in the *Journal*, in the hope that the important papers of Spiegel and Roth might be given to the English public *in extenso* by some student of Oriental antiquities at home. I see, however, no intimation of any intention to reproduce these papers; the country of Hyde not only seems to have abandoned original investigation into the ancient religious system of Persia, but to be disinclined even to acquaint itself with the progress of Continental scholars in this very interesting field of inquiry. In the absence, then, of a full translation, the following paper is now published, as containing a brief statement of some of the most important conclusions to which the students of Zend literature have at present arrived.

I.

The very rapid progress that has of late years been made in the opening up of the most ancient religious monuments of the Hindus is well known to all who take an interest in Oriental investigation. The Veda is no longer a mystic and unintelligible book. For a considerable time after Colebrooke's Essay on the Vedas was published, it seemed as if the investigation could not advance beyond the point to which he had brought it; but recently the study has been prosecuted with redoubled zeal, and with most satisfactory results.

There is, however, another religious monument of the ancient East, scarcely less interesting than the Veda, on which comparatively little light has as yet been shed. The Zendavesta, the sacred book of the ancient Persians, is still an unintelligible volume. The investigation slumbered from the days of Anquetil du Perron until M. Burnouf took it up. He accomplished much; but notwithstanding his zealous

and successful labours, a deep darkness still enveloped everything pertaining to the ancient books and ancient religious history of the Persians. Light, however, is now breaking in,—we have at least the promise of a dawn; and it is an interesting thing to observe that a considerable portion of the light which is now resting on the Zendavesta is reflected upon it from the Veda.

That the ancient Hindu and ancient Persian races were not very remotely descended from one common stock—now generally denominated the Arian stock—is a fact with which doubtless all present are familiar. A comparison of the languages used by the two races establishes the point to a demonstration. A connexion somewhat similar, although not capable of being traced out to the same extent, exists between the religions of the two races. The points of resemblance here are not merely those which are common to all religions, nor those common to all the religions of the great Indo-Germanic family: they cannot with any show of reason be pronounced either accidental, or the result of intercourse between the two races in later times; but they appear to be based on an original relationship, or rather identity, of the two systems. Each of these throws light upon the other, and the Veda and the Zendavesta—the ancient sacred book of the Hindus, and that of the Persians—ought to be studied in their mutual connexions. The relation of the two books is thus well stated by Dr. Roth:—"The Veda and the Zendavesta are two rivers, flowing from one fountain-head: the stream of the Veda is the fuller and purer, and has remained truer to its original character; that of the Zendavesta has been in various ways polluted, has altered its course, and cannot, with certainty, be traced up to its source."

The Veda and the Zendavesta present two subjects of study that are of very unequal difficulty. The study of the former is by far the easier task. Not to mention that the Sanskrit language, in which it is composed, is still a living language, although doubtless in a form greatly altered from the "rustic dialect" (to use Colebrooke's epithet) of the Veda, we possess admirable commentaries on the Veda written in easy Sanskrit, grammars, lexicons, explanatory notes, &c. &c., which were composed by accomplished Hindus at a time when the study of the Veda was still prosecuted with zeal and success. On the other hand, the Zend must be called a dead language; and to aid us in the study of the Zendavesta we possess a Sanskrit translation of a very small part of the work, a Pehlivi translation, which is as enigmatical as the Zend, the bare rudiments of a lexicon or vocabulary, but not even the rudiments of a grammar. When we add to this slender *apparatus*

criticus the traditionary exposition of their sacred books by the Pársís, as presented in their later versions and commentaries, we have exhausted the list of the aids at our command in the study of the Zendavesta.

In that invaluable repository of information on so many branches of Oriental literature, the *Journal of the German Oriental Society*, (*Zeitschrift der Deutschen Morgenländischen Gesellschaft*), two papers have recently appeared, which are highly deserving of attention, as important contributions to our knowledge of the Zendavesta. One, by Dr. Friedrich Spiegel, is entitled "Studies on the Zendavesta"*; the other, entitled "The Legend of Feridun in India and Iran,"† is from the pen of Dr. Rudolph Roth, whose important treatise on the Literature and History of the Veda was formerly brought to the notice of the Society. (See *Journal*, vol. ii. p. 404.) The latter more especially demonstrates that light can be thrown on the Zendavesta by the Veda.

Dr. Spiegel's article is chiefly occupied with the consideration of the aid which Pársí tradition affords us in the investigation of the Zendavesta. He takes occasion to pronounce an opinion on the merits of the celebrated French version, by Anquetil du Perron. The work of Anquetil is so generally accessible, and so likely to be had recourse to as an easy means of information on the subject of Pársíism, that it is of importance for us to ponder the judgment which the German critic passes on its merits, lest we be led astray by deceptive lights. "The French version," says Spiegel, "was long held to be correct: it was believed that a closer investigation of the languages of the ancient books would be advantageous to philology, and might here and there modify the translation in details; but that substantially the conclusions of Anquetil would be confirmed. Contrary, however, to all expectation, recent investigation has completely set aside the results which we had deemed so certain, and has demonstrated that the whole inquiry must be commenced *de novo*. It is no longer a secret, that Anquetil's version is not trustworthy."

While employing this severe language, we must not forget—and Dr. Spiegel does not forget—that our obligations to Anquetil are exceedingly great. The zeal and unconquerable perseverance which he displayed in his search for the ancient Persian books are worthy of all admiration; and whatever may be thought of him as a philologist, he was at all

* *Zeitschrift der Deutschen Morgenländischen Gesellschaft*, I. Band, III. and IV. Heft. p. 249.

† *Ibid*, II. Band, II. Heft. p. 216.

events a great discoverer. Even had his version been a blunder from beginning to end, still the service he rendered in bringing the Zend writings from India to Europe, and directing the attention of Europe to them, would have entitled him to our gratitude and respect.

It has been usual, Dr. Spiegel remarks, to say that Anquetil was misled by trusting to the traditionary interpretation of the Zendavesta by the Pársís. Spiegel, however, doubts the correctness of this opinion. Since the Sanskrit version of portions of the Zend by Neriosengh is on the whole a close and correct rendering, it is scarcely credible that in the course of a few centuries so complete a revolution in the interpretation of their ancient books can have taken place among the Pársís, a people who cling with tenacity to what they believe to be their ancient creed, and who have been, since their arrival in India, subjected to no great national calamities.

Dr. Spiegel mentions that he is not acquainted with the modern Gujarátí versions of the Zendavesta. These will be referred to afterwards; but in the mean time we may remark that they confirm the opinion he has expressed. Most certainly Anquetil deviates widely from those versions that are at present accessible in Bombay; nor is it conceivable that in Surat, towards the end of last century, when he was there, the Pársís gave an interpretation of their sacred books nearly resembling that presented in Anquetil's work. Spiegel's opinion that Anquetil must have *guessed* the meaning from the Persian renderings which his Pársí teacher supplied him of the Zend vocables, and must deliberately have tortured the stubborn terms till they appeared to yield some intelligible sense, is no doubt correct. Had Anquetil confessed his ignorance, (for he must have been aware of it,) he would have possessed a far stronger claim to our respect and gratitude than as the case now stands.

Spiegel's paper is mainly occupied with the tradition of the Pársís as contained in the Huzvareh or Pehlivi version of the Zendavesta. In the entire absence of grammatical, and the almost entire absence of lexicographical, works on the Zend language, we are necessarily dependant on the translations that, happily, have come down to us; and pre-eminent among these is the oldest, or Pehlivi. From it, indeed, all later versions have been drawn. Of the date and character of the Pehlivi language a good deal is known from coins and inscriptions. It belongs to the era of the earlier Sassanian kings of Persia, [from A. D. 226 onwards,] and we may pretty safely refer the Pehlivi version of the Zendavesta to the same age. It is of high importance in the criticism of the Zend text. The fixing of a correct text is the first step

we must take in an investigation of all records. Comparing the Veda with the Zendavesta, we can rely on the readings of the former much more confidently than those of the latter. The original Vedic text appears to have been wonderfully well secured by the various safeguards that were had recourse to; but the case is far otherwise with the Zendavesta. In particular, passages exist in the present Zend which do not appear in the Pehlivi version; and these are so embarrassing to the sense that they must be considered interpolations. As translated from a more ancient Zend text than that which now exists, the Pehlivi version is of high value in all questions of this nature.

Equally important is the Pehlivi version in the interpretation of the Zend. The Pehlivi is entirely a Persian dialect. A comparison of the Zend with the Sanskrit furnishes most important elucidations; but the connexion between Zend and Pehlivi is still closer, and, were the latter only as well understood as Sanskrit, it would be still more fruitful of results.

Spiegel illustrates at some length the utility of the Pehlivi version as throwing light on the state of the Persian religion in the time of the Sassanian kings. Wholly apart from its use as a translation, as a relic of the Sassanian dynasty it is possessed of much historical value. The Sassanian epoch is one of the highest importance in the history of Asia—and of Asiatic *mind*; but unhappily it is involved in much obscurity. The science of History may expect to receive interesting contributions from the light which will be shed on that epoch from the study of the Pehlivi version of the Zendavesta, and the works connected with it. At that period, Persia by no means secluded herself from intercourse with foreign nations. Greek and Christian influences acted powerfully on the Persian mind; and Pársiism, again, largely contributed to the opinions of the Gnostics and Manicheans. The western influence acted on Persia in two modes; the one, translations of Greek writers into Persian, the other, direct contact between the Persians and the Syrian Christians who were scattered in large numbers throughout the country.

The large number of Syriac words occurring in Pehlivi has long attracted attention; and Sir W. Jones expressed his "perfect conviction that Pehlevee was a dialect of Chaldaic." The usual explanation of this fact is that Pehlivi must have prevailed in the west of Persia, and there come in contact with the neighbouring Syriac; but the facts above noted have suggested an ingenious explanation to Spiegel of a different kind. He thinks that instead of personal, it may have been literary, intercourse between the Syrians and Persians that occasioned the similarity—the large circulation of Syriac books and ideas in Persia

naturally leading to the transference of many words, just as the theological terms in modern Persian are to a large extent drawn from Arabic, the sacred language of Muhammadanism.

Dr. Spiegel's paper contains a brief notice of the history of the Pársi religion since the period of the Sásanian kings, which we pass over. He has two or three pages on the subject of *Pársi Eschatology*, which we hope afterwards to refer to. We shall doubtless soon see still further results from the labours of this very diligent investigator. In the mean time we proceed to notice the paper of Dr. Roth on *The Legend of Feridun in India and Iran*.

It has been well known for a considerable time that many of the technical religious terms occurring in the Veda are reproduced in the Zendavesta. Thus, the Vedic *Yajata*, meaning *worshipable*, is an epithet of the gods, and corresponds with the Zend *Yazata*, which denotes an *Izad*, or angel of the second class; the Vedic *soma* corresponds with the Zend *haoma*, the hom plant; the Vedic *deva* with the Zend *daévo*; and the first half of the Zend name of God, *Ahura Mazdá*, (Hormazd,) apparently with the word *Asura*, which is frequently applied as a laudatory epithet to Vedic deities.* Thus, farther, *Vivanghvat* in Zend corresponds with the Sanskrit *Vivasvat*†; and the son of the former, *Yimo*, with *Yama*, the son of the latter. The identification of proper names thus happily commenced by Bopp and Lassen has been carried out by Dr. Roth, in the case of the word *Feridun*.

The name of Feridun, the sixth king of the Peshdadian dynasty, is one of the most renowned in the whole compass of Persian history. The epic genius of Firdausi has found a congenial theme in the mighty achievements of "Feridun the Fortunate"; and later prose writers have delighted to hold him forth as a pattern of every virtue. Amid the confessedly inextricable confusion in which the primeval annals of Persia are involved, it has been fondly imagined that with him at all events we discern some traces of historic truth. The greatest exploit of Feridun was the overthrow of the tyrant Zohák. Notwithstanding all the wild fables recorded of the latter,—such as that the devil kissed his shoulders, and made two fearful serpents spring from them, which required to be daily fed on human brains,—it has been customary to recognise in Zohák the representative of a Western invasion, Arabian or Assyrian; and the thousand years during which he is said to have reigned have been held as the probable duration of the conquering

* Lassen's Indische Alterthumskunde, I. p. 522.

† Bopp's Nalus, 2nd Ed. p. 203. (1832.)

dynasty. Feridun is thus represented as the deliverer of Persia from a foreign yoke; and Sir John Malcolm is so far satisfied of the reality of his existence as to identify him with Arbaces the Mede, who is stated by Greek historians to have overturned the Assyrian monarchy under the effeminate Sardanapalus. There is a well-known passage of Firdausi to this effect:—

“ Feridun the fortunate was not an angel,
Neither was he formed of musk and ambergris;
He acquired his glory by justice and liberality:
Be thou just and liberal, and thou shalt be a Feridun.”

Now, if the conclusions of the German critic be accordant with truth, Feridun was certainly not formed of musk and ambergris, but he was composed of materials still less earthly and substantial: Feridun, in short, according to Roth, is no historic personage at all—he is simply one of the deities acknowledged in remote times by the Arian race; and, without any figure of speech, we may say that the battles which Firdausi celebrates with so much Homeric fire took place in the region of the clouds.

The investigation of this point by Roth is full and minute; but it will be sufficient to mention the more important particulars in the inquiry. The modern Persian word *Feridun* is derived from *Phrédûna*, a softened form of the Zend *Thraëtôna*. In the Zendavesta he is said to have slain the destructive serpent with three throats, three tails, six eyes, and a thousand powers, which was created by Ahriman for the destruction of the world. This slaying of the serpent is in fact the sum and substance of the history of *Thraëtôna* in the Zend books. In the poetical narrative of the Shah Nameh the name of the tyrant whom Feridun slays is Zohâk; but Firdausi also writes the name *اش دہاک* *ash dahâk*, which is almost exactly the Zend *ashi dahâk*, i. e. *destructive serpent*. *Thraëtôna* is the son of *Athwya*, which in Persian is written *Atbin*, or, as changed by Firdausi, *Abtin*.

Nearly the whole of this seems to occur in the Veda. In the Veda *Trita* occurs, or, as it is at least once written, *Traitana*, which closely resembles *Thraëtôna*. The Zend *Thraëtôna* is the son of *Athwya*; the patronymic of the Vedic *Trita* seems to be *Aptya*—an exact coincidence, the interchange of *t* and *p* being frequent between these languages. In Zend *Athwya* can hardly be etymologically significant; but the Sanskrit *Aptya* yields it a meaning, viz. “water-inhabiter,” or “water-ruler.”

But the resemblance goes beyond names—it extends to acts. *Thraëtôna* in the Zend books slays the “destructive serpent,” and so does

Trita in the Veda. The serpent in the Zend books is a horrid monster, three-headed, three-tailed, and six-eyed : the Vedic serpent is very similar. We read thus in one of the Vedic hymns (x. 1, 8, 8):—

“The Aptya (*i. e.* Trita) knew his father’s arms to wield ;
Sent (or, encouraged) by Indra, strode he to combat :
The three-headed being, with seven tails, Trita slew,
And the might of Twáshtri set the cattle free.”

So far the resemblance is singularly exact. The champion, the enemy, the battle, are almost identical in the Veda and the Zendavesta. A difference exists between them as to the prize contended for.

In the Veda, Trita is a divine personage, who contends against the serpent for the rescue of the cows. We have here an edition of the old legend which occupies so prominent a place in the religion of the Veda, viz. that demons seize on the waters,—the many-tinted clouds, when, like cows going to pasture, they move across the sky,—carry them off captive, and bind them in fetters beyond the horizon ; or, what is another form of the same thought, the malignant being who dwells in the mountains, locks up the springs in the dark recesses of his rocky caverns. Then it is that the thunderbolt of Indra (or, the arrow of Trita) cleaves the rocks, or rends asunder the dark mantle with which the demon has enveloped the sky, and then the imprisoned waters leap forth to liberty, and rush down to cheer and fertilize the earth. Such is the famous battle—one perpetually recurring in the Vedas ; and such precisely is the battle between Trita and the serpent. Now in the Zendavesta the scene shifts ; the battle is transferred from heaven to earth. The champion is the mortal son of a mortal sire ; and the serpent he slays is a creation of the evil power, which is furnished with devilish might for the destruction of good in the world.

And then, lastly, comes the later Persian hero-legend, as presented in the great poem of Firdausi, the *Sháh-Námeh*. Here the attempt is made to draw the whole representation into the province of actual history. The battle is in Persia ; the three-headed serpent is Zohâk, with a serpent springing up from each shoulder ; he is seated on the usurped throne of Persia ; his wickedness is the tyranny which he exercises over his conquered subjects ; and the blessing for which the noble Feridun contends is freedom to his country, and the restoration of its ancient royal line.

Dr. Roth thinks he finds some evidence of the fact that Trita—who certainly is not often mentioned in the Vedas, perhaps not oftener than thirty times—was a far more important person in the period anterior to the collecting of the Vedic hymns than he afterwards became. His

similarity to Indra may have obscured his renown, as it certainly rendered his services of less importance. Apparently he was the ruler of the distant sky-waters, while Indra swayed over those in the visible heavens immediately around us. Trita is removed to the farthest point in space to which imagination can reach ; thus in the prayer (viii. 6, 5, 13, &c.)—

“ Our sins, be they known, or be they secret, oh gods !
Remove all far away from us to Trita the Aptya.”

The supposition that the Vedic Trita, a divine being, is changed in the Zend and Persian books into a mortal hero of earthly mould, although rather startling at first sight, may be divested of all antecedent improbability by analogous facts that do not admit of question. One of the most renowned personages in the poem of Firdausi is Jamshid, the fourth king of the Peshdadian dynasty, whose romantic tale of love and sorrow is from first to last of the most earthly complexion. Yet it has been demonstrated to the satisfaction of Orientalists that the Jamshid of Firdausi, the Jam of other books, and the Yimo of the Zendavesta, are all one, and all identical with a deity in the Vedas, Yama. The king Jamshid of Firdausi appears in the Zendavesta as Yimo, a servant of Ahura Mazdâ, who ruled on earth during a golden age, in the earliest period of the world's history. On the contrary, in the Veda, Yama dwells in heaven as the ruler of the spirits of the departed, who banquet with him. (x. 1, 14, 10.) Thus it is said of him (ix. 7, 10, 7. 8):—

“ Where is the unextinguished light
In the world, where the sunbeam dwells,
Thither bring me, O Soma, into the immortal, inviolable world ;
Where the son of Vivasvat (Yama) ruleth as king,
Where the steps up to heaven are,*
Where those great waters dwell,
There let me immortally be !”

Dr. Roth concludes his interesting inquiry with the following sentiments, the truth and importance of which will be generally admitted.

The time is now come to answer all questions as to the historic value of the accounts given by Firdausi and his innumerable followers respecting the early Persian kings ; and we can do it by the assistance of the long-concealed but now disclosed legends of ancient India, [as contained in the Veda,] which must be connected with the statements of the Zendavesta. No confidence can be placed in the representations

* Roth, in a later paper, translates this “ in the innermost of heaven.”—*Zeitschrift*, IV. 427.

of the Musulman writers. Not from works later than the Zendavesta, but from earlier ones, must light be obtained,—light, before which many figures which have been held as real flesh and blood will fade away like spectral illusions. But it is better to confess the void, and allow it to remain until we can gradually fill it with genuine forms, than view it through the delusive glimmer of a cloudy mythology. Instead of vainly toiling to extract historic truth from Firdausi's fascinating song, better far to make at once the humiliating admission that we are at this moment in total ignorance of the history of Persia as far down as the days of Cyrus.

II.

Since I last had the honour of bringing before the Society the chief facts connected with the recent progress of investigation in Zend literature, great advances have been made by some of the Continental Orientalists. I cannot attempt at present to comment on the labours of all who are doing good service in this important field of inquiry; I shall in a great degree confine this paper to a notice of the zealous and successful studies of two, whose names are already familiar to you—Professor Spiegel, of Erlangen, and Dr. Rudolph Roth.

Had time permitted, it would have been well to attend to the very useful work of Professor Brockhaus, who has given us an edition of the Zendavesta in Roman characters.* The index of this work is exceedingly useful; and the glossary is a valuable gift in the present state of Zend lexicography.

I have not yet seen the work on the first five chapters of the Vendidad that has been published within these few months by Lassen, but everything that comes from his pen must be of the highest value.†

Dr. R. Roth, whose interesting paper on the Legend of Feridun in India and Iran I have already brought to the notice of the Society, has continued the same style of investigation in an article on the Legend of Jamshid. (See *Zeitschrift der Deutschen Morgenländischen Gesell-*

* Vendidad Sade. Die Heiligen Schriften Zoroaster's: Yaçna, Vispered, und Vendidad. Nach den lithographirten Ausgaben von Paris und Bombay, mit Index und Glossar, herausgegeben von Dr. Hermann Brockhaus. (VENDIDAD SADE. *The Sacred Writings of Zoroaster: Yaçna, Vispered, and Vendidad. Edited after the lithographed editions of Paris and Bombay, with Index and Glossary. By Dr. H. Brockhaus.*)

† LASSEN (Christianus) Vendidadi Capita quinque priora.

schaft, IV. Band, s. 417.) Roth is not the discoverer of the identity of the Vedic *Yama*, and the Zend *Yimo*, or *Yimo Khshaeta*, i. e. *Yimo the Ruler*, or, as the designation is softened in the later Persian and Gujarátí, *Jamshid*. His paper is interesting, as fully unfolding the position which *Yimo* holds in the *Zendavesta*, and that of *Yama* in the *Veda*—positions very far from identical. In fact, amid the thousand fantastic metamorphoses to which mythological beings are subject in the lapse of centuries, we can scarcely discover a change more complete than that which the original Vedic deity *Yama* has been made to undergo. The word *Yama*, which it has been hitherto customary to translate *Tamer*, *Subduer*, Roth contends can only mean *Twin*, (from the same root as occurs in the Latin word *Geminus*, *Gemellus*). *Yama* is the twin-brother and *Yamí* the twin-sister; and Roth believes that these “twins” simply designate the first pair of the human race. But how deduce from this the general Vedic idea of *Yama*? The first man, says Roth, was the first stranger who found his way to the abode of the immortals, and the natural head of those who are destined, each in his order, to follow him thither,—*Yama* is the leader (prince) of beatified men. He dwells with the gods, and banquets with them. His dwelling is a place of joy—even of revelry.

In the *Zendavesta*, *Yimo* is the head of a golden age. In his kingdom there was “no frost, nor heat, nor darkness, nor death.” We hear also much of a blessed region—a garden, or paradise—into which were collected chosen men, cattle, plants, &c. (See *Vendidad*, *Fargard* 2nd; *Yaçna*, Chap. 9th.)

He is also clearly pointed out in the *Zendavesta* as the receiver from *Hormazd*, and imparter to men, of a law or religion. Of the *Bundeshne*—a much later and most unsatisfactory work, abounding in things unintelligible and absurd—we need not say much; but it makes one statement of some importance, viz. that *Jem* (*Yimo*) had a wife, *Jemê*, or a sister, *Jemakê*. Connect this with what was said of the “twin-sister” *Yamí*.

In the great poem of *Firdausi*, and the innumerable works that draw from it as a store-house, *Jamshid* is a wise, magnificent, but finally erring and most unfortunate prince, who is expelled by *Zohâk*, and dies in exile.

But, lastly, the later Hindu idea of *Yama* is exceedingly unlike the Vedic one. *Yama* is still indeed the “king of justice—the ruler of the *Pitris*,” or ancestors*; but he is also the king of hell. “These, and

* See *Vishnu Purána*, (Wilson's,) p. 152.

many other 'fearful hells, are the awful provinces of the kingdom of Yama, terrible with instruments of torture, and with fire.'**

Such are the magic transformations of mythology! In the books of the one country (Persia), we see the blessed and honoured ruler of a golden age, in whose kingdom evil and death are unknown, changed into a fugitive and miserable prince, who dies by violence; in those of the other (India), the prince of the blessed dead in heaven, in whose realm only pleasure and rapture have place, is metamorphosed into the gloomy and relentless judge of the dead. And all of these four conceptions are as widely as possible removed from the fundamental idea out of which the whole has arisen, viz. that of Yama as the great ancestor of the human race.

Should this identification of Yama and Yimo be permanently retained, (and, startling as the divergencies become, there is little doubt that the connexion traced by Dr. Roth is correct,) it is worth while to note that the conception of Yimo in the Zendavesta and later Persian books remains truer to the original idea than that which is presented in the Vedas. Yimo, the ruler of a blessed period; the teacher—himself divinely taught—of men; the inhabitant of a blessed region or paradise on earth,—this description of *the first man* is singularly like that contained in Genesis, and would seem no indistinct echo of the inspired record. Various questions of course immediately suggest themselves as to the age of the Zendavesta, and the purity of the text, before we can base any very positive conclusions on this coincidence; but the point is eminently worthy of investigation. The further striking coincidences with the record in Genesis which the poem of Firdausi supplies cannot be urged as of very much importance, inasmuch as Biblical ideas, derived from the Korán, mingle themselves to a large extent with all the representations of early Persian history by Persian Musulmans.†

The Orientalist, however, who has during the last three or four years communicated to the public the largest amount of new information, is Dr. F. Spiegel, of Erlangen, whose name is already familiar to this Society. His contributions are numerous and valuable.

In the *Zeitschrift der Deutschen Morgenländischen Gesellschaft*, III. Band, s. 246, we have an article from his pen on "The Legend of

* See Vishnu Purána, (Wilson's,) p. 207.

† The name *Jamshid* is still in frequent use among the Pársis. We have it in the first part of the name of our worthy Pársi Knight, which is, in Jonesian orthography, *Jamshid-ji*. We have also in Bombay a newspaper called the *Jám-i-Jamshid*,—the *Cup*, or rather *Mirror*, of *Jamshid*.

With respect to the popular conception now prevalent in India regarding Yama,

Sám."* This we may pass over as not very important in its bearing on Zend literature. Sám is the first of a line of heroes—Sám, Zál, Rustam,—who are highly renowned in early Persian history. The conclusion to which Spiegel comes is that the whole account of Sám is unhistorical—a purely poetic fiction. He thus adds another proof to the assertion that the record of the Peshdadian period of the Persian annals, in which the genius of Firdausi so luxuriates, is simply wild mythology.

Directly connected with the Zendavesta, there are several important papers of Dr. Spiegel's. Various articles of his, published in the Transactions of the Royal Bavarian Academy of Sciences, treat of the manuscripts of the Vendidad, and the purity of the text. We omit the consideration of these at present; when Spiegel gives us a collection of various readings in the edition of the Zendavesta which he is now happily carrying through the press, he will doubtless supply us with his matured conclusions as to the state of the Zend text.

He has published a separate paper on "Some Interpolated Passages in the Vendidad." He applies the Pehlivi version to the Zend, and finds numerous passages, some of them important, in which the Zend readings have nothing corresponding to them in the translation. These

the following *abhang*, or Maráthí ode, will suffice. The translation is literal—the abruptness of expression being retained from the original:—

" Worldly joy here seemeth sweet ;
 Afterwards, hard are the pains of Yama.
 They strike, they cut, terribly they slash,
 The servants of Yama, for many years.
 The tree with sword-shaped leaves—fire of Khair—
 Flames of burning oil burst forth. •
 They make them walk over burning ground ;
 Pillars of fire with their arms they clasp.
 Therefore is Tuká full of pitying sorrow—
 Enough of coming and going, and being born !"

How infinitely unlike the realm of Yama, as pictured in these terrible words, from the region where, "in the innermost of heaven," the Vedic Yama banquets with the divinities! The transformation, as a historical fact, has been skilfully traced by Roth. Equally interesting, however, would be an inquiry into the causes that produced the change. I do not know that the investigation would raise our estimate of the Veda, morally considered. Its allusions to the unseen world of the departed—to immortality and future blessedness, are exceedingly few. Allusions to future punishment, in consequence of sin in this life—are there any such? If not, it seems to me that the conception of hell, even when so gross as the horrible representations of the Puránas of the later Hindus, the Ardai-Viraf-Nameh of the Pársis, and the Korán of the Musulmans, exhibits a higher condition of the moral consciousness than we can trace in the Veda.

* *Die Sage von Sám, und das Sám-náme.*

he deems interpolated. He has also published a treatise, containing the Zend text of the 19th Fargard of the Vendidad in Roman characters, a translation, and copious notes, critical and explanatory. This is an important part of the Zendavesta, and Spiegel's annotations touch on some weighty questions. One of these is the Pársis doctrine respecting *Zaruána Akarana*. The question has often been discussed whether the Pársis recognize a being called Zaruán Akaran as the supreme divinity, or whether Ahura Mazdá, the good principle, is so. In the treatise now under review, Spiegel strongly contends against the personality of Zaruán Akaran. The Zend words occurring in the 33rd section—*Dathat çpënto mainyus dathat Zrvánê Akarane*, are highly important in the decision of this question, as on them mainly has been based the view which Spiegel combats. Anquetil renders the passage thus :—"L'être absorbé dans l'excellence t'a donné, le tems sans bornes t'a donné"—that is : "The being absorbed in excellence has given thee ; time without bounds has given thee." Spiegel, on the other hand, thus translates : Cpënto-Mainyus (*i. e.* Ahura Mazdá) created it ; he created it in endless time." In a note on the passage he says that Anquetil's version, with all the consequences which he and others have deduced from it, is certainly false ; and that the opinion that endless time is in the Zendavesta exalted over Hormazd is thus left entirely without support. The views of Spiegel on this question agree with those of Müller, Brockhaus, and Roth ; and it is interesting in this connexion to observe that our modern Pársis in India coincide with them. They have been attacked, however, by Schlottman, in an article in Weber's *Indische Studien*,* and in a commentary on the Book of Job. The latter work I have not seen, but the paper in the *Indische Studien* is now before me. The writer conceives that Zaruán Akaran corresponds with the Semitic *Χρόνος*—a deity found under various names among the ancient Babylonians, Phœnicians, and Arabians. Zaruan answers, according to Schlottman, to the Βῆλος ἀρχαῖος, Ahura Mazdá to the Βῆλος δεύτερος.† These two, he conceives, are not necessarily different : the first and second Bel are in certain cases identified, and, in like manner, Ahura Mazdá, considered as the absolute, the eternal, is Zaruán Akaran. Spiegel has written a

* Heft I. s. 304.

† This signification of the word Akaran has occasioned a good deal of discussion. Spiegel accedes to the translation of Anquetil, *without bounds*, which corresponds with the Pehlivi rendering, and is the prevalent one among the Pársis now. The objection to this rendering is that the word *kanár* (*boundary*) is not known in Zend. Roth, Brockhaus, and others, prefer the rendering *causeless, uncreated*.

full reply to the criticism by Schlottman.* He contends, with Müller, that in the proper Pársí system there is no place for Zaruán as the supreme deity, and that the dualism of the Pársís is not absolute, a superiority being still retained by Ahura Mazdá. This conception of Zaruán, then, must be later than the original system; and the testimonies of later Greek and Armenian writers on the point, however true regarding the Pársí system prevalent in their own day, do not apply to its earlier form. The existence at a later period of the idea of Zaruán as deified fate or destiny, Spiegel admits, as also the resemblance between this conception and the Babylonian one. The question then arises—Did the Pársís obtain the conception from their Babylonian neighbours? Possibly so; but we cannot pronounce positively,—the conception may have occurred spontaneously to the Pársís. So Spiegel; but, considering the close connexion between the Pársís and their neighbours on the west,—the Assyrians and Babylonians,—and considering the abundant evidence of the religious influence exerted by the latter two nations on the first, supplied by the recent discoveries of Layard and others, we can hardly hesitate to pronounce the notion of Zaruán not original, but borrowed from Mesopotamia.†

Another point of great importance in the interpretation of the Zendavesta is the doctrine of the resurrection. The doctrine of the resurrection of the body is the general belief of the modern Pársís, unless, perhaps, where, in country districts, their intercourse with Hindus has shaken their confidence in a tenet so much opposed to the prevalent Indian notion. We find the doctrine, also, in the Pársí later books, from the Bundeshne downwards. Anquetil thought he saw it also distinctly enunciated in the Zend books; and on his authority it was for a long time considered an integral portion of the Zoroastrian theology. A polemical use was eagerly made of the supposed fact by various Neologian critics; for example Gesenius, in his commentary on Isaiah xxvi. 9,‡ boldly asserts that the Jews adopted the dogma of the

* Zeitschrift der D. M. G. V. 221.

† A very difficult word, which is generally connected with Zaruán Akaran, viz. *voyi*, is rendered by Anquetil, although with some hesitation, (See on Vendidad, Farg. xix. p. 415, note,) *oiseau*, or *bird*, but is translated by Spiegel *sky*. Schlottman very pertinently refers to the winged figure in a circle that is often seen suspended over the head of the king in Assyrian and Persian monuments. Anquetil's "bird acting on high" certainly bears a remarkable resemblance to this symbol of deity.

‡ "Thy dead men shall live; together with my dead body shall they arise. Awake and sing, ye that dwell in the dust; for thy dew is as the dew of herbs; and the earth shall cast out the dead."—*Authorised English Translation*.

resurrection from the Zoroastrian theology.* M. Burnouf in 1840, in the pages of the *Journal Asiatique*, has discussed with great fullness and precision the meaning of the terms *yavaēcha yavatataēcha*, which Anquetil renders *until the resurrection*, and has proved that they have no such signification, but simply mean *for ever*. Spiegel, in his critical examination of the 19th Fargard of the Vendidad, has occasion to discuss nearly all the terms in which Anquetil finds the doctrine of the resurrection; and the conclusion at which he arrives is in accordance with that of Burnouf. Except for the testimony which Theopompos *perhaps* bears as to its existence, and the occurrence of certain Zend quotations which Spiegel finds in the Bundeshne which seem to bear on the subject, and which at least deserve investigation, we might safely enough assert that the doctrine of the resurrection was unknown before the Sassanian era.†

Spiegel unhappily does not quote the words of Theopompos, but refers to Plutarch, *De Iside et Osiride*, Chap. 47. The edition of Plutarch to which I have access is that of Reiske, (Lipsiæ, 1777,) which does not divide the treatise into chapters. I have carefully searched for the sentiments which Spiegel refers to, but in vain. Theopompos is quoted more than once; but the nearest approximation to the sentiment attributed to him which I can find is the following. Speaking of the final defeat of Ahriman, Ἀρεμάνιος or Ἄδης, he says it is the opinion of the Magi τὸν μὲν ἀνθρώπους εὐδαίμονας ἕσεσθαι μήτε τροφῆς δεομένους, μήτε σκιᾶν ποιούντας—i. e. "Men will then be happy, neither requiring food, nor making a shadow." This has nothing to do with the doctrine of a resurrection.

Immediately preceding the quotation from Theopompos, Plutarch says that when Areimanius is destroyed it is believed "the earth will be plain and level, one mode of life and government will prevail, and men will be blessed, and all speak one language." This too is as wide as possible of the doctrine.

With regard to Zend quotations on the subject in the Bundeshne, we shall be happy to see Spiegel's comments upon them; but unless they

* "Die Juden dieses dogma aus der Zoroastrischen theologie annehmen, und an ihre Messianischen vorstellungen anwenden, wofür unsere stelle classisch ist."

† The important term *hakhshâné*, in the 19th Fargard, Sect. 26, which Anquetil renders *resusciter*, or *rise again*, Spiegel renders *auffordern*, or *call forth, summon*.—Theopompos was a contemporary of Alexander the Great. Should his evidence seem to prove the doctrine of the resurrection to have prevailed among the Pársis in his time, we might infer that probably they obtained it from the Jews in the sixth century B. C. But we shall hope to have a full examination of this important matter from Spiegel or some other Continental scholar before long.

can be referred to the Zendavesta proper, their appearance in such a *farrago* as the Bundeshne will prove little or nothing on the point in question. So far as evidence is at present available, the probability is exceedingly strong that the doctrine of the resurrection is of comparatively recent introduction into the Zoroastrian system.

I may take this opportunity of expressing my conviction that our Orientalists are not in general disposed to attribute so much influence to Judaism in the development of the Pársí system as the historical connexion between the Jews and Persians suggests as probable, and even necessary. The wide dissemination of Jews and Jewish opinions throughout the Roman Empire is an admitted fact, and in reference to their influence on the Roman mind Seneca uses the strong language *victoribus victi leges dederunt*.* We have no reason to believe the influence of Judaism in Persia to have been less. Of its powerful action on the mind of Arabia I need not speak.

Another paper from the pen of Spiegel, entitled "The Second Part of the Yaçna, a Contribution to the History of the Text of the Zendavesta,"† is exceedingly interesting, as a vigorous attempt to form some judgment regarding the relative antiquity of the chief portions of the Zend books. As yet we are wholly at a loss to fix anything like a date connected with the Zendavesta. Shall we refer it bodily, with the Pársís, to the age of the mythical Gushtasp? Shall we, with some who still adhere to Vans Kennedy's opinion, make out the whole to be an impudent forgery, committed since the overthrow of the Persian kingdom by the Muhammadans? Or shall we refer the compilation of the Zendavesta to the Sassanian epoch? And, in that case, may not fragments at least of books, composed some centuries earlier, have found a place in the collection? Such questions may be asked, but no satisfactory reply has as yet been possible. In the paper we now refer to, Spiegel mentions that several years ago he pointed out the fact that in the Yaçna we have two distinct dialects, which must be referred to two different ages, or else localities. This opinion has been confirmed by his more recent studies, and the paper now before us gives us the grounds of his belief. We cannot in these pages enter into the grammatical details which he investigates, but the general summary with which he concludes his paper will be read with interest:—

"We are now prepared to attempt an arrangement of the different portions of the Zendavesta in the order of their antiquity. First, we place the second part of the Yaçna, as separated in respect to the

* De Superstitione.

† Indische Studien, I. 303.

language of the Zendavesta, yet not composed by Zoroaster himself, since he is named in the third person ; and indeed everything intimates that neither he nor his disciple Gushtasp was alive. The second place must unquestionably be assigned to the Vendidad. I do not believe that the book was originally composed as it now stands,—it has suffered both earlier and later interpolations ; still, its present form may be traced to a considerable antiquity. The antiquity of the work is proved by its contents, which distinctly show that the sacred literature was not yet completed.

“The case is different with the writings of the last period, among which I reckon the first part of the Yaçna, and the whole of the Yeshts. Among these a theological character is unmistakeable, the separate divinities having their attributes and titles dogmatically fixed.

“Altogether, it is interesting to trace the progress of religion in these Pársi writings. It is a significant fact that in the oldest, that is to say the second part of the Yaçna, nothing is fixed in the doctrine regarding God. In the writings of the second period, that is in the Vendidad, we trace the advance to a theological, and, in its way, mild and scientific system. Out of this, in the last place, there springs the stern and intolerant religion of the Sassanian epoch.

“Closely related to the Persian system in its origin, yet how totally different in its development, has been the religious system of India ! While the Pársis learned to venerate every syllable of their sacred books, we find in India, as soon as theological exposition commenced, an allegorizing spirit busily at work, to fashion anew the old materials which were no longer in accordance with the spirit of the age. Thus, in the course of generations, we find that the old nature-worship of the Vedas has been succeeded by a fantastic system, so utterly unlike the earlier that no one, looking at the later development, could possibly have conjectured the original form.”

Another important work of Spiegel's is a “Grammar of the Parsi Language.”* By the term *Parsi* language Spiegel denotes a dialect that has not hitherto received a name—one intermediate between the Huzvaresh or proper Pehlivi, and the modern Persian. We pass over all grammatical minutiae, and attend to some general characteristics of the language. In an introduction of fifteen pages, our author enters into a discussion of the term *Pá-zend*, which leads to some useful results. There has been considerable doubt as to the real meaning of this frequently-recurring term—some denoting by it a book, others a language.

* Grammatik der Parsi Sprache, nebst Sprachproben von Dr. F. Spiegel. Leipzig : 1851.

That Pá-zend was the name of a book was the view of Hyde, the English scholar who first successfully cultivated the study of the ancient Persian religion. He adopted this opinion from the Arabic and Persian writers with whom he was familiar,—such being the uniform testimony of the Persian lexicon the *Burhán-i-Qáti*, and other eastern authorities. On the other hand, Anquetil, in his great work, and a special treatise on the language of ancient Persia, denominates the oldest language of Persia, and the language of the ancient sacred books, as Zend. He knew that the term was used by the Pársís themselves, and various eastern writers, to designate a book; but this he conceived to be an error. Anquetil, says Spiegel, is mistaken. Recent investigators, such as Burnouf and Müller, hold that the terms Zend and Pá-zend denote books, not languages. Burnouf remarks that the term Zend does not occur in the Zend text. He understands it to be derived from *zantu*, a town, and properly to signify the book of the people, or of the towns,—a sense which he compares with the Indian name, *devanágari*, of the Sanskrit character.

Spiegel is convinced that by the term *Avesta* are properly understood the sacred writings; by *Zend* the commentary, or rather the translation of this; and by the term *Pá-zend* the glosses or annotations on the translation. The signification of *Avesta* is, as shown by Müller in his essay on the Pehlivi, *text*. Spiegel has no etymology of the term Zend which satisfies himself. The Sanskrit seems to afford little aid; and, as the word is of comparatively later origin, he deems it possible that some of the Semitic tongues may yet supply the desideratum.

It may be doubted if the opinion expressed by Spiegel regarding the meaning of the terms Zend and Pá-zend will stand. The usage of our modern Pársís is rather conflicting, and, perhaps, not much can be based upon it. They certainly often apply the term Zend to the language of their sacred books; but the more learned among them apply it primarily to the *character* or *writing* of the sacred books, and hence, secondarily, to the language. By Pá-zend the Pársís seem to understand the *translation* of the sacred text, which is generally interlinear.

In the *Zendavesta*, or, as Spiegel would call it, the *Avesta*, there are three languages: 1st, the so-called *Zénd*; 2nd, the *Huzvaresh*,* or proper Pehlivi; and, 3rd, the language hitherto unnamed, which Spiegel now analyses, and denominates *Parsi*. In the last language are composed various translations and independent pieces,—the *Aferins*, the *Patets*, the translation of *Minokhired*, &c. This dialect is intermediate

* *Huzvaresh*, i. e. *Huzaothra*, *bonum sacrificium*.

between the Pehlivi of the Sassanian epoch and modern Persian, but with nearer relationship to the latter. We may, with probability, refer it to the time that intervened between the conquest of Persia by the Arabs, and the birth of Firdausi. It has been noted that Firdausi writes in the Deri dialect of Persia; and between the Deri and the "Parsi" of Spiegel there is considerable resemblance. Mohl would refer it to the eastern parts of Persia.

But the most important of all Spiegel's labours in Zend literature is his edition of the Zendavesta which is now passing through the press.* The first part, containing, in 112 pages, ten fargards of the Vendidad, is now before me: it is most beautifully got up,—paper and printing do great credit to the Imperial Press of Vienna, from which the work is issued. The original text is to be followed by the Huzvareh (Pehlivi) translation, a copious list of various readings, and a German translation.

We shall be laid under the deepest obligations both to this zealous scholar, and to our learned friend Mr. Westergaard, of Copenhagen, who is also busy engaged in carrying an edition of the Zendavesta through the press, accompanied by what will be a great recommendation to it among our Indian Pársís, an *English* translation. The simultaneous appearance of two translations will be an advantage. So dark a work as the Zendavesta cannot be fully elucidated by the labours of one investigator, however learned and laborious; and the Danish and German critics will profitably be studied together.

Reference has been more than once made in the above pages to the modern Gujarátí translations of the Zendavesta. By far the best known of these is that of Frámjî Aspandíárjî, an edition of which was lithographed by our Society in 1842 and 1843, and copies distributed to the chief colleges and learned societies of Europe. It may be an interesting thing to compare the versions of the 19th Fargard of the Vendidad as given by Anquetil, Spiegel, and Frámjî. I shall here subjoin literal English renderings of the three versions. In translating Frámjî's almost untranslatable Gujarátí, I have had the kind assistance of my learned friend Mr. Dhanjîbhái Frámjî, whose unwearied labours in Zend and Pehlivi literature are well known to the Society, and whose forthcoming work we hail as an important contribution to the elucidation of the subject.

* *Avesta; die Heiligen Schriften der Parsen. Zum ersten Male im Grundtexte sammt der Huzvareh uebersetzung herausgegeben von Dr. Friedrich Spiegel, &c. Leipzig: 1851. (Avesta; the Sacred Writings of the Pársís. Now first edited in the original text, with the Huzvareh version, by Dr. Frederick Spiegel, &c. Leipzig: 1851.)*

I.—*Spiegel's Translation of part of the 19th Fargard of the Vendidad.*

1. From the northern region, from the northern regions, rushed Agra Mainyus, he who is full of death, the Daeva of the Daevas.
2. Thus spoke this malevolent Agra Mainyus, who is full of death :
3. Drukhs ! run, kill the holy Zoroaster.
4. The Drukhs ran round him, the Daeva Buiti, the perishable, the deceiver of mortals.
5. Zoroaster pronounced the prayer Ahuna-vairyas, *Yatha ahu vairyas*, &c. May they praise the good waters of the good creation, and honour the Mazdaçanian law.
6. The Drukhs ran troubled from him, the Daeva Buiti, the perishable, the deceiver of mortals.
7. The Drukhs answered him, [Ahriman,] Tormenting Ahriman !
8. I see not death on him, on the holy Zoroaster.
9. Full of splendour is the holy Zoroaster.
10. Zoroaster saw in spirit : the bad malevolent Daevas consult about my death.
11. Zoroaster raised himself, Zoroaster advanced ;
12. Not injured by Aka-mano's very tormenting questions.
13. Holding darts in his hand—which are of the size of a Kata—the holy Zoroaster ;
14. Which he had received from the Creator, Ahura Mazdá.
15. To hold them on this earth, the wide, round, difficultly-traversed [earth], in great strength, in the dwelling of Pourushaçapa.
16. Zoroaster addressed Agra Mainyus : Malevolent Agra Mainyus !
17. I will slay the creation which has been made by the Daevas ; I will slay the Naçus whom the Daevas have made ;
18. I will slay the Paris to whom they pray (?) until Caoskyaç [viz. the useful] shall be born, the victorious, out of the water Kançaoya.
19. From the eastern region, from the eastern regions,
20. Him answered Agra Mainyus, who has made evil productions :
21. Kill not my productions, oh ! holy Zoroaster !
22. Thou art the son of Pourushaçapa, and hast life from a [mortal] mother.
23. Curse the good Mazdaçanian law, acquire happiness, as Vadhaghna, the ruler of the regions, acquired it.
24. To him rejoined the holy Zoroaster :
25. I will not curse the good Mazdaçanian law—
26. Not though bones, soul, and means of life shall be separated from each other.
27. To him rejoined Agra Mainyus, who has made bad productions :
28. Through whose word wilt thou slay ; through whose word wilt thou destroy ; through whose good weapons, against the productions of me, Agra Mainyus ?
29. To him rejoined the holy Zoroaster :
30. Mortar, shells, homa, and the words which Ahura Mazdá has spoken—
31. These are my best weapons ;
32. Through this word will I slay ; through this word will I destroy ; through these weapons are we victorious, oh ! wicked Agra Mainyus !

33. Cpento Mainyus created it ; he created in endless time.
 34. The Amesha-spenta created it, the good rulers, the wise.

II.—*Frámjī Aspandīrjī's Translation.*

1. From the northern quarter, the northern quarter, ran fast the wicked Mino, full of death, Dev of Devs.
2. Thus said the malevolent, the wicked Mino, full of death : Daruj !
3. Run quickly to injure the holy Zoroaster.
4. The Daruj ran upon him, named But Dev, death, he who walks in secret, the deceiver.
5. Zoroaster loudly prayed the Ahunavar, the pure water was much praised of the Vehedáeti, [according to] the Masdiasnian religion, Faruáráne.
6. The Daruj, distressed, ran away back, the Dev But, of death, he who walks in secret, the deceiver.
7. The Daruj replied to the destroyer, the wicked Mino :
8. Not upon that death do I see Sapetmán Zoroaster.
9. Full of light is holy the Zoroaster.
10. Zoroaster saw in his mind that the Dev, the infidel and malevolent, was asking for his death.
11. Zoroaster stood up—Zoroaster moved forward,
12. To distress the Akuman [by] hard questions.
13. The holy Zoroaster, holding in his hand the excellent [instrument], namely the Noghre,* was in the house ;
14. Received from Dádár Hormazd.
15. That [*quaere*, by which ?] he kept the earth [under his] protection, far away [from the Dev] hard, hard gold,† in the house of Pouroshasp.
16. Zoroaster quickly rose‡ [on] the wicked Mino, the malevolent, wicked Mino :
17. Let me kill the creation of the Dev, given, let me kill Nasas, given by the Dev ;
18. Let me kill the worshippers of the Paris, for [they are] idolaters, for soon will be born the beneficial, the successful, from the water Keáns.§
19. From the eastern quarter, from the eastern quarter,
20. Replied the malevolent, wicked Mino :

* A stick with nine knots.

† This seems nonsense. The commentary slurs over the difficulty, and says nothing of *gold*.

‡ This sense is so much out of place, that perhaps there is an error of transcription.

§ "Let me kill the respecters of the Paris, and the idolater, that is, the worshipper of images, and let my disciples also kill you, and afterwards the victorious and beneficial will arrive from the river Kánsé : he too will kill you, that is my sons Hoshedar, and Hoshedar-maha, and Sosioesh. These three sons will be born from the river Kánsé, and they shall kill you for your own deeds, they shall kill you for your actions."

The above is Frámjī's commentary on Sects. 18, 19. The passage is important, as connected with Pársī eschatology. The foolish and disgusting tale told in the later books regarding the three sons of Zoroaster who are still unborn will be seen in Anquetil's *Zendavesta*, Tom. I. Part 2, p. 46 ; and Tom. II. p. 420. Frámjī evidently refers to it in the above comment ; but his literal version is pretty correct. Anquetil's version (see below) is a commentary, not a translation.

21. Do not kill my creatures, holy Zoroaster.
22. Thou art son born from Pouroshasp.
23. Abandon the excellent Masdiasnian religion, and attain virtue, like Zoliák, the king.
24. Said to him in reply Sapetmán Zoroaster :
25. I will not abandon the excellent Masdiasnian religion ;
26. Not while I have body, and soul, and life, will I turn (apostatize).
27. Said to him in reply the malevolent, wicked Mino :
28. By what word wilt thou destroy ; by what word wilt thou remove ; by what excellent instrument [wilt thou destroy] the creation of me, wicked Mino ?
29. Replied to him Sapetmán Zoroaster :
30. By havanim, tasto,* haom, and the word spoken by Hormazd.
31. My instrument is excellent, (high).
32. (By) this word I will throw off, by this word I will force [you] to retire, by this instrument made holy, oh ! malevolent, wicked Mino !
33. Given by Sapena Mino ; given by† boundless time, (Zamána Akanár).
34. Given by the excellent Amshaspands, pure masters, givers of purity.

III.—*Anquetil's Translation.*

1. It is from the north quarter, various places which are to the north, that Ahriman, full of death, that chief of the Dews, runs.
2. He runs continually, that Ahriman, full of death, master of the bad law.
3. That Daruj runs over the world, and ravages it, oh ! pure Zoroaster !
4. That Daruj goes everywhere : it is he that is the Dew, author of evils, who ravages, torments, and teaches the bad law.
5. (In the commencement) I pronounced the Honover, oh ! Zoroaster (saying) : It is the desire of Ormusd, &c. I made izeshne to the pure water, which has been given pure : I practised the law of the Mazdeiesnans.
6. That Daruj, enfeebled and without force, (*sans forces*,) returned behind, he who is the Dew, author of evils, who ravages, and teaches the bad law.
- 7, 8. That Daruj, that proud Ahriman, wished to answer me.
9. He had not seen, oh ! Sapetmán Zoroaster, the holy Zoroaster full of glory.
10. That infernal Dew, author of the bad law, saw in thought Zoroaster, and was annihilated by it.
- 11, 12. (He saw) that Zoroaster would have the superiority, and would march with a victorious pace ; he saw that cruel Akuman, the source of evils, would be destroyed.
13. He who has long arms, and an extended body, oh ! holy Zoroaster !
14. Without having regard to the great Ormusd, the just judge,
15. (Traversed) the extended earth, ran over its length and breadth, and after having passed (like) a bridge which extends far along, he went into the strong place which Poroshasp (inhabited).
16. Zoroaster was stronger than Ahriman, that Ahriman, author of the bad law.
17. He struck the people given by that Dew, he struck (the Daruj) Nesosh, given by that Dew.

* Figures of these sacrificial vessels will be found in Anquetil's Zendavesta, Tom. II. p. 533 ; and the Rev. Dr. Wilson's "Pársi Religion," p. 231.

† In his translation Fránjí makes this *to* ; in his commentary *by*.

18. The Paris and their designs shall be destroyed by him who will spring from the fountain, by Sosioesh the conqueror, (who will arise) from the water Kansé.
19. By Osheder (bami), and by Osheder (mah), who (will come) from the quarter (where is the water Kansé).
20. Then Ahriman, master of the bad law, said :
21. Destroy not my people, oh ! pure Zoroaster !
22. You, son of Poroshasp, who art born of her who has borne you.
23. The pure law of the Mazdeiesnans shall be practised (in the world) when the pure chief of the provinces shall appear.
24. I answered him, oh ! Sapetmán Zoroaster :
25. If thou do not embrace the pure law of the Mazdeiesnans,
26. The bones, the soul, the members (of thy productions) shall not grow again.
27. Ahriman, that master of the bad law, said to me on that :
28. What is that word which is to give life to my people, which is to increase it, if I regard it with respect, if I make vows with that word ?
29. I answered him, oh ! Sapetmán Zoroaster :
30. Pronounce the word of Ormusd, with the hávan, with the salvers, and with the hom.
31. It is I who (by that word) augment Behesht.
32. It is in regarding that word with respect, in making vows with that word, that thou shalt have life and happiness, Ahriman, master of the bad law.
33. The being absorbed in excellence has given thee, time without bounds has given thee.
34. He has also given with greatness the Amshaspands, who are pure productions and holy kings.

It will be seen, from a comparison of the above three versions, that the German Professor and the Pársí Dastur, on the whole, well agree with each other, while the French rendering deviates so widely from both, as seldom to present the same sense as theirs throughout a single sentence. The explanation of the coincidence between Spiegel and Frámjî is that both are nearly correct in their understanding of the Zend, and both attach much importance to the Pehlivi version. Anquetil's deviations, on the other hand, are as inexplicable as they are capricious.

These remarks are lengthening out more than I desired, and I shall say less than I once intended on our modern Pársí versions.

1. The one of greatest importance is that of Frámjî Aspandíárjî. In the preface to the work it is mentioned that it was compiled at the request of the late Frámjî Cawasjî, Esq., a man whose name stands honourably distinguished among the Pársis both for philanthropy and enlightenment. The translation was commenced in 1823, and finished in 1825. The translator followed chiefly the Pehlivi version. The work contains the Zend text written in Gujarátî characters, an inter-linear literal version into Gujarátî, and a freer rendering, more a com-

mentary than a version. When it was finished it was submitted for revision to four learned Pársí Dasturs, viz. Mulla Firuz, (the well-known Editor of the *Desatir*, and a man highly complimented by Sir John Malcolm,) Edaljí Dárábjí Sanjána, Jamshidjí Edaljí, and Jámásjí Edaljí. Meetings were held by three of the Dasturs now mentioned, for the purpose of examining the work—Edaljí Dárábjí for some cause or other absenting himself. The translation was revised, and, when approved, manuscript copies were made, and to some small extent circulated in the Pársí community.

Disputes connected with the calculation of time have run high among the Pársís; and although Frámjí Aspandíarjí personally belonged to the Rasamí party, his patron was the leader of the other; and for this reason, as many Pársís say, his work has been violently attacked by one party. When a proposal was recently submitted to our Society at the request of Dr. Graul, of Leipsic, in which Dr. Brockhaus (of whose valuable labours in Zend investigation we have spoken above) was understood to concur, that Frámjí's version should be rendered into English, strong remonstrances were made by some of the Pársí community against the translating of "an erroneous book." Unhappily, while declaiming against its errors, they have substituted nothing better in its place.

2. It was indeed asserted that a translation of the Zendavesta had been made by Edaljí Dárábjí Sanjána. A manuscript copy of this was actually exhibited to the Society, which contained four fargards of the Vendidad, the whole very carefully written out, and containing the Zend original in its own character, the Pehlivi version in its character, and a Gujarátí version, with occasional notes. If the entire Zendavesta, or even the entire Vendidad, has been completed in the same style, the work would be most valuable; and the Pársí Panchayet, to whom it is understood to belong, certainly owe it to their own character to render the book accessible. Why should not some Pársí *millionaire* publish an edition of it?

3. Edaljí Dárábjí Sanjána published in 1811 an edition of the Khurdah Avesta, the Zend in Gujarátí characters, and accompanied by a Gujarátí version, 12mo. pp. 799. A second edition of this work, enlarged, 8vo. pp. 338, appeared in 1845.

4. The Herbad Edaljí Dastur Dárábjí Asájí published in 1833 the Avá Yast, Zend in Gujarátí characters, with a Gujarátí version, 8vo. pp. 234.

5. Aspandíarjí Frámjí, the son of Frámjí Aspandíarjí, published

in 1849 an edition of the *Yaçna*, *Zend* in Gujarátí characters, with a Gujarátí version, quarto, pp. 383.

We shall, however, soon have the pleasure of receiving the English translation of Professor Westergaard, and the German one by Professor Spiegel; and the cause of Oriental investigation will not greatly suffer even though the labours of such learned men as Edaljí Dárábjí should by a most mistaken policy continue to be withheld from the public. The mystic oracle, long silent, will soon be vocal, and even intelligible. Should such men as Westergaard and Spiegel read these lines, they will accept of our thanks for the great work they are performing. Their labours have a far higher than an antiquarian, a philological, or a philosophic value. In the present condition of the Pársí community they will exert a practical influence of a most important character; they will powerfully tend to recall to consciousness the slumbering mind of an interesting race,—the remnant of a once mighty and influential people,—lead them to reflection on the most momentous and arousing of all questions, and thus co-operate with still higher agencies in giving freedom to intellectual and moral energies which have been for ages enslaved.

ART. III.—*On the conflicting views of European Scholars as to the Races inhabiting Polynesia, and the Indian Archipelago; and as to the Languages spoken by them.* By the Hon'ble Sir ERSKINE PERRY, President.

Presented 1st May 1852.

THE receipt of a work from England by my relative Mr. John Crawford,* which has probably not been yet seen by my colleagues, induces me to bring before the Society the state of a very interesting question, which has been much battled by European Scholars, and on which information may still be gathered in the East, viz. as to the races of mankind, and the languages spoken, in Polynesia and the Indian Archipelago. It is well known that over that vast region of the earth's surface, extending from what may be called, generally, the East Coast of Africa on the one hand, to the West Coast of America on the other, but more definitely from Madagascar to Easter Island in the Pacific Ocean, and from Formosa, on the coast of China, to New Zealand, including the Indian Archipelago, the Nicobars and Andamans in the Bay of Bengal, and the Maldives and Laccadives on the Malabar Coast, two races of men, distinctly severed from each other by a marked variance of colour, exist. In some of the innumerable islands scattered over this vast region, the brown race is to be found exclusively, in others the black race, while in certain localities the blacks are to be found driven into the rugged and wild interior, and the brown race is in occupation of the coast, and of the choicer parts of the territory. An example very near at hand of this distribution may be seen in the Nicobars and Andamans, the former† of which is occupied by the brown, the latter by the black race exclusively, and also in the Malacca peninsula, where the Negroes are to be found only in the mountainous interior.

* Grammar and Dictionary of the Malay Language, with a Preliminary Dissertation. 2 vols. 8vo. 1852.

† I saw a notice in a Calcutta newspaper within the last two or three years of a black race as inhabiting the Nicobars also, but I have lost the reference.

Amongst all these tribes a very well established connection between their languages has been detected, which the judicious Marsden was the first to point out in detail, and which he, as well as Crawford, considered to have originated in a great Polynesian language of some extinct race. But since the publication of the remarkable posthumous work of William von Humboldt on the Kawi language of Java,* the generally received opinion has been that the brown races at least, as well of the Archipelago as of the innumerable islands of the Pacific, and the different languages they speak, are all identical in origin. That distinguished philologist gives such an interesting view of his theory in his preliminary dissertation "*On the Varieties of Human Language, and its Influence on the Mental Development of Mankind,*" that I am tempted to make a long extract from a translation I had prepared for an educational purpose; but, as the matter is deeply interesting to Indian scholars, and the work has not yet appeared in an English dress, I trust that the Society will not deem it unsuitable for this place:—

"The races of Malay origin, with respect to locality, government, history, and, above all, language, are perhaps more singularly connected with races of different cultivation than any other people in the world. They inhabit only islands and island groups, but these extend over so wide a range as to afford unmistakable testimony to their early acquaintance with navigation. Their settlement on the Continent at Malacca scarcely deserves to be mentioned here, as it is of modern date, and proceeded from Sumatra, and that on the coasts of the China Sea, and of the Gulf of Siam, at Champa, was a still later occurrence. With these exceptions, we are unable to trace, with any certainty, even in the most remote history, the existence of Malays on the mainland. If from these races we separate those who in a strict sense deserve the name of Malays, and who, according to undeniable grammatical researches, speak closely allied tongues, easily intelligible to one another, we shall find them settled (only mentioning those points where the inquiry into languages has had sufficient materials to work on) in the Philippines,—where the language is to be found in the richest development of forms, and in its most original condition,—in Java, Sumatra, Malacca, and Madagascar. A large number of words, however, of unquestionable relationship, and even the names of a considerable number of islands, betoken that the islands in the neighbourhood of the above localities are peopled by a similar race, and that even the more strictly so-called Malay language extends itself over all that portion of the South Pacific

* Ueber die Kawi-Sprache auf der Insel Java nebst einer Einleitung, &c. 3 vols. 4to. Berlin: 1838-39.

which reaches from the Philippines southerly to the West Coast of New Guinea, and, more westerly, to the chain of islands which joins the eastern point of Java, and runs up between Java and Sumatra to the Straits of Malacca. It is a matter for regret that the large islands of Borneo and Celebes, to which probably all that has been said above may apply, have not yet had their languages sufficiently examined to allow of any conclusion being drawn on grammatical grounds.

“To the eastward of the zone here drawn of the pure Malay language, from New Zealand to Easter Island, thence northerly to the Sandwich Islands, and then back again westwards to the Philippines, a race of islanders is to be found, who display most unquestionable traces of an old connection in blood with the Malays. This is proved by the number of similar words, and essential coincidences of physical structure, in the languages whose grammar we know intimately, such as those of New Zealand, Tahiti, the Sandwich Islands, and Tongu. A like similarity is to be found in manners and customs, especially where pure Malay customs are recognisable, unaltered by Indian usages. Whether the races to the north-west in this part of the Pacific belong wholly or in part to the latter division, or to the Malays in the strict sense; or whether they form a connecting link between the two, cannot yet be decided with our present materials, as even the researches which have been set on foot with respect to the language of the Mariana Group have not yet been made public. The whole of these races possess social institutions sufficiently complicated to make it improper to exclude them wholly from the class of civilized nations. They have a well-established, and by no means simple system of government, of religious doctrines, and of usages, and some of them possess a species of spiritual government; they display skill in various arts, and are bold and experienced seamen. We find amongst them in several spots the remains of a sacred language, unintelligible even to themselves, and their custom of recalling formally obsolete expressions into life on certain occasions speaks not only to the richness, age, and depth of the language, but also to their powers of observation as to the effect of time in modifying circumstances. With all this they allowed, and still partly allow, barbarous practises inconsistent with civilization.* They appear never to have acquired the art of writing, and, consequently, are deprived of all that literature which is founded upon it, although they are by no means wanting in fanciful legends, impressive eloquence,

* Mr. Crawford mentions a somewhat cultivated race in Sumatra, well acquainted with letters, who appear to be the only literary cannibals recorded in history.—
E. P.

and poetry in defined rythmical cadence. Their languages, however, have not sprung out of any corruption or change of the Malay tongue of the narrower zone, but we may rather trace in them an unformed and original condition of the latter.

“ Along with the race thus described in the two divisions of the Great Southern Archipelago, we meet, on some of the islands, with people who, from their appearance, must be attributed to a wholly different stock. Both the Malays in the stricter sense, and the more eastern inhabitants of the South Sea, belong without doubt to the same human family, and they form, if one makes an accurate division by colours, the class passing from the light browns into white. The races of whom we are now speaking approximate, by their black skin, occasionally by their woolly frizzled hair, and by their peculiar features and build, to the African Negro, although, according to the most trustworthy evidence, they are nevertheless essentially different, and can by no means be considered as the same race. Writers on these countries, in order to distinguish them from Negroes, call them either Negritoes or Austral-Negroes, and but few of them exist. Both in the islands inhabited by the Malay races, and in the Philippines, they usually occupy the middle of the island, and inaccessible hills, to which they appear to have been gradually driven by the more numerous and powerful white race. We must carefully, however, distinguish them from the Haraforas, or Alfuris, the Turajos of Celebes, who are to be found in Borneo, Celebes, the Moluccas, Mindenao, and some other islands. These latter appear to have been driven out in a similar manner by their neighbours, but belong to the light brown race; and Marsden attributes their disappearance from the coast to Mahomedan persecution. In wildness they approximate to the black race, and they constitute a population of uniformly low development. Other islands, amongst which are some large ones, like New Guinea, New Britain, New Zealand, and some of the Hebrides, contain these Negro races only, and the inhabitants of the large continents of New Holland and Van Dieman's Land, so far as there has been hitherto opportunity of becoming acquainted with them, belong to the same race. But although this race in all the localities here indicated displays general marks of similarity and relationship, it is by no means thoroughly established how far essential differences of race exist among them, for their language has not yet been investigated so as to satisfy the exigencies of a thorough grammatical inquiry. We have only the materials collected by the Missionary Trelkeld as to one race in New South Wales, by which we are enabled to form any judgment as to its organic and grammatical

structure. The race everywhere distinguishes itself by a greater wildness and barbarism than appears in the lighter races; and the differences herein relate solely to their greater or less intercourse with the latter. The inhabitants of New Holland and Van Dieman's Land appear to stand on the lowest grade of civilization which has ever yet been occupied by mankind. It is a remarkable phenomenon to meet, even on the peninsula of Malacca, the light and dark races in contact with one another, for the Semangs, who occupy part of the mountain range of that country, are by most unquestionable testimony a woolly-haired Negrito race. As this is the only point of the mainland of Asia where the fact occurs, it is unquestionable that immigration must have taken place here at a comparatively recent period.* Among the lighter races, also, as the Malay expression *orang benna* (men of the country) appears to prove, more than one immigration seems to have occurred. Both occurrences only show, therefore, that the same kind of connection between countries at different periods brings about similar historical facts, and, consequently, to this extent there is nothing remarkable in them. In reference to the state of culture of the different races of mankind in this Archipelago, however, any explanation by means of colonization becomes deceptive. To enterprising nations, the sea offers rather a means of easy connection than of distinct separation, and the general diffusion of bold active seamen, like the Malays, explains itself in this way by short trips from island to island, sometimes intentionally made, and sometimes by their being driven away through the violence of the prevailing winds; for activity, expertness, and knowledge of sea-craft, are not characteristics of the proper Malay only, but are to be found amongst the whole of the light brown race. I need only mention here the Bugis of Celebes, and the South Sea Islanders. But if this description of the Negritoes, and of their diffusion from New Holland to the Philippines, and from New Guinea to the Andamans, is correct, these races must have deteriorated more than is usually supposed from a more civilized condition, and have become wild. Their present condition rather favours the hypothesis, which is not in itself improbable, of revolutions of nature, old traditions of which still exist in Java, by which a populous continent

* Yet it is strange that Herodotus records amongst the ranks of Xerxes' army a Negro race from India, who appear to have been brigaded with the Hindus, and who, says the father of history, were only distinguished from the African Negro by their language, and by not having woolly hair. See Lassen's *Altarthumskunde*, vol. 1. where he points out other evidence of an aboriginal black race in India; and the subject seems worth pursuing.—E. P.

became broken up into the present island groups. Men, like ruins, might, so far as mankind could survive such convulsions, have remained on the scattered island tops. Both of these explanations, perhaps, if united, so as to consider the dislocation by the powers of nature as occurring during a lapse of centuries, and distinguished from the connection through human colonization, might perhaps afford us some sort of account of the various races which now appear.

“Tanna, one of the Hebrides, but a word of Malay origin, New Caledonia, Timor, Ende, and some other islands, possess a population which is left doubtful after inquiry whether we are to reckon it, with Crawford, as a third race, or, with Marsden, as a mixture of the two others; for the inhabitants, in their physical make, woolliness of hair, and colour of skin, occupy a middle place between the light brown and black races. If, at the same time, a similar affirmation can be made as to their language, this circumstance would tell authoritatively for their being a mixed race. There still remains an important question, but one very difficult to decide from the materials at hand, viz. how far older and more intimate mixtures of the white and black races have occurred in these countries, and how far gradual changes may thereupon have ensued in language, and even in colour and growth of hair, the woolliness of which, moreover, in some localities, is cultivated as an ornament. To judge correctly of the Negro races in their pure form, we must always commence with the inhabitants of the Great Southern Continent, as between these and the brown races no direct contact is conceivable, and according to their present condition it is difficult to suppose any kind even of indirect connection. The remarkable fact still remains, that many words in the languages of these races, although we certainly possess only a few of them, bear an evident likeness to the words of the South Sea Islands.

“Amid these geographical relations, in some instances amounting to close neighbourhood, certain Malay races adopted Indian civilization to such an extent that perhaps no similar example is to be found of a nation undergoing such a complete infusion of the national spirit of another race, without losing its own independence. The phenomenon as a whole is very intelligible. A large part of the Archipelago, and the most attractive from its climate and fertility, lay at a very short distance from the great continent of India—opportunities and points of contact were consequently abundant. But where such occurred, the preponderating influence of a civilization so ancient, and so diffused through every branch of human activity as the Hindu, could not fail to attract towards it other nations of active and impressionable temperaments.

This was rather a moral than a political revolution. We recognise it in its consequences in the Hindu elements, which undeniably present themselves to view in a certain range of Malay races; but how did this mixture arise? On this point, even amongst the Malays, as we shall see, nothing but obscure and doubtful traditions exist. If inroads of powerful races and extensive conquests had produced this state of things, clearer traces of such political events would have been preserved. Intellectual and moral causes work, like nature herself, in silence, and their operation is similar to the growth of a seed, eluding observation. The *modus operandi* in which Hinduism struck root amongst the Malay races proves that as a mental spring of action it excited the imagination, and became powerful through the impressions of wonder which it produced in races susceptible of culture. In India itself, so far as I know, we find no mention of the South-eastern Archipelago in Hindu history or literature. Even if Lanka were perhaps considered to extend further than the limits of Ceylon, this was only dark and uncertain surmising, or mere poetical license. From the Archipelago itself, on the other hand, as we may well conceive, nothing proceeded which could have any influence on the mainland. It was India that exerted a substantial influence, and perhaps even by colonization, which was not intended to keep the mother country in view as a home, or to preserve relations with it. Reasons for establishing settlements might be various. How far Buddhist persecution might have co-operated I shall have to discuss hereafter.

“But to explain properly the mixture of Malay and Hindu elements, and the influence of India on the whole of the Indian Archipelago, we must discriminate between its different modes of operation, and thereby commence with that which, early as it may have began, has continued to the latest times, and consequently has left the clearest and most indelible traces. It is not only the influence of a spoken foreign language which in this case, as in all mixtures of nations, operates powerfully, but also the whole of the mental culture which springs out of it. This phenomenon is unquestionably apparent in the introduction of Indian language, literature, myths, and religious philosophy into Java. The whole purport of the following work is to discuss this question, but principally with reference to language,—I therefore must content myself here with this mere allusion. This species of influence affected only the Indian Archipelago, properly so called, and the Malay zone in its stricter sense; but possibly not even the whole of the latter, and certainly not to an equal extent. The focus was so undoubtedly Java, that we may reasonably doubt whether that island was not the

immediate source from which it extended itself over the rest of the Archipelago. Independent of Java, we find, however, distinct and complete proofs of Indian civilization amongst the proper Malays and Bugis of Celebes. A true literature, from the essential elements of the formation of language, is only capable of existing contemporaneously with a written character which is in daily use. It is an important fact, therefore, for the mental development of the South-eastern Archipelago, that just that portion of the island group which has been designated as strictly Malay possesses an alphabetic character. A distinction not to be overlooked, however, here occurs. The alphabetic character in this part of the world is Indian. This arose naturally from the intellectual relations of these countries, and is visible in most of their alphabets, with the exception perhaps of the Bugis, in the similarity of the letters, not to mention their arrangement to designate sounds, which undoubtedly does not furnish any decisive proof, as it might have been adopted subsequently to a foreign alphabet. Nevertheless, a complete similarity, with merely an adaptation to the simpler phonetic system of the indigenous tongues, occurs only in Java, and perhaps at Sumatra. The character of the Tagalis and of the Bugis is so different, that it may be regarded as an example of alphabetic invention. In Madagascar the Arabic character has planted itself, as the Indian has done in the centre of the Archipelago. At what period this occurred is uncertain. And there does not appear to be any trace of an original character which it displaced. The use of the Arabic character amongst the Malays proper decides nothing as to their intellectual relations, which we are now discussing, for it is notoriously a modern introduction. I have already mentioned the total want of all writing in the South Sea Islands, and amongst the woolly-haired races. The traces of Hinduism which we have here in sight are so distinct that we may recognise them everywhere without difficulty, and we can distinguish them as foreign elements. No true intermixture or amalgamation is here discernible, but a mere mosaic union of foreign and native. So far as relates to manners and customs, we may clearly recognise in Indian antiquity the foreign words in the Sanskrit descended to us, and which have not entirely lost their grammatical forms: we may even discover the laws which governed the transplantation of foreign elements of speech into a native soil. This is the foundation of the cultivated and poetic language of Java, and is closely connected with the introduction of literature and religion. All that has been said above undoubtedly has not operated with the language of the people, and still less can it be affirmed, that merely because Indian words are to be found in it they

were introduced in a similar manner. In thus tracing minutely the operations of the different modes of Indian influence, two deeply-seated questions arise, suggested by actual phenomena, but which are extremely difficult to answer accurately, viz. whether the whole of the civilization of the Archipelago is traceable to an Indian origin; and whether, from a period anterior to the rise of literature, and to the last and most complete development of the language, any connection existed between the Malay and Sanskrit languages, which is still capable of being traced in the social elements of speech?

“I am inclined to answer the former of these questions in the negative. It appears to me to be made out that the brown race had an original civilization of their own. It is still to be found in the Eastern portion, and is not altogether unrecognizable in Java. It may, indeed, be said, that the population of the Archipelago principally issued from its centre, where the influence of India was most powerful, and extended itself thence towards the east, so that the distinct Hindu element becomes more diluted at each extremity. This proposition, however, is supported, less by any distinct similarity than by remarkable coincidences in manners, which have nothing specially Indian to distinguish them, amongst the races of the central and eastern parts of the Archipelago. One sees also no reason why we should deny to a race like the Malay a self-developed civilization, in whatever subsequent direction the march of population, and their gradual culture may have been. A proof is even afforded by the readiness of the different tribes belonging to the race to adopt the Hinduism imported among them, and, still further, by the manner in which they still retain the indigenous element, and scarcely ever allow its peculiar form to merge in the Indian. The contrary would have happened if these races had been wild, uncultivated savages, when Indian colonization first came in contact with them. When I speak here of Hindus, I of course only mean people speaking the Sanskrit language, and not the inhabitants of the continent of India generally. How far the one race came in contact with, and was, perhaps, driven out by the other, I do not now enter upon, as my purpose is only to show the different elements of civilization by which the Malay races were influenced.

“The second question, which alone relates to language, must, I conceive, be answered in the affirmative. In this respect the limits of Hindu influence have a wider range. Without mentioning the Tagali, which contains a tolerable number of Sanskrit words, with completely different meanings, there are to be found, even in the languages of Madagascar and the South Sea Islands, both words and sounds belonging

to the Sanskrit, and in such an elementary part of speech as the pronoun ; and even the modes of change of sound, which may be looked upon as a good comparative test of the period of introduction, are different in the languages of the narrower Malay zone, in which, as in the Javanese, it is notorious that the influences of Hindu literature and language displayed themselves at a much later period. It becomes, therefore, a matter of great difficulty to explain this phenomenon, and to ascertain what reciprocal operation these two great families of languages have on one another. At the end of this essay I will return to the subject, as it is sufficient for me here to call attention to the influence of Sanskrit on the Malay languages, which appears to be distinct from the subsequently introduced mental cultivation and literature, and to belong to a much earlier period, and to different connections between the two races. I shall subsequently touch on the languages of the Negro races, but must make the preliminary remark now, that if in some of these tongues, as in the Papuan of New Guinea for example, similarities with Sanskrit words are to be found, this does not at all prove any immediate connection between India and those islands, as such common words might have been introduced through the commerce of the Malays, just as we see now with Arabic terms.

“On seeking, therefore, to take a general view of the state of the civilization of the great Archipelago, we find the Malay populations to be hemmed in, as it were, between influences and characteristics which are strongly contrasted. On the same islands and island-groups, which still contain races on the lowest level of civilization, or where at all events such tribes once existed, we find a very ancient state of culture, which had borne choice fruits, and which, derived from India, had become indigenus. The Malay races have appropriated this culture, in nearly all its parts, to themselves. Herein they may be perceived to be connected in race with the inhabitants of the South Sea Islands, who, compared to them, may be looked on as savages ; and it is even doubtful whether their language is altogether strange to the Negro races. The South Sea Islanders have kept themselves distinct from those rude races by institutions peculiar to themselves, and by a language which in its present form is quite their own. The population of the Great Archipelago, which, according to our present knowledge, cannot be traced to the continent of Asia, is found in places where all foreign influence must be left out of consideration, in a most rude and savage state, or on the lowest step of civilization. This is especially true if we regard only the Negro races and the South Sea Islanders, and exclude the Malay races, strictly so called, although no very

sufficient ground presents itself for ascribing to these races a much higher station in civilization before Indian influences had operated upon them. We still find, even with the Battas of Sumatra, whose myths and religion display unmistakable traces of Hindu influence, the barbarous custom of cannibalism on certain occasions. The Great Archipelago, however, extends itself along the whole coast-line of Asia, and connects itself with both its extremities, stopped only by Africa on one side, and America on the other. Its centre lies at a considerable distance, so far as navigation is concerned, from the nearest point of the continent of Asia. At different times, therefore, it has been acted upon from the three great focuses of the earliest awakening of the human mind amongst mankind—China, India, and the seat of the Semitic races. It has felt the different influences of all of them at proportionately remote periods. To its earlier progress India alone contributed anything of importance; Arabia nothing, even if we except Madagascar; and China just as little of importance, notwithstanding its early settlements.”

It will be seen by the above extract, that William von Humboldt arrived at the conclusion that the Malay language was the stem from which the various dialects spoken by the brown races inhabiting this vast portion of the globe had branched out. He also thought it an indisputable fact that all these brown races belonged to one family of nations, the Malay;* and in his explanation of the phenomenon of one race, and one universal language, being thus diffused over such a wide surface of the globe, and throughout such distantly severed localities, he appears to have supposed that a great convulsion of nature had occurred, by which a mighty continent had been shattered and overwhelmed, leaving only its mountain tops, with a few survivors clinging to them, to constitute the innumerable isles and islets of what has been so happily termed Polynesia. He also conceived that a clear connection existed between the Sanskrit and Malay languages, prior in time to the subsequent influence which Hinduism had impressed on the Malay language and on Malay civilization through the joint means of commerce and religion; and therefore that in all probability the Malayan tongue belonged to what has been latterly termed the Indo-European family of languages. He would also seem to be of opinion that when increasing knowledge made us more intimately acquainted with the languages of the black races, they also would be found to be closely connected with the Malay. His Editor, Buschmann, carrying out the views of his author still further, announces that he is

* Kawi Sprache, vol. ii. p. 216.

prepared to show in a forthcoming work, by analogous reasoning, that the various languages of America, which even Humboldt thought were distinct, are all closely allied tongues.

The profound philological qualifications which William von Humboldt brought to the investigation of these interesting phenomena are too well known to require remark; but they are well tested in the present inquiry by his demonstration of the true character of the mysterious Kawi language of Java, now obsolete in that island, but still the language of religion and law in the neighbouring island of Bali, where the Brahmanical faith has kept its footing. Sir Stamford Raffles, in his work on Java, considered it to be a foreign language, of unknown origin, imported into that island. Crawford, in his history of the Indian Archipelago, perceived its connection with Javanese, but deemed it to have been merely a written language of the priests. William von Humboldt proved, however, by a thorough scientific analysis, that the language is merely an archaic form of modern Javanese, though plentifully interspersed with Sanskrit terms; and subsequent inquiries have arrived at exactly the same conclusion, though by different premises.

Mr. Crawford, at an early period of his life, whilst in the Company's service, spent twelve years in places where the Malayan and Javanese languages are vernacular; the former portion of the time in the island of Java, under Sir S. Raffles, the latter at Singapore, of which he was the first Resident. At these places he obtained that insight into the vernacular tongues which active Indian administrators are so often seen to acquire, and from his work on the Archipelago, and the rich collections which he made on the spot, it will be observed that Baron William Humboldt derives the principal portion of the materials for the conclusions he draws in the work published after his death in 1838. Indeed, his illustrious brother, Baron Alexander Humboldt, in his preface to the posthumous work I have before mentioned, admits, that without the materials thus freely contributed by Mr. Crawford, the work in question could not have been produced; and the graceful terms in which the gratitude of the two most distinguished scholars of Europe is there expressed, must have been deemed an ample recompense for years of literary toil by him to whom they were addressed.

Mr. Crawford now comes before the world, as he tells us, with a work, which contains the result of labours, spread, though with various interruptions, over more than forty years; and I trust I am not misled by partiality for the author when I state my conviction that the mass of information, and originality of views, condensed in the thin octavo

volume which contains the preliminary dissertation, will awaken in no slight degree the attention of that distinguished school who are prosecuting the study of comparative philology in Continental Europe with an ardour little appreciated in India, and with results tending to throw the greatest light on the most interesting questions connected with the diffusion of the human race.

As the conclusions drawn by Mr. Crawford are diametrically opposed to those of William von Humboldt, it is well to recollect that the two authors come in conflict in different characters—the one a profound scholar, with all the information that the closet and devotion to the study of comparative philology can confer; the other a practical man, with accurate personal knowledge of the localities and of the races, and possessing, what the great Humboldt wanted, an intimate acquaintance with the chief vernacular languages on which the inquiry turns.

Mr. Crawford holds—1st. That there is no foundation for the prevalent idea that, Negroes excepted, all the descriptions of men in the limits I have above described belong to the same race—on the contrary, there are several races.

2nd. He also contends that many of the nations belonging to the same race, for example the Malays and Javanese, speak distinct languages.

3rd. He holds that the black race, the Austral-Negroes, or Negritos, are not identical, and that their languages, like their races, are also distinct.

4th. He admits that the Polynesians speak one very largely diffused language, with dialectic differences, but maintains that it is quite distinct from the Malay.

In order to place the conflicting views of these two writers in closer opposition, it will be well to recapitulate the leading facts, and these are that in all the islands, from Madagascar to Easter Island,—a zone, I may recall to mind, embracing much more than half the circumference of the globe,—an infusion of the Malay language is to be found, with more or less of foreign adjuncts from Sanskrit and Arabic sources. Further, it is indisputable that in many of the insular languages considerable resemblances in grammatical construction and organic formation of sounds may be discovered. According to Humboldt, the Malay language (the purest form of which, he asserts, is now to be found in the Tagala, one of the languages of the Philippines,) is the mother language of this vast affiliation. But as in so widely a diffused family of languages there will be synonymes for very many of the leading ideas, one term being used by one nation, one by another, it may turn

out on comparison of different languages that not very many words are used by different groups in common. Humboldt, therefore, considers that the grammatical construction, and, above all, the accordance of grammatical sounds in two languages, is the most convincing proof of affinity. He lays down, accordingly, the following method, which he prescribes to himself:—

“I therefore shall not confine myself to a comparison of words, but especially address myself to the grammar. It will then appear that these races not only express their ideas in the same manner, but follow the same path in their forms of speech, form their words and construct their sentences with the same sounds, and according to the same laws, and therefore possess concrete grammatical forms, borrowed from one another. A language cannot be looked on as a mere aggregate of words. Every language is a system by which the mind embodies an idea in audible expression. It is the business of a philologist to discover the key to this system.”

Mr. Crawford, on the other hand, objects to both of these tests, viz. the essential identity of a few words, and the supposed similarity of grammatical structure, the latter of which, when applied to languages of remarkably simple forms, such as those under discussion, affords but few salient points for comparison.

“With respect to the test by the identity of words,” Mr. Crawford writes, “it has been imagined by some writers, that when the class of words expressing the first and simplest ideas of mankind are the same in two or more languages, such languages may be considered as derived from the same stock. This certainly does not accord with my experience of the Malayan and Polynesian languages, into which, from the simplicity of their structure, I find that well-sounding foreign words very readily gain admission. Instead of words expressing simple ideas being excluded, I should, on the whole, owing to the familiar and frequent use of the ideas, consider them the most amenable to adoption of any class of words whatsoever. Accordingly, such words will be found either to have supplanted native terms altogether, or to be used as familiar terms along with them. Thus, to give some examples in Malay: the most familiar words for the head, the shoulder, the face, a limb, a hair, a pile, brother, house, elephant, the sun, the day, to speak, to talk, are all Sanskrit.

“In Javanese we have from the same Sanskrit the head, the shoulders, the throat, the hand, the face, father, brother, son, daughter, woman, house, buffalo, elephant; with synonymes for the dog, and hog, the sun, the moon, the sea, and a mountain. In the language of

Bali, the name for the sun in most familiar use is Sanskrit, and a word of the same language is the only one in use for the numeral ten. It is on the same principle that I account for the existence of a similar class of Malayan words in the Tagala of the Philippines, although the whole number of Malayan words does not exceed one-fiftieth part of the language." (The Tagala, it will be recollected, is the language which William von Humboldt indicates as the purest form of Malay.) "In the Maori, or New Zealand, the words forehead, sky, gnat, stone, fruit, to drink, to die, are Malay or Javanese—yet of these two tongues there are not a hundred words in the whole language. As to the personal pronouns, which have often been referred to as evidence of a common tongue, in as far as concerns the language under examination, they are certainly the most interchangeable of words, and cannot possibly be received as evidence. Some of them, for example, are found in the Polynesian dialects, where, in a vocabulary of five thousand words, a hundred Malayan terms do not exist. The numerals must surely be considered as out of the category of early invented words, for they imply a very considerable social advancement, and seem to be just the class of words most likely to be adopted by any savages of tolerable natural capacity. The Australians are not savages of such capacity, and although with the opportunity of borrowing the Malayan numerals, they have not done so, and in their own languages count only as far as 'two.' "

Mr. Crawford then proceeds to submit his own test of a common language, and I subjoin it for the examination of the philologists belonging to our Society, whether in India or on the banks of the Tigris, who are engaged in kindred researches:—

"The words which appear to me most fit to test the unity of languages are those indispensable to their structure; which constitute, as it were, their framework, and without which they cannot be spoken or written. These are the prepositions, which represent the cases of language of complex structure, and the auxiliaries which represent times and moods. If a sentence can be constructed by words of the same origin in two or more languages, such languages may be safely considered as sister tongues—to be, in fact, dialects, or to have sprung from one stock. In applying this test, it is not necessary that the sentence so constructed should be grammatical, or that the parties speaking sister tongues should be intelligible to each other. The languages of the South of Europe can be written with words common to them all, derived from the Latin without the assistance of any of the foreign words which all of them contain. The common stock, therefore,

from which they are derived is Latin, and they are sister tongues. English can be written with great ease with words entirely Anglo-Saxon, and without any French words, although French forms a sixth part of the whole body of its words, but no sentence can be constructed consisting of French words only. The parent stock of our language therefore is not French, nor Latin, but Anglo-Saxon. By this test the Irish and Gaelic are shown to be, virtually, the same language, and the Welsh and Armorican to be sister dialects; but it will not prove that the Welsh and Irish, although they contain many words in common, are the same language, and derived from the same source.

“Applying this test to the Malayan languages, it will be found that a sentence of Malay can be constructed without the assistance of Javanese words, or of Javanese without the assistance of Malay words. Of course either of these two languages can be written or spoken without the least difficulty without a word of Sanskrit or Arabic. The Malay and Javanese, then, although a large proportion of their words be in common, are distinct languages, and as to their Sanskrit and Arabic elements, they are extrinsic and unessential. When the test is applied to the Polynesian languages we find an opposite result. A sentence in the Maori and Tahitian can be written in words common to both, and without the help of one word of the Malayan which they contain, just as a sentence of Welsh or Irish can be constructed without the help of Latin, although of this language they contain at least as large a proportion of words as the Maori or Tahitian do of Malayan. The Maori and Tahitian are therefore essentially the same language, and their Malayan ingredient is extrinsic.”

According to Crawford's view, the Malayan races have diffused themselves, and the civilization which they attained by self-derived culture, from two distinct and independent centres. The Malayan-speaking Malays from the rich table-lands of the interior of Sumatra,—Sumatra, which, from its physical gifts, and large proportion of coast-line abutting on placid seas, would be at once seized on by the geographer as a focus of civilization; and the Javanese-speaking Malays from Java, an island not less richly endowed in physical advantages. The mode in which these races were enabled to come into contact with distant localities, such as Madagascar and the South Sea Islands, is minutely explained by reference to existing facts, and the evidence on this subject is not dissimilar to that collected by Sir Charles Lyell in support of his celebrated theory of geology.

The contact of the Malays with Hinduism is not less satisfactorily explained, and some curious facts connected with the commerce of the

East are brought to light. There is no doubt that a portion of the transit by which the much-prized products of the Spice Islands were conveyed to Rome was conducted by Hindus, and when the Europeans first came in contact with the races of the Archipelago in their own waters, they found an active commerce in existence between the Hindus of the Coromandel Coast and the Malays. Barbosa, a highly intelligent traveller, describing Malacca before its conquest by Albuquerque in 1511, says: "There are here many great merchants, Moors as well as Gentile strangers, but chiefly of the Chetis, who are of the Coromandel Coast, and have large ships, which they call giunchi" (junks). And again: "The merchants of the Coromandel Coast, called Chetis, who dwell among them, (the Malays,) are for the most part corpulent, and go naked from the waist upwards."* Mr. Crawford observes that "the word here given as Chetis there can be little doubt is a misprint for Kling, or Chleng,† which is the local name that would be given to the Hindu traders on the spot." But, with deference to so accurate an observer as Mr. Crawford, it would seem that Barbosa described the Hindu merchant by his own Tamil name; and his accurate description of the Coromandel Chitty, or Banyan, is a picture to the life, such as he may be seen at the present day, and with the same name, at Madras, or in the island of Ceylon.‡ Indeed, the similarity of the term Chitty, or Chetijs as Ramusio writes it, to the word used by the Maráthas in the Deccan, Shetti, to denote the trading classes, points out the common origin of the word in the Sanskrit word *S'restin*, a trader. I may further observe that a large body of evidence will be found collected in Ritter, and which Crawford seems to have overlooked, that tends to show Ceylon to have been the spot, at the commencement of the Christian era and subsequently, where the enterprising seafaring Hindus of Talinga, the Chinese with their heavily-laden junks, and the Arabs from the African Coast, assembled, in order to interchange the products of the East and West.§

* Ramusio, vol. i.—cited by Crawford.

† From Kalinga, which is the term applied by the Malays to denote India, being a corruption of Talinga, from whence the commercial Hindus issued to drive their trade in the Archipelago and elsewhere.

‡ So also Paolini distinguishes the traders of the Coromandel Coast by their native name from the Banyans of the Malabar Coast. Speaking of Cochin, he says: "Gli Ebrei i Baniani e li *Cettis* o Canarini vi hanno molti magazini." Cited by Marsden, *Travels of Marco Polo*, p. 679.

§ For example, Sopater, the friend of Cosmas, found many Chinese junks at Ceylon circa A. D. 560. So Ibn Batuta, A. D. 1340, found thirteen junks at Calicut, waiting for the monsoon to return to China. See Ritter's *Asien*, vol. iv. p. 592; vol. v. p. 28.

It would be tedious here to give the views of Mr. Crawfurd as to the mode in which two limitrophic nations, speaking distinct languages of simple structure, might be led to borrow a similar grammatical structure from one another; but the theory will inevitably remind the reader of the interesting essay of Adam Smith on the formation of language. Nor can I condense the substantial portion of the evidence on which the principal conclusions are founded. But with respect to the Tagala language, on which Humboldt has laid so much stress, as the purest form of the Malay, Crawfurd, after a minute analysis of its grammatical structure, denies wholly its alleged parentage, and gives the following result of a close examination of the 16,482 words in the Tagala Dictionary, published by Father Juan de Nouda :—

Malay and Javanese words.....	399
Sanskrit.....	33
Arabic.....	7
Persian.....	2
Telंगा.....	1

This makes little more than one thirty-eighth part of the language.

I think that the sketch which I have given of the leading views of the two works under discussion may possibly show that the brilliant generalizations of Humboldt are scarcely reconcilable with the facts which the industry of subsequent writers has brought to light. Baron Humboldt, in a passage of noble eloquence in his *Essay on the South Sea Languages*, points out the causes which kept the nations of antiquity and of the middle ages in gloomy isolation. "But," he continues, "if there is any one idea which shines out conspicuously throughout all history in ever-increasing brilliancy,—if there is any idea which tends to prove the much-contested, and still more misunderstood, perfectibility of the human race,—it is the idea of HUMANITY. The endeavour to remove the boundaries which the prejudices and mutually conflicting selfish views of mankind have set up amongst one another, and to consider the whole of the human race, without reference to religion, nation, or colour, as one great family—an organic whole, bent on the attainment of a common end—the free development of its mental powers,—this is the grand and ultimate aim of society; and, at the same time, it contains within itself the true direction of man towards the indefinite development of his being. He looks upon the earth as it lies extended before him; the skies, so far as they are visible; the stars, with their eternal fires; and in his inner mind he considers them as his own, bestowed on him for contemplation and activity. Even as a child he sighs for heaven; to cross the seas; to

pass the limits of his narrow homestead ; and then, again, like a plant, pines for his native soil,—just as all that is animating and beautiful in man, by directing his aspirations either to something longed for, or to something lost, prevents him from being bound up exclusively with the present.”

Grand and animating views like these led the illustrious author to look upon general philology as one of the handmaids by which the nations of the earth might be brought into closer brotherhood, and he gave to the elaboration of the science the better part of his existence. If the generalizations thereby suggested have been too hasty, and if the additional body of facts which have been brought to light by Mr. Crawford and others* demonstrate that the time has not yet arrived for such large and world-comprehensive theories, this conclusion will only accord with the march of science in other departments of knowledge, and will point out, which is the end I desired principally to indicate in the present paper, that the field is still open for inquiry, and that a rich harvest still awaits the patient student and attentive observer amongst the countless tribes of the Indian and Pacific Oceans.

I may, perhaps, add, that I never arise from inquiries of this nature, which, from their union of fact and mystery are to many minds indescribably interesting, without being deeply impressed that the same great fact which the science of geology has indisputably established, viz. the recent appearance of man on the surface of the globe, is equally clearly proved by the study of ethnography, with the addition that the *recency* of the event becomes a chronological date, not one of geology.

* The reader is referred to a very interesting series of papers on the “Ethnology of the Indo-Pacific Islands,” now in the course of publication in the *Journal of the Indian Archipelago*, by its able editor, Dr. Logan.

ART. IV.—*The Theory of the Great Elephanta Cave.* By the
Reverend J. STEVENSON, D.D.

Presented 13th May 1852.

THE CAVES of Elephanta have been so often described, and the last description of them, by Mr. Erskine, in the first volume of the Transactions of the Bombay Literary Society, is so excellent, that it may seem unnecessary to add anything to what has been already written with so much accuracy and detail. But the very excellence of Mr. Erskine's description, especially the minuteness with which he dwells on some particulars, has been one of the causes of my attempting to furnish a sketch, which, taking for granted what he has proved, and omitting what is of inferior moment, might better serve the purpose of the numerous visitors to Elephanta, who are not deeply versed in Hindu lore. At the same time, I am not without hopes of being able to exhibit to the general reader the theory of those interesting excavations, with a greater fulness and simplicity than has hitherto been done.

My literary readers will find in the notes appended some farther observations on the subject, and proofs which could not well be introduced into the narrative, and which will enable them better to judge of the accuracy of the theory of the caves, which, following Mr. Erskine in the general outlines, I have filled up, and illustrated from the Hindu sacred literature.

THE NAME ELEPHANTA.

The name Elephanta has been derived from a stone elephant, having, it would seem, originally a tiger on its shoulders, which stood near the southern landing-place. That figure, after successively losing its different members, crumbled down a few years ago into a mass of ruins, now scarcely distinguishable from the surrounding stones. The name Elephanta is still unknown to most of the uneducated natives, who call the island Gárapurí, (Gahrapooree,)* *i. e.* the Town of Excavations.

* The orthography of the text is the Jonesian; that within parentheses is intended to represent the sound better to the mere English reader.

The caves are called *Lenen*, (*Laina*), a word used throughout India and Ceylon for these artificial grottoes, most probably on account of the first of them being intended for hermitages to Buddhist ascetics.

TIME OF CONSTRUCTION OF THE CAVES.

The time when these caves were excavated can only yet be guessed at, but it is supposed that it must have been some time between the eighth and twelfth centuries of the Christian era. The main reason for this supposition is, that from inscriptions and tablets found in various parts of Southern India, and architectural structures whose age is known, it seems that the religious system to which the carved images and architectural embellishments belong, had not gained much currency before the first mentioned of those eras; and, owing to their conflicts with the Mahomedans, the Hindu Rajas, it is surmised, would not be able to give attention to such works after the last mentioned period. The rock, also, out of which the caves are excavated, being full of rents, the water penetrates through it, and detaches piece after piece from the figures, so as to threaten to destroy them one day altogether. This process, then, it is conjectured, if the caves had been of very ancient date, would by this time have occasioned a greater degree of damage than we find has actually taken place. This damage, since the caves were first described by Niebuhr, has been very considerable, and several Europeans in Bombay can testify that even during the last quarter of a century it has been by no means immaterial.

THE LINGA CHAPEL.

The Great Cave at Elephanta is what the Hindus call a *Siva Linga* (*Sheewa Ling*) Temple, a class of sacred buildings very common in Southern and Central India. Many of the Brahmans in Bombay will not acknowledge its claim to this honor, and the place is now nearly deserted. They, with other natives, maintain that this and all the rest of the excavations around are the works of the sons of *Pandu*, who constructed them while wandering about the country in banishment from their native land. They imagine these excavations works far too mighty for the degenerate mortals of our day, a misconception which it is to be hoped the railway works, now in progress, will soon clear away. The reason why this temple has been deserted may have been the unhealthiness of the island, which, during certain seasons of the year, is very prolific of ague; or perhaps the first Europeans may have desecrated the images, and led the Hindus to abandon them. Although the current tradition that the Portuguese fired into the cave

from the offing, and hauled guns up the hill to its mouth to destroy the idols, is absurd, and could never, even if true, account for the actual damage done, as every visitor may easily satisfy himself; still it is not improbable that they desecrated the place, and that hence arose those popular stories. The Great Cave is nevertheless still visited by Hindus, especially of the Banyan caste, on the great festivals of Siva, and the great Ling is worshipped on these occasions by crowds of devotees.

After entering the Great Cave from the usual entrance on the north, the popular object of worship, which more particularly attracts the devotees above mentioned, is seen about half way up on the right hand, or towards the west of the cave. It is a conical stone called the Ling, and is enclosed in a square chapel with four doors, facing the four principal directions. The Ling is intended to represent Siva in his character of the prolific power of nature. Around this chapel on the outside are a number of large figures, representing door-keepers, who are supposed to be high caste Hindus. They lean on dwarfs, intended I suppose for low caste men, but called by the Hindus Pis'áches, (Peeshachas,) or demons. This, then, is the principal object of popular worship. All the other figures in this excavated temple are to be considered merely as subsidiary to this, and might rather be compared to our historical frescoes in Europe than to anything else. At most they can but be considered analogous to the pictures in churches in Southern Europe, additional to the altar-piece, which receive a degree of homage far inferior to that reserved for the patron saint.

THREE-FACED BUST, OR TRIMURTI.

The chief of the mural figures is the immense three-faced bust, nineteen feet in height, which faces the northern entrance. It is the representation of Siva (Sheewa) in his three-fold character of Brahmá, Vishnu, and Rudra, (Brumma, Vishnoo, and Roodra). The Hindu notion of the deity is, that God is essentially one, but that when the time for the renewal of the world arrives, he causes to emanate from his essence three impersonations of the divinity, one who creates, a second who preserves, and a third who destroys. The three-faced figure, then, called by the Hindus a Trimurti, (Treemoortee,) is intended to represent these three gods, who emanate from the one divinity, and still continue united in him. According to the system of Hinduism followed in these sculptures, the eternal divinity is Siva, in another system it is Vishnu, and in a third the principal goddess of the Hindus. Siva is sometimes represented with five faces, and it has

been surmised that this three-faced bust is intended to represent him in that form, one of the heads being hid behind, and another above. I have seen representations of this five-faced *Síva*, but in those figures part of all the five faces were visible, four arranged round the head, and one peeping out from the crown before the knot of twisted hair. In the other figures, especially that of *Brahmá*, as carved in these caves, a portion of all the faces any being is supposed to have are always represented. We do not, then, need to go to the Greek and Roman representations of the three-faced *Hecate*, as preserved in ancient sculptures, for an illustration of the theory for which we contend, when we find it universally adopted by Hindu artists, and even in these very caves. The bust, then, represents a three-faced god.

The central face—the one that immediately fronts the spectator in this triple bust—is intended for *Síva* in the character of *Brahmá* the Creator. *Brahmá*, again, I have little doubt, is the impersonation of the Brahman caste,—the originator of all the sacred rites and ceremonies of the Hindus. He is represented as an ascetic Brahman, with his characteristic gourd in one hand, to serve for a drinking vessel. The face to the spectator's right, and to the left of the bust, is *Síva* in the form of *Vishnu* the Preserver; he has here his unfailing mark, a full-blown lotus, in his right hand. To the right of the bust, again, or to the spectator's left, *Síva* appears as *Rudra*, *i. e.* the Destroyer, which is generally considered to be his proper character. He is smiling on a cobra capella, which is twisted round his arm, and with expanded hood looking him full in the face. A swelling on his forehead is his third eye, from which is to burst the flame that will consume at last the world. Among the ornaments of his cap are a death's skull, a leaf of the *nirgudi*, and a branch of the *bilva* tree, all peculiar characteristics of this god. The large figures at the portals are Hindu door-keepers, and they lean, as before, on dwarfs, called by the natives *pis'aches*, or demons, probably caricatures of the rude aborigines or hill tribes of the country. (See Note A.)

ARDHANARISHVAR, OR HALF MALE HALF FEMALE DIVINITY.

In the first compartment to the right of the central figure, or to the spectator's left, there is an exhibition of *Síva* (*Sheewa*) in his character of *Ardhanárishvar* (*Arddanahreshwur*). The right half of the figure is intended to be that of a male, and the left that of a female, and thus to represent *Síva* as uniting the two sexes in his one person. The first European visitors supposed this figure to be intended for an Amazon, transferring the traditions of Greece to India. No such being is known,

however, to Indian mythology, while such a manifestation of Siva as we have mentioned is described in the Puráns. The bull on which two of the hands of the figure lean, and on which it is supposed to ride, is called Nandi, (Nundee,) is a constant attendant on Siva. Brahmá, on his lotus throne, supported by five swans, and with his four faces, is exhibited on the right of the figure. He has a portion of all these faces visible. On the left, Vishnu is seen riding on what is now a headless Garuda, (Garoor,) a fabulous creature, half man half eagle. Above and in the back-ground are found a number of inferior gods, and sages of the Hindus, which neither our plan nor their importance will allow us to describe. We may mention, however, that Indra, king of the old gods,—those worshipped in ancient times,—appears there mounted on an elephant.

The porters will be found at the door of the compartment, as before. (See Note B.)

SIVA AND PARVATI.

The visitor must now retrace his steps, and, passing the large image, look to the first compartment on its left, or on the west side of the cave, and he will there see two principal figures, intended to represent Siva and Párvati, (Sheewa and Parwuttee,) the former to the right of the latter. From the head of the male figure the Ganges is represented as flowing, and from its centre three heads are seen to issue, representing Ganga, Yamuna, and Sarasvati, the deified rivers,—Ganges proper, Jumna, and Soorsatee of our maps,—which, when united, form the Ganges of the Lower Provinces, and which is fabled by the Hindus to spring from Siva's head. Siva is thus identified with the Himalaya Mountains, whence the Ganges really flows into Hindostan. (See Note C.)

ANALOGIES SUGGESTED BY THESE THREE COMPARTMENTS.

Unusual as it has become in recent times to trace any connection between the Hindu traditions and the Scripture records, I cannot allow myself to proceed without asking how it is possible for any unbiassed mind not to see in the triple figure an effort of the Hindu intellect grasping at that great doctrine, so diffused throughout the world, of an Unity and Trinity in the Deity. No one who studies the subject carefully will maintain that the Hindu and Christian notions on this subject are indetical; and no one who judges without prejudice can fail to see that there is an analogy between them, which is all that any sound theologian would ever think of maintaining. My own idea in respect to the derivation of this Hindu Triad is, that it had no wide-

spread currency in its present form till about the period above mentioned, —the eighth century of our era; that it was copied from the Buddhist Triad of Buddha, Dharma, and Sanga (Intellect, Virtue and Union); that this philosophical Trinity was derived from the ancient Vedic notion of the three sacrificial fires forming one Agni, or God of Fire—a much nearer approach to the Christian idea than the modern system; and that this, again, was connected with the Egyptian and other primeval traditions.

The half-male half-female figure I consider to be the Hindu way of representing the Adam whom God at first created, and from whose side a rib was separated for the formation of Eve. The third compartment under this notion will be an exhibition of Siva and Párvati as the progenitors of mankind, as they are declared to be in some of the Hindu mythological writings.

THE MARRIAGE OF SIVA AND PARVATI.

To the next compartment the visitor must proceed on in the same direction, still farther to the west, till he has passed the chapel first described, and he will see a group representing the marriage of Siva and Párvati; for, following up the analogy above noticed, the Hindu traditions represent Brahmá the Creator as performing the marriage ceremony, and uniting by a solemn rite the primeval male and female—thus giving a divine sanction to the institution of marriage. It is strange that, after the right idea had been suggested both by Pike and Moor, Mr. Erskine should have “perceived nothing to favour the supposition,” since in this compartment alone does the female stand to the right of the male, a position a Hindu woman rarely occupies, except at her marriage. Like dining with her husband, it is one of the privileges of the wedding-day. Down in the corner, at the right of the female, is Brahmá, known by his four faces, sitting on his hams, and reading or reciting the sacred texts suited to the occasion. Among the attendants on the same side one is represented bearing a vessel, probably supposed to be filled with sugar-plums, and other sweetmeats, as is the custom still in Bombay, and exactly like one I accidentally saw in the streets while writing this paper. Vishnu will be noticed on his man-eagle conveyance on the other side, and in the back-ground a numerous train of inferior gods and goddesses. (See Note D.)

THE BIRTH OF SIVA'S FIRST SON.

The visitor must now retrace his steps a second time, and go to the corresponding compartment in the eastern side of the cave from where

he now is, near the place whence the rubbish was lately cleared away, and the two lions brought to light. There he will again see *Síva* and *Párvati* in the fore-ground, and a little behind them, but somewhat nearer to the latter than to the former, he will observe a female with a child, borne astraddle upon her haunch, in the way little children are usually carried in India. The child is *Vináyaka*, or *Ganesha*, usually in Bombay called *Ganpati*, (*Gunputtee*), and is *Síva's* eldest son. The legends about his birth and infancy greatly vary, and it must suffice us here to say, that although at first possessed of a proper human form, as here represented, he had soon the misfortune to lose his head, and, no better substitute being forthcoming, an elephant's was clapped upon his shoulders, which to this day he has been doomed to wear, and with which he is always represented in the compartments yet to be described. Among the group of figures *Bhringi*, a special favourite and worshipper of *Síva*, reduced almost to a skeleton, is conspicuous, as also *Párvati's* tiger, on which she rides when she goes abroad. (See Note E.)

RAVANA UNDER KAILAS.

The visitor must now turn round his face in the opposite direction, and instead of looking southward, look northward, and, after advancing a few paces, he will come directly in front of the sixth compartment. There is here exhibited a group representing *Rávana*, (*Rahwun*), king of Lanka or Ceylon, as well as of all India south of the *Nerbudda*, under *Kailás*, the heavenly hill of *Síva*, while *Síva* and his attendants are sitting above. *Rávana*, it will be observed, has ten heads, and, as the legend goes, he had got under the hill for the purpose of carrying it off to Ceylon, and thus keeping *Síva* all to himself, and protecting himself against *Ráma*, by whom he was at last slain. *Párvati*, having in alarm cried out that the hill was shaking, *Síva* raises up his leg as here represented, and firmly fixes down *Rávana* between heaven and earth, where he remains ten thousand years, till, taught by his grandfather to propitiate the god, he is at last released; and after which he continues, notwithstanding all his crimes, a devoted worshipper of *Síva*. *Rávana* I suppose to be the type of the rude aborigines who inhabited India before the Brahmans and high caste Hindus from the north invaded the country. The moral taught in this compartment, then, is *Síva's* power over these rude aborigines, and their devotion to his worship.

DAKSHA'S SACRIFICE DESTROYED.

To follow out the theory of the cave systematically, it is necessary for the visitor once more to cross to the opposite side, and, passing the

Linga Chapel, place himself before the corresponding compartment on the west. The legend referred to in this sculpture is one very famous in Hindu mythology. It is represented at Ellora twice, and once or twice in the caves near Amboli, in Salsette. Daksha, (Duksh,) the patriarch of the high caste Hindus, had begun to perform a sacrifice, according to the ancient Vedic ritual, and to which all the gods that should be worshipped according to the Vedas were invited. Síva and his wife did not belong to that number, and of course were not asked to attend. At this the lady took sore offence, and excited her husband to assume the form of Víra Bhadra, (Veer Buddha,) here occupying the principal place in the tableaux, for the purpose of spoiling the sacrifice, and dispersing the attendants. One of the hands of the god has seized Daksha's coronal tuft of hair, another is holding a vessel to catch his blood, and a third is wielding an immense sword, with which he is about to cut off his head. The head was hacked to pieces and burnt, and when Síva's wrath was afterwards appeased, the goat or ram's head that had been sacrificed was made to supply its place, thus keeping him ever mindful of the might of Síva, and of the offence he had committed against it.

The rest of the gods, among whom Indra, sitting on his elephant, is conspicuous, seem petrified with terror, but whether the word went forth *sauve qui peut*, or whether they stood forward and manfully fought it out, cannot from the variation in our authorities be determined. All agree, however, that in the end they were reconciled to Síva, and worshipped him as the supreme god. There is a remarkable bottle-shaped figure above the principal image, around which the sages are seated in adoration. This is a Ling, the emblem of the worship of Síva, at this time fully established. It has on it a circular figure, which may perhaps be regarded as the mystic *Om*, the emblem of the Triad, and compounded, as the Brahmans tell us, of *A*, *U*, and *M*, the emblems of the three great gods respectively, and which the French would pronounce exactly as the Hindus do, for *Om* is pronounced like the French *Aúme*.

The legend referred to in this tableaux scarcely conceals that there was at the time mentioned a contest between the followers of the ancient Brahmanical ritual and the adherents of the new system, in which Síva, a god borrowed from the superstition of the aboriginal Hindus, the worship of the Ling, and other heterogeneous elements, were introduced,—a system essentially the same as the current Saiva Hinduism. This group, then, marks the putting down of the Vedic Brahmanism, and the substitution of Saivaism, and the worship of the Ling, in its room.

BHAIRAVA.

The visitor, proceeding outward towards the entrance of the cave, arrives at another compartment, still on the same side. Śiva is here represented in his character of Bhairava, a form he took to put down the extravagant pretensions of the sectaries of Vishnu. In Southern India the Narsinha, (Nursing,) or man-lion, of the same form nearly as the Egyptian Sphynx, is one of the forms under which Vishnu is worshipped. Bhairava was created to put down the boasting of this incarnation of Vishnu, who maintained that he was superior to Śiva. Ganpati and other attendants are here sculptured, but there is no appearance of actual warfare. This is, perhaps, intentional. The artist thought it sufficient to exhibit the god in this form to assert his supremacy, without irritating the numerous worshippers of Vishnu as the supreme deity, by any humiliating mark of inferiority. Such caution was not necessary in the last described compartment, as all natives on this side of India, and I believe everywhere else, maintain the supremacy of either Vishnu or Śiva.

SIVA AS A RELIGIOUS ASCETIC.

Turning round, and advancing a little, the visitor comes in front of the last group, in which Śiva is exhibited as a religious ascetic. Asceticism is the highest form of all the different systems of Hinduism. None of them promise union with deity to any, as a general rule, except to ascetics. As such a one Śiva is here represented,—as a Yogí, which is the name the Brahmans give to a Saiva ascetic of the highest order. The Gosains, who go about our streets covered with ashes, belong to an inferior sect. This is the figure supposed to represent Buddha by the earlier visitors, an explanation of it against which Mr. Erskine has given very good reasons. Nevertheless, it is not improbable that the Saiva asceticism, with its monastic establishments, and the yellow garments of those that are clothed, has been borrowed from Buddhism. Though this figure, then, were an image of Buddha, it would be Śiva as Buddha, Śiva the sage, the possessor of every attribute that can inspire reverential awe. Among the ten avatárs of Vishnu there is one called the Bauddha, evidently a caricature of Buddhism, and there is no reason why Buddha might not have been made an avatár of Śiva the Mahayogí.

SUPPLEMENTARY EXCAVATIONS.

There is a small excavation in the face of the hill to the west, just opposite to the Ling Chapel first described, dedicated to Ganesha,

(Gunputtee). He himself, easily recognized by his elephant head and pot-belly, is seated at the southern extremity, and the company, of which he is the leader, is ranged along the western wall of the small excavation. On going out by the eastern opening, the visitor finds a stair with a few steps, on each side of which is a sculptured lion, leading to a small Ling Chapel, on which are no figures. On going round the hill a little way to the south, two other excavations close to one another are found, fronting the east. They too are Ling Chapels, with a few sculptures outside, representing door-keepers, &c. such as before described. On the hill opposite to that out of which the Great Cave has been excavated, an excavation has been commenced, but the work seems to have been stopped before any material progress had been made.

CONCLUSION.

The Great Elephanta Cave, then, contains a representation of the chief objects of Saiva worship, and of some of the great events that took place on the establishment of that form of Hinduism. The five tableaux on the southern wall, as we have shown, point to traditions that are in a great measure common to all the ancient nations that attained to any degree of civilization; and the following three mark so many great struggles that took place in the establishment of the present system of Saiva Hinduism; while the last points to the quiet that succeeded these conflicts, by the supremacy of the system which is fitly enough exhibited by representing Siva in the peaceful character of a religious ascetic.

NOTES.

A.

The idea of the principal figure in the Elephanta Caves being Siva, in the character of Brahmá, Vishnu, and Rudra, is mentioned by Mr. Erskine as having been suggested to him by a learned friend. Who the learned antiquarian referred to was I do not know; but though this theory was set aside by Mr. Erskine, from erroneously supposing it inconsistent with the unity of design manifested in the sculptures of the cave, it is doubtless the true one, as the following considerations will show.

In looking about for illustrations of the Elephanta Caves in the existing body of Hindu sacred literature, I found that the legends sculptured are all, with a single unimportant exception, to be met with in the Linga Purána, and follow it, even when they are differently narrated, in others of those compilations of Hindu traditions. This Purána

advocates the Smarṭta theory, which Colonel Kennedy has explained to differ from the Saiva in this—that whereas the latter allows of no worship to be paid to Vishnu, the former, while maintaining the supremacy of Śiva above all the other gods, yet directs them also to be worshipped in subordination to him; just as the Bhāgavata ascribes supremacy to Vishnu, while admitting other gods to a share in divine honours, and thus differs from the exclusive Vaishnava theory. In reference to the three-faced bust of Elephanta, the very first line in the Linga Purāna illustrates it. It is नमो रुद्राय हरये ब्रह्माणे परमात्मने. “Adored be Rudra, Hari, and Brahmá, the Supreme Spirit.” After finishing the table of contents, we have, in the commencement of 11th Adhyāya, a brief account of the manifestation of Śiva as Purusha and Prakṛiti (the former and thing formed); and then of the Linga as one, seven, eight, and eleven; and in the 6th Shloka we have the following important statement:—

तेभ्यः प्रधान देवानां त्रयसासी श्रुवात्मकं ।
 एकस्मान्निष्पन्नं द्विष्व मेकेन परिरक्षितं ।
 एकेनैव चतुर्विधं व्याप्तं त्रैकं त्रिवेणसु ।

“After these the chief of all the gods, the Triad manifestation of Śiva, was produced. The world sprung from one of these three, by another it is preserved, and by a third it is destroyed, and the whole world is pervaded by this one Śiva.” Nothing can be plainer than this. Besides, it is to be borne in mind that among the Maráthas of the present day there is an object of adoration called Dattátreya, affirmed by all of multitudes of learned and unlearned Hindus I have asked, and these are not a few, to be an incarnation of the three gods, Brahmá, Vishnu, and Śiva. In ordering while at Poona from a native artist a set of all the objects of divine worship in the place, without any particular directions given, he brought me one of this god with three faces, and one full length figure. I showed also the picture of the Elephanta bust, given in the first volume of the Literary Transactions, the other day, to a Poona Brahman, who had never seen the caves, nor heard the sentiments of Europeans on the subject of them, and he said, after looking at it, that it was a figure of Śiva. I then replied, Śiva in what form,—has Śiva not got five faces? He seemed then a little taken aback, and, after examining the figure more minutely, he said it probably was Śiva as an incarnation of the three principal gods, Brahmá, Vishnu, and Rudra. The sentiments, then, of the natives on this side of India, are quite in unison with the idea I have expressed, whatever may be those entertained by the natives of Bengal and Upper

India. What is especially to be noted in this theory is, that Śiva is, properly speaking, the eternal deity,—or, as he is termed in our Purāna, the Paramātmá,—and that the three by whom the operations of the world are carried on are Brahmá, Vishnu, and Rudra—Rudra being distinguished from Śiva. Colonel Sykes, after examining carefully the Trimurtis in the hill at Ellora, concludes that one member of the Triad is a female. I do not think this can be the case with the Elephanta Triad, but I see no necessity for those at Ellora being busts of the same form of the divinity. The Ellora busts may represent Śiva, Párvati, and Vishnu, although in reference to this I speak only hypothetically, not having found anything in the Purānas or popular traditions to support such a theory. In appearance, they certainly differ considerably from the figures at Elephanta. The union of which Párvati is a member is usually indeed a double one, such as is described in the next compartment,—still such a union could subsist, theoretically at least, without running in anything counter to the Smartta system of Hinduism.

B.

The Ardhanárishvar is well known to the students of Hindu antiquities, and no illustration of it is needed; yet the following passage from the Linga Purāna on the subject may be interesting—it is from the 5th Adhyāya of the first part:—

पुत्रीकृता सती या सा मानसी शिवसंभवा ॥
 दक्षेण जगतां चाची वदनेवास्थिता परी ॥
 अर्द्धनारीश्वरं दृष्ट्वा सर्मादौ कनकांजलः ॥
 विभक्तोच्चाह दौ यदाजाता शुभा ॥
 तस्याश्चैवां भजाः सर्वासुस्त्रिया श्चिभुवने तथा ॥
 एकाद्भानिष वद्राक्षुषां शौद्धभा सया ॥
 लिङ्गिन्मन्त्रिणं सवै पुङ्गवमोक्षोद्धितः ॥

“Daksha, having produced his mental daughter Satí, adapted for Śiva, applied her to the Lord Rudra. At the beginning of the multiplication of creatures, (Brahmá,) sprung from the golden egg, said to this (Ardhanárishvar) half-male half-female divinity—‘Divide thyself’: then she sprang forth a fair female, and as portions of her all the females in the three worlds have been produced in succession; and from the male sprang as portions of him the eleven Rudras, and so on. She was entirely a female, and he entirely a male.”

C.

The last portion of the above quotation illustrates the subject of the third compartment,—the separated Śiva and Párvati.

D.

The legend of the marriage of Śiva is given in the 98th Adhyāya of the Linga Purāna. That Brahmā Deva was the officiating priest the following words distinctly show :—

नतः प्रबन्धं वृष्टात्मा प्रबन्धलोक पिता मयः ॥
 वसु देवस्य देवाम् च यथोज परमप्रभुः ॥

“Then bowing reverentially, and rejoicing in spirit, the great father of Brahmāloka, the supreme lord, joined the hands of the god and goddess.” During some religious rites, as well as at marriages, the wife appears on the husband’s right, yet there can be no reasonable doubt that this is the marriage I have mentioned.

E.

The next Adhyāya, the 99th, contains the account of the production of Vināyaka, or Ganesha, and this is the main reason that I have fixed on him, rather than on Kārtikeya, as the child here represented. He afterwards also acts a more important part, and much more is said about him than about his brother, who is not mentioned till afterwards. The story generally current among the Hindus here, that Ganesha was formed of the scurf of Pārvati’s skin, is not adopted in this Purāna; he is brought forth at once by the power of Śiva, or rather is a manifestation of Śiva, as the following line shows :—

नतस्तदा निबन्धयै पिनाकधृक् सुरेश्वरोः नगेश्वरं सुरेश्वरं वपुर्दधारसः

F.

The legend of Rāvana’s attempting to carry off Kailās is the only one illustrative of the Elephanta sculptures that I have not met with in the Linga Purāna. It is so generally known, however, and the subject so unquestionably refers to this mythological history, that the want is of no consequence.

G.

The legend of Daksha, taken from the Vāya Purāna, is translated by Professor Wilson in his Vishnu Purāna. The Linga is still more severe upon the gods. There is, according to it, a regular stand-up fight, and not even Vishnu escapes with his life. At the intercession of Brahmā, however, who was not in the fray, and comes in at the end as a mediator, Śiva restores them to life, when they all become his reverential worshippers. The account of this transaction is in the 95th Adhyāya. This legend brings also before us the important fact that

Brahmá was not a Vedic god, though, as the deified Prajapati, or Brahman patriarch in after times, he is artfully supposed here to come in and intercede for the other gods.

H.

Before meeting with the account of the production of Bhairava, contained in the 91st Adhyáya of the Linga, I never understood rightly the relation in which Vira Bhadra and Bhairava stood to one another, or what were their peculiar offices. It appears, then, that the former was a special manifestation of Síva, for the purpose of humbling the followers of the ancient Vedic worship; and the latter to bring down the pride of the modern Vaishnavas, and their avatárs of Vishnu. As I have not seen this idea referred to by Europeans, I give a portion of the account as it stands in the original. The conflict is said to have been maintained with Narsinha, who, after his victory over Hiranyakasípu, became quite overbearing, and insufferable in his insolence to gods and men. The divinities, accordingly, with Brahmá at their head, supplicated aid of Síva. The narrative then proceeds as follows:—

एवमभ्यर्थितो देवैर्मणिचक्रे कृपालयः ॥
 यत्नेनसा मुसिंहारक्षं संवर्णं परमेष्ठिनः ॥
 नदर्थं कृतवान् बद्धो वीरभद्रं महाबलं ॥
 आत्मनेभिरवर्णं महाप्रलयकारकं ॥
 आजगाम पुरासद्यो मणानाम यतो वसन् ॥
 सद्गुणैर्गणवै रत्य नदभि रितस्ततः ॥

“Being thus entreated by the gods, he mercifully formed his plan; and the supreme lord Rudra, that he might encircle himself with the radiance necessary to slay him who is called the man-lion, meditated upon the mighty Vira Bhadra, and caused to proceed from himself the form of Bhairava, which will one day destroy the world. Smiling, he sprang now, as formerly, to the front of the band of clotted-haired grinning heroes, that were produced along with him.”

We have, then, two or three speeches of defiance in the Homeric style, when Bhairava assumes the form of the bird Sarabha, and over and over again lifts the helpless Narsinha up in the air, and dashes him down on a rock, till he cries peccavi, and जमी बद्धाय.

I.

In illustration of the compartment where Síva is represented as a Mahayogi, the whole of the 22nd Adhyáya of this Purán is important. It is a section, which describes prophetically the spiritual worship of

Síva, and the ascetic forms he assumes in all the twenty-eight Manwantaras, when seated amid his four sons, forming a group like the five Dhyáni Buddhas, he spends his time in mental contemplation. Síva, it is said, will in the ninth Manwantara be called Rishaba;—now Rishaba was a Hindu ascetic king, whom the Jains claim as their first Tirthankara. In the tenth, it is said, he will be a Muni, seated on the top of the Himalayas. In the fourteenth, it is said, he will be called Gautama, and sit in the Gautama Vana. Gautama is both the name of a Hindu sage, and of the last Buddha, but the attitude and place lead us to think of the latter rather than of the former, though the author probably wished his readers to understand the Brahman Gautama. In the eighteenth, he will be called Sikhandi, *i. e.* “feather-crested,” whence a sect of Gosains derive their peculiar badge. In the twelfth, he is to be called Atri, and cover himself with ashes, as a large sect of Gosains do. In the seventeenth, he is to be called Guhavási, *i. e.* “inhabitant of the cave,” and to sit in a cave of the Himalaya Mountains. It might be hazardous to affirm that the sculptor had this last form of Síva especially in his mind. I am rather inclined to believe that he intended to give a general figure, which might stand for Síva in any of the ascetic forms he had assumed in different eras; but that the intention was to represent Síva as a Yogí I think cannot admit of even the shadow of a doubt. It agrees with the general conception that runs throughout the whole, and I cannot conceive how any one can seek an explanation different from that which the chapter of the Purána referred to suggests.

ART. V.—*Brief Memorial of the Literary Researches of the late WILLIAM ERSKINE, Esq.* By JOHN WILSON, D.D., F.R.S., Honorary President of the Bombay Branch Royal Asiatic Society.

Presented, July 15, 1852.

MR. ERSKINE came to Bombay with Sir James Mackintosh in 1804. "I had the good fortune," says that acute judge and exquisite critic of human character and culture, "to bring out with me a young Scotch gentleman, Mr. Erskine, who is one of the most amiable, ingenious, and accurately informed men in the world." "My philosophical friend Erskine," was the designation which he not unfrequently gave him in his conversation and correspondence. In 1809, this admired friend of Sir James became his respected son-in-law.

In 1808, Mr. Erskine was appointed Clerk to the Court of Small Causes, a division of the Recorder's Court over which Sir James Mackintosh presided. For many years he was one of the Magistrates of the island. In 1820, he was nominated Master in Equity by Sir W. D. Evans. During the nineteen years he was in Bombay, he enjoyed the highest character for ability, learning, integrity, and honour. When, in consequence of the failure of his health, and his removal from his offices in the Court, he left India in 1823, he was thus addressed by between sixty and seventy gentlemen, forming the body of the European Society of Bombay:—"Few of us have had the happiness of your acquaintance during the whole period of nineteen years that you have resided here. But early intimacy, or the report of our predecessors, impressed all of us with such an estimation of your character, as inspired our respect and esteem; and which subsequent intercourse has to the last moment increased and confirmed. In public life we have observed you perform the arduous duties of various important situations with the most conciliating address, the greatest ability, the strictest integrity, and the most benevolent but impartial justice. In private life, we have been delighted with the most engaging urbanity, the correctest feelings of a gentleman, the nicest principles of honour, and the loftiest sentiments

of disinterestedness. In literary pursuits, your animating example diffused a love of literature, and your intimate acquaintance with the learning of the West and the East enabled you to communicate that information which might have been elsewhere sought in vain, and to confer, not only on many of us, but on others, the important benefit of your advice in the direction and amelioration of our pursuits and studies." Mr. Erskine took a large share in the management of some of the philanthropic institutions of Bombay. Some of the early reports of our Bible Society are from his pen. It is due to him to say, that he was the first advocate of such charity schools as those of the Bombay Education Society now in Byculla, as is evident from his correspondence in one of the documents now referred to.

But it is principally in connexion with this Society that at present we have to do with Mr. Erskine. He was one of its most distinguished founders. He was present at the meeting of seventeen gentlemen held in Government House, Parell, on the 26th November 1804, when, on the proposal of Sir James Mackintosh, it was constituted under its original designation of **THE LITERARY SOCIETY OF BOMBAY**; and he was then appointed to the office of Secretary, on the efficient discharge of the duties of which the prosperity and advancement of the institution was greatly dependent. He was the last survivor of the twenty-eight members who were enrolled at its first meeting. He held the office of Vice-President for some years before he left India. On that occasion, a letter of thanks was, on the motion of the then President, the Honorable Mountstuart Elphinstone, seconded by Archdeacon Barnes, addressed to him, which, as it has not yet appeared in any of the publications of the Society, or its English consociate, the Royal Asiatic Society of Great Britain and Ireland, may be here introduced:—

"SIR,—Your unexpected return to your native country has prevented the Literary Society of Bombay from expressing to you, previous to your departure, the high sense that it entertains of the important benefits which you have conferred on it. One of the original members by whom it was instituted in 1804, you became the Secretary; and it is to your unremitting and judicious exertions in that situation to which the formation and prosperity of the Society must be principally attributed. The kindness, also, with which you have assisted in preparing its Transactions for the press, and in contributing to them papers so distinguished by their learning, research, and elegance of style, have given to that work an interest and a value which it would not otherwise have possessed. But not in these respects alone has your influence

proved beneficial to literature; for your intimate acquaintance with classical, modern, and Oriental literature, your sound judgment, and your correct and cultivated taste, have enabled you to afford to others that information which is so often requisite in this country, and to point out to them the studies and pursuits to which their attention might be most advantageously directed. The readiness, at the same time, and indulgence with which such assistance has always been given, can be only equalled by the unassuming manner and the urbanity with which opinions the most instructive were invariably communicated.

“That the loss of a person possessed of such eminent qualifications and abilities can ever be replaced is scarcely to be expected. But the regret which the Society experiences on this occasion is diminished by the hope that the interests of literature will be materially promoted by your now being relieved from the interruptions of official business. That your constitution may re-invigorate by your return to your native country, and that you may enjoy undisturbed happiness for many years in the bosom of your family, and in the solace of literary pursuits, are the sincere wishes of a Society by whom you will ever be remembered with sentiments of the truest respect and esteem.”

This letter was from the pen of Captain (afterwards Major-General) Vans Kennedy, who well weighed his words in complimentary addresses.

The first paper laid before the Society by Mr. Erskine was entitled—“Observations on two Sepulchral Urns found at Bushire, in Persia.” It was read on the 6th July 1813. The antiquities of which it treats had been forwarded to him in Bombay by Mr. Bruce, the Resident in the Persian Gulf. They were of the cylindrical form, of which many examples have since been found both in Persia and its confines. Mr. Erskine, after showing by quotations from Herodotus, Strabo, and Sextus Empiricus, that the ancient Persians did not universally follow the mode of sepulture in *dakhmas*, or “towers of silence,” as they have been of late denominated, now in use among the Zoroastrians, came to the following conclusion:—“It seems not improbable that the urns found at Bushire contain the remains of two ancient Persian fire-worshippers; the bones were probably those of poor people, who used an urn of baked clay, as a cheap and effectual method of excluding the elements; and the bones were not probably deposited in them till they had been blanched and purified by the exposure of the corpse to the air, and to birds and beasts of prey.” Questions relative to the disposal of the dead in olden times have their principal interest, and that is frequently of no unimportant a character, in the light which they throw on the ancient ethnography and religions of the world.

Mr. Erskine's second paper, laid before the Society also in 1813, was that for which he is best known to the public in India—the "Account of the Cave-Temple of Elephanta." It is one of a remarkably interesting character. It is correct and minute, without being tedious; and its individual descriptions are associated with general and important deductions, illustrative of the Hindu religion and mythology, the state of the arts at the time the temple was excavated, and the manners and customs of the inhabitants of India. It bears ample evidence to the accuracy and refinement of the author's taste and judgment, and to the caution of his research as an Oriental antiquarian. Like Niebuhr, and some other writers who had preceded him, he associated the excavations solely with the *Shaiva* form of the Hindu religion. No corrections of any consequence have been made of his general or specific interpretations of their varied arrangements and multitudinous figures, though the theory which he mentions as that of one of his friends, that "the temple might be dedicated to *Shiva* [as in the case of the *Trimúrti*] with the attributes of *Brahmá* and *Vishnu* [superadded]," is that which will now be assented to by all competent judges. All doubt on this subject was set at rest by Professor H. H. Wilson, in the *Quarterly Oriental Magazine* for 1824. Such of the Hindu *Puránas*, indeed, as are devoted to *Shiva*,—the *Matsya*, *Kurma*, *Lainga*, *Shaiva*, *Skanda*, and *Agneya*,—all absorb the attributes of *Brahmá* and *Vishnu* in their favourite deity; while in the spirit of the violent sectarianism by which modern Hinduism is characterized, those devoted to *Vishnu*, and partially those devoted to *Brahmá*, make a similar usurpation for the objects of their admiration. In *Shiva* himself, independently of this circumstance, several distinct gods have been combined by the Bráhmans, in deference to him as the "Great God," *Mahádeva*, a popular divinity, originally unknown to their pantheon, as well shown by Professor Lassen in his invaluable work on Indian archæology. His worship under the form of the *Linga*, or *Phallus*, as hinted at by Mr. Erskine, originated in the south of India. It is rather remarkable that Mr. Erskine's estimate of the age of the Elephanta temple, though founded on more restricted data than those now possessed, is likely to prove nearly correct.

Mr. Erskine's third paper, "On the Sacred Books and Religion of the Pársis," was laid before the Society in 1819. He takes a rapid view in it of what was then known of the ancient languages of Persia; examines the comparative value and authenticity of the details of ancient Persian history, as contained in the writers of Greece and Rome on the one hand, and of Persia on the other; gives a short sketch of

the tenets of the modern Pársís, and the works ascribed to Zoroaster, on which they are founded; and briefly indicates the proofs of the antiquity of many of their particular doctrines and observances. The contribution is an admirable one; and it must be admitted to be extremely creditable to the research and observation of the author, especially when the restricted nature of our, now excellent, Bombay library at the time when it was composed is taken into consideration. It forms an important document in the history of the investigation of the literature and religion of the ancient Arians. According to the views which it advocates, the Zend language is of Indian origin, and the Persian liturgy of no higher antiquity than the age of the Sasánís. But these views the philological labours of Bopp, Burnouf, Lassen, and others, ultimately led him to change. In a letter, addressed to the writer of this imperfect memorial, dated the 14th November 1843, he expresses his strong approbation of the general views both of the Zend language and religion which are contained in his larger work on "The Pársí Religion," remarking of the most important matters on which we had differed, "you are no doubt right." However, one of his most important theses on the Zend language, that it is not the *parent* of the present Persian, can easily now be established. The inscriptions of the Achæmenian Kings at Besitun, so ably deciphered and interpreted by Colonel Rawlinson, and Professor Westergaard, reveal to us the true parent of the Persian, which is not Zend, though a cognate tongue. The Zend, as will soon be publicly shown by Westergaard, was in its two dialects the language of Soghdia and Bactria. The greater portion of its literary fragments transcend the times of the Achæmenides, and are devoted to a rude and peculiar state of society, bordering perhaps on the reign of Dejoces. Whether Zoroaster was a historical, or merely a mythological personage, is not yet certainly known. Mr. Erskine well shows the discrepancies which are to be found respecting him in the Greek writers, as well as severely comments on the incongruities which have found currency under his name.

Mr. Erskine's fourth communication to the Society forms an accompaniment to the preceding. It is directed to the disproof of the authenticity and genuineness of two works of high pretension—the *Deshtir* and *Dabistán*, brought into notice by some ingenious but unfounded conjectures of the prince and pioneer of British Orientalists in India, Sir William Jones; and it is most thoroughly successful in its adducement of facts and arguments. It displays critical acumen of a high order. It thus concludes:—"From what I have already said,

you will be sufficiently aware what my opinion is regarding both the *Desútir* and the *Dabistán*: you will see that I am not sanguine enough to hope that any gleam of light can be cast from any such quarters over the early history of mankind. You will have discovered that, far from regarding the doctrines of the *Desútir*, and the historical narrative of the *Dabistán*, as resting on *unexceptionable authority*, and as consequently believing that the learning and philosophy of Persia existed some thousand years ago, and produced the science of the Greeks and the Bráhmans; I consider the whole of the peculiar doctrines ascribed to Mahábád and Hoshang as being borrowed from the mystical doctrines of the Persian Sufis, and from the ascetic tenets and practices of the Yogis and Sányáshis of India, who drew many of their opinions from the Vedántí school. I regard them as having had no existence before the time of Azer-Kejwán and his disciples, in the reigns of Akbár and Jehángír, and as having been devised and reduced into form between 200 and 300 years ago, in the school of the Sipásí philosophers. The language of the *Desútir* I regard as one fabricated, with no great address, to support this religious or philosophical imposture, and as at no time having belonged to any tribe or nation on the face of the earth." Since these remarks were penned, no more has been heard of the *Desútir*, except as a cunningly devised, though clumsily executed, literary forgery. The *Dabistán*, as illustrative of the professions and speculations of its dreamy authors, has yet some relative interest.

Mr. Erskine's last communication to the Society is entitled "Observations on the Remains of the Buddhists in India." It treats of the comparative antiquity of the Buddhists, Jainas, and Bráhmans,—justly giving the palm to the latter, from whom the Buddhists are dissenters, while the Jainas are dissenters from the Buddhists; of the tests by which their respective religious excavations may be distinguished; and of the actual remains of the Buddhists in India, as far as they were known in 1821. There is much condensation in it of information elsewhere scattered over an extended surface. It conveyed to the reader, too, much novel intelligence at the time it appeared. Like all that proceeded from the pen of the author, it is both sound and substantial.

In 1826, Mr. Erskine published the autobiography of the Emperor Baber, translated by the late learned Dr. John Leyden and himself from the Jaghatai Turkí, so little known to Europeans, though one of the most powerful and refined languages, as far as natural description is concerned, which is spoken in Asia. Of the most valuable and ably written historical and geographical introduction to this most curious and important work, as well of the numerous illustrative notes and

supplements which are attached to it, he was the sole author. It cost him an immensity of labour in Bombay, where it was prepared, and great editorial care, when he carried it through the press in Edinburgh. It is one of the most precious literary contributions which the East has given to the West in modern times. Baber united in his extraordinary character the general, the statesman, the poet, and the scholar, though with certain failings and faults, not much to be wondered at when his religious education, his eventful times, the depravity of many of the parties with whom he came in contact, and the remarkable scenes of his varied actions, both as a fugitive and a conqueror, are adverted to; and his journal, though it occasionally notices matters neither of personal nor general interest, throws a flood of light on the peculiar habits and conduct "of the founder of a new dynasty, in one of the richest and most powerful empires on earth," and the natural and social state of the various countries, particularly India, which he visited in the progress of his extensive military operations and civil administration. "Perhaps no work ever composed," as remarked by Mr. Erskine himself, "introduces us so completely to the Court and Council, the public and private life, of an Eastern Sultan." It is not at all improbable that had not Mr. Erskine, with marvellous zeal and application, followed up the labours on it of his early companion in study Dr. Leyden, it would have remained to this day unknown to Europeans. It is now so much and justly valued, that it is with difficulty that a copy of it can be procured. The estimate formed of Baber's character by Mr. Erskine, and which he sums up in chaste and classical style, has been assented to by all subsequent writers on Indian history.

Mr. Erskine joined the Royal Asiatic Society, on its foundation, after he had proceeded to Europe. He became, also, a member of the Committee of the Oriental Translation Fund. To these institutions, however, he made no contributions. Several articles on India, which appeared in some of the home periodicals, were attributed to his pen.

Mr. Erskine spent the last years of his life principally in Edinburgh, and at Bonn, on the Rhine. They were devoted to studies quite congenial with his former literary occupations—to the elucidation, from original sources, of the early Muhammadan history of India; but though he was on the verge of his eightieth year when he died, he was not spared to lay the results of them before the public. The intelligence of his death, on the 28th May, arrived in India by the last mail. It may be safely said of him, without detracting from the meritorious services of others, that this Society owes as much to his exertions,

as one of its most active office-bearers and learned contributors, as to those of any other of its members. None of his early contemporaries in India, known to the literary world, now remain. Many of them were men of distinction, who will not soon be forgotten. Sir James Mackintosh, though he never entered deeply into Oriental research, was, perhaps, next to Jeffrey, the most accomplished critic of the day, a proficient in mental and ethical science, and one of the richest and most eloquent of writers and speakers. Jonathan Duncan, the Governor of Bombay, in spite of his "Brahmanized mind,"—facetiously alluded to by Sir James,—never lost the happy sympathies of the West, as well evinced by his zealous exertions for the abolition of infanticide. He was an excellent Persian and Hindustáni scholar, intimately acquainted with the manners and customs of the natives, and gave some short communications to the Bengal Asiatic Society before he came to our Presidency. Lord Valentia and Mr. Salt established a high character for their extensive travels, voyages, and researches in India, Abyssinia, and Egypt; and to them we ourselves are indebted for our first respectable and trustworthy notices of the excavations of Kárlá and Salsette. Dr. Helcnus Scott, a member of the Medical Board, is not unknown to chemical science. Colonel Boden became the founder of the Sanskrit Professorship in Oxford, which is so effectually revealing the ancient literature and history of India to England. Dr. Robert Drummond published grammars of the Malabár, and Maráthí and Gujaráti languages, from which important gleanings may yet be made by the best of our local philologists. Major Edward Moore published an interesting history of Lieutenant Little's Detachment, a work on Hindu Infanticide, Oriental Gleanings, and the well-known work on the Hindu Pantheon, which, notwithstanding its "Duncanese style,"—for so the compositions of its author have been characterized,—can scarcely now be procured for its original price of five guineas. Sir Jasper Nicholls was our first writer on the meteorology of Bombay. Mr. Francis Wrede and Lieut. Frissell were among the earliest contributors to the Society, the latter furnishing a curious article on Persian ethics. Mr. Robert Steuart, a respectable antiquarian, was one of the first writers on the Sauráshtrian coins. Colonel Alexander Walker's reports on Infanticide and the various districts of Káthiáwar, which were "settled" by him, are among the most interesting documents connected with the public services in India. Major David Price's works on Muhammadan history, and other Oriental matters, are standard authorities. It was in the view of the services rendered to Oriental literature by these distinguished men, that the address was presented to Mr. Erskine on his leaving India which has been already quoted. This may show to us, their successors of

what, adverting to the changes of Indian Society, may be denominated the third generation,—for our Malcolms, and Kennedys, and Elphinstones, and Sykeses, and Briggsses, and Romers, intervene between their day and ours,—the peculiar value of Mr. Erskine's services and labours. Let us feel and do justice to the encouragement and stimulus of his worthy example.

ART. VI.—*The late Professor EUGENE BURNOUF, of Paris, and his Oriental Publications.*

THIS most distinguished Orientalist, an Honorary Member of our Society, a most valued correspondent of most of our Eastern scholars, and the instructor of them all by his great and important works, died at Paris, on the 29th of May last. Asia, as well as Europe, mourns his loss. We have a melancholy satisfaction in transferring the following notices of him and his various publications to the pages of our Journal, from *Le Moniteur Officiel des Etablissements Français dans l'Inde* :—

“MONSIEUR LE REDACTEUR,—Sous le titre de *Nécrologie* et à la date du 29 mai dernier, le numéro du *Siècle* du 30 du même mois contient ce qui suit :

“L'Académie des inscriptions et belles-lettres vient de faire une nouvelle et grande perte. M. Eugène Burnouf, que ses collègues avaient, il y a peu de jours, appelé à remplacer dans les fonctions de secrétaire perpétuel M. Walckenaër, mort tout récemment, est décédé hier à la suite d'une longue et cruelle maladie, âgé de 50 ans à peine. Fils d'un philosophe éminent que l'Académie a compté aussi parmi ses membres, Eugène Burnouf s'était depuis longtemps placé, par de nombreux travaux et de remarquables découvertes, au premier rang des orientalistes. Il était professeur de langue et de littérature sanskrites au Collège de France, et inspecteur général de l'enseignement supérieur. En apprenant la triste nouvelle de sa mort, sur la proposition de M. Guizot, l'Académie, qui tenait sa séance hebdomadaire, s'est immédiatement séparée.

“Le seul journal français publié dans l'Inde, pays qui n'a cessé d'être, pendant toute la vie de M. Eugène Burnouf, l'objet de ses predilections et de ses investigations dévouées, ne pouvait passer sous silence un si douloureux évènement. Permettez-moi de le signaler comme ayant sans doute échappé à votre connaissance, et d'ajouter quelques lignes à celles que je viens de citer. M. Eugène Burnouf, d'ailleurs, était non seulement, comme Silvestre de Sacy, Champollion le jeune, et Abel Remusat, une des gloires intellectuelles de la France, une illustration unanimement saluée partout où ont pénétré les études philologiques et asiatiques ; mais en outre, il n'était pas tout à fait un étranger pour Pondichery : plus d'un, parmi nous, a eu l'honneur, à diverses époques et à différents titres, de l'approcher et de le connaître, et c'est l'un motif

de plus pour que son indigne élève ose venir appeler un instant sur sa mémoire l'attention de vos lecteurs.

“ Je ne saurais mieux faire connaître la portée, l'esprit general et le developpement successif des travaux considérables de M. Eugène Burnouf qu'en reproduisant, de l'article *Orientalistes* inséré en 1842 dans l'*Encyclopédie nouvelle*, les passages ci-après, écrits, j'ai tout lieu de le croire, sur ses indications mêmes :

“ Elève de Chézy, il étudia le sanskrit, et après avoir appris cette langue, il voulut savoir ce qu'elle était dans le temps et dans l'espace; il étudia alors le pali, et se convainquit que cet idiôme, cultivé à Ceylan et dans l'Indo-Chine, était un italien du sanskrit, et que par suite le pali avait été porté de l'Inde dans l'Indo-Chine, et cela lors de l'invasion du Buddhismisme dans ce pays. Puis, après avoir constaté l'antériorité du sanskrit sur les langues parlées à l'est de l'Hindoustan, il rechercha si le sanskrit était également postérieur ou bien antérieur aux langues parlées au nord-ouest de l'Hindoustan, dans ces vieilles contrées de l'Arie et de la Bactriane. Le resultat de ces recherches fut que le zend, la langue antique de l'Asie, est congenre du sanskrit classique, mais plus ancien; que le sanskrit presente déjà de nombreuses traces d'une culture plus avancée; que le zend lui-même présente aussi, en moins grande quantité, il est vrai, quelques alterations, que des lors on doit les regarder comme deux langues derivant d'une même source, inconnue et sans doute perdue à jamais. Un autre resultat de ces recherches philologiques fut la publication du *Commentaire sur le Yaçna*, et la création de l'étude de la langue zende. Il devint dès lors constaté que le plateau arien avait été le point de départ de deux courants: l'un arien-brahmanique, qui a converti l'Inde et, par le Buddhismisme, l'Asie orientale; l'autre, arien-bactrien, qui a enfanté les diverses civilisations de l'Asie occidentale et de l'Europe. Continuant ses importantes recherches, après avoir constaté ce qu'était le sanskrit dans l'espace, après lui avoir fixé pour théâtre l'Hindoustan, M. Burnouf a voulu savoir ce qu'était, dans le temps, la civilisation dont la langue sanskrite était l'expression. Il a publié alors le *Bhāgavata Purāna*, afin de faire connaître les généalogies (livre IX) qui, comparées avec celles des autres Purānas, et les traditions épiques du Mahābhārata, donneront les seuls renseignements historiques que l'on puisse vraisemblablement obtenir des livres sanskrits. Puis enfin, après avoir précisé la question sur le sanskrit et le vrai rôle de la civilisation hindoue, venue du nord de l'Inde, conquérant le sud de la presqu'île, et débordant sur l'Indo-Chine, il a voulu compléter ses études sur le Buddhismisme, c'est à-dire sur le courant religieux de l'Asie orientale.

“ Nous ne craignons pas de dire à l'avance que la publication que prepare en ce moment M. Eugène Burnouf jettera bien des clartés sur cette importante question de l'histoire des religions. Cette publication se compose :

“ 1° D'une traduction du *Lotus de la bonne loi*, contenant plusieurs paraboles d'un caractère presque évangelique sur les principaux dogmes du Buddhismisme; on y voit le Buddhismisme triomphant et développé;

“ 2° D'une analyse des livres qui composent la collection des manuscrits envoyés du Népal; plusieurs sont évidemment des premiers temps du Buddhismisme, et sont d'autant plus curieux à connaître qu'ils montrent bien l'origine toute brahmanique du Buddhismisme et son caractère de reforme;

“ 3° Enfin, d'une histoire du Buddhismisme.

“ En 1844 parut le premier volume de *l'Introduction à l'histoire du Bouddhisme indien* : On y trouve l'exposé le plus complet des origines et des doctrines de cette religion curieuse qu'il soit possible d'obtenir actuellement, en présence de l'immense étendue des écritures sacrées des Buddhistes, composées de quelques centaines de volumes in folio. Bientôt après, l'auteur, ne cessant de poursuivre la synthèse de ses savantes recherches, et voulant faire pour le Bouddhisme du sud ce qu'il avait fait pour celui du nord, reconnut la nécessité d'entreprendre l'étude de la langue barmane, qui devait lui permettre de contrôler l'ancien texte pali de Buddha par la version moderne. Il a probablement laissé inachevé l'ouvrage ou ce *tour de force* (il considèrerait ainsi son projet) aurait eu sa place ; et, jusqu'à ce que les connaissances si variées et si larges qu'il réunissait se présentent de nouveau chez un même homme, demeurera ajournée une comparaison digne du plus puissant intérêt.

“ Si la logique et l'esprit de suite qui guidaient les efforts progressifs de l'infatigable professeur sont remarquables, l'importance des résultats obtenus par lui l'est davantage encore. M. Burnouf a, pour ainsi dire, ressuscité la langue zende, complètement perdue avant Anquetil Duperron et a peine entrevue, sous les voiles séculanes qui l'enveloppaient, par le danois Rask, l'homme qui a, dit-on, possédé le plus grand nombre de langues. Il n'existait sur le zend que des ébauches imparfaites et des hypothèses hasardées : Eugène Burnouf le reconstruisit, grammaticalement et analytiquement, au moyen de ses rapports avec le sanskrit et des principes positifs de la philologie comparée. Il eut aussi l'honneur d'être le premier à déterminer l'alphabet cunéiforme, en usage dans les inscriptions indéchiffrées de la Perse et de l'Assyrie. On se rendra compte des fruits réservés à cette nouvelle découverte, si l'on songe aux grands événements dont les contrées intermédiaires entre la haute Asie, l'Inde, l'Arabie et l'Égypte ont été le théâtre pendant une longue période de l'histoire ancienne, à la route qu'ont dû suivre la plupart des migrations orientales, et à l'influence de ces événements et de ces migrations sur la civilisation du monde. M. Burnouf, à travers des difficultés qui pouvaient paraître insurmontables, a tracé la voie où l'ont suivi MM. Rawlinson, Botta, de Saulcy et autres ; il préparait peut-être lui-même un ouvrage critique sur les inscriptions dernièrement apportées de Ninive.

“ *L'Essai sur le pali*, publié en 1826, et auquel collabora M. Lassen, de Bonn, a ouvert l'étude des textes du Bouddhisme ; l'impression du *Vendidad Sade*, commencée en 1829, et celle du *Commentaire sur le Yaçna*, en 1835, l'étude du zend et de la religion de Zoroastre ; le *Mémoire sur les inscriptions cunéiformes de Hamadan*, qui date de 1836,

l'étude de l'écriture monumentale de l'antiquité persane et assyrienne. Trois civilisations reculées sont ainsi venues livrer à l'humanité moderne leurs premiers mystères, providentiellement sauvés des abîmes du temps.

“ Cette rapide esquisse, ces indications purement fondamentales auxquelles je dois me borner feront apprécier suffisamment, j'en ai l'assurance, la valeur de M. Eugène Burnouf et de ses œuvres, ainsi que la perte irréparable faite en sa personne par la science orientale et le corps de l'enseignement. Ses travaux resteront comme des modèles où la rapidité du coup d'œil, la méthode de l'examen, la netteté des conclusions sont accompagnées d'une conscience pleine d'autorité. Les traductions, pensées par une intelligence maîtresse à la fois d'elle-même et du texte à interpréter, sont aussi belles par leur fidélité et leur transparence que par le charme et la supériorité du style. Toutes ces productions sont frappées d'un cachet magistral.

“ M. Eugène Burnouf, à côté de sa haute raison, de la profondeur de ses connaissances, avait un esprit pétillant et fin qui, dans le monde et à son cours, rendait sa parole extrêmement pittoresque et attachante. Les arts, surtout la musique, avaient pour lui un grand attrait, et il passait avec un égal amour des méditations austères de son cabinet à l'audition des symphonies de Beethoven exécutées au Conservatoire. Cette souplesse de facultés harmonisées ensemble a souhait m'a souvent paru phénoménale. La bienveillance du caractère de M. Burnouf était parfaite : il a rendu à ses élèves, à ses collègues, à tous, un nombre de services incalculables, et il se montrait toujours étonné des témoignages de reconnaissance des personnes que sa position ou son savoir lui avait permis d'obliger.

“ M. Eugène Burnouf avait débuté dans l'enseignement par une chaire de grammaire générale et comparée fondée pour lui à l'Ecole normale. Il était, depuis 1832, professeur de langue et de littérature sanskrites au collège de France, membre de l'Académie des inscriptions et belles-lettres, et secrétaire de la Société asiatique de Paris ; il avait remplacé en 1837 M. Silvestre de Sacy comme inspecteur de la typographie orientale à l'imprimerie nationale, et, chargé à ce titre de la direction scientifique du classement et de la fabrication des caractères orientaux et de la révision supérieure des impressions étrangères, il avait fait introduire plusieurs perfectionnements dans nos superbes éditions qu'admire l'Europe ; il était officier de la Légion d'Honneur depuis 1844 ; nommé, en 1848, administrateur du Collège de France et membre de la Commission des hautes études, il ne put accepter la première de ces fonctions. Plusieurs sociétés savantes étrangères s'honoraient de le compter parmi leurs membres. Tout récemment le Président de la République l'avait appelé au rang d'Inspecteur général de l'enseigne-

ment supérieur, et, pendant la maladie à laquelle il à succombé, ses collègues de l'Académie des inscriptions l'avaient choisi pour secrétaire perpétuel. Sur sa tombe sera gravé ce titre inappréciable, qui rappelle les hautes traditions, les grandes renommées de l'érudition française.

“ La science a dévoré les jours de celui dont elle avait de bonne heure fait couronner le mérite. Le nom d'Eugène Burnouf ne perira pas : puisse sa nombreuse famille y trouver une consolation.

“ Agréez, etc.

“ ED. ARIEL.

“ P. S.—Un ami m'envoie, au moment où je termine, le numéro du *Journal des Débats* qui renferme le compte rendu des obsèques de M. Burnouf. L'hommage des regrets les mieux sémis, de l'admiration la plus vive, et de l'affection la plus vraie, a été déposé au bord de la fosse, au milieu d'un nombreux et imposant cortège, qui montrait assez combien la perte faite, était considérable et justement comprise. M. Natalis de Wailly, au nom de l'Institut, M. Barthélemy Saint-Hilaire, au nom du Collège de France, et M. Guigniaut, au nom de l'Université de la famille et des amis de M. Burnouf, ont successivement parlé. Ils ont dit qu'à ses derniers instants, il avait pu connaître le suffrage unanime par lequel 'l'Académie, soigneuse de sa propre gloire,' lui avait décerné la dignité de secrétaire perpétuel et qu'il 'aurait abandonné, pour cette dignité qui comblait toute son ambition, les hautes fonctions dont il venait d'être investi par le Gouvernement, préférant ainsi aux intérêts de sa propre famille, qu'il aimait pourtant d'un amour infini, la science, à laquelle depuis longtemps, et sans le savoir peut-être, il avait sacrifié chaque jour sa santé et sa vie ;'—que le 'philologue de génie,' comme l'appelait la voix respectée de M. Villemain, vivrait 'de cette immortalité qui est promise aux grands travaux de l'intelligence qui leur suffit ;' que 'la philologie française, honorée déjà par tant d'illustrations, n'aura rien produit de plus grand que lui ;'—qu'il avait terminé son *Histoire du Bouddhisme* quand son mal s'était déclaré il y avait trois mois, et que ses forces s'étaient 'usées dans la rédaction et l'impression du second volume de ce grand ouvrage' philologique, historique et philosophique, où il lui fut donné de 'réunir, dans une harmonie suprême, ces trois caractères de la véritable et complète érudition.'

“ Il est impossible de rien ajouter à ces éloquentes témoignages.

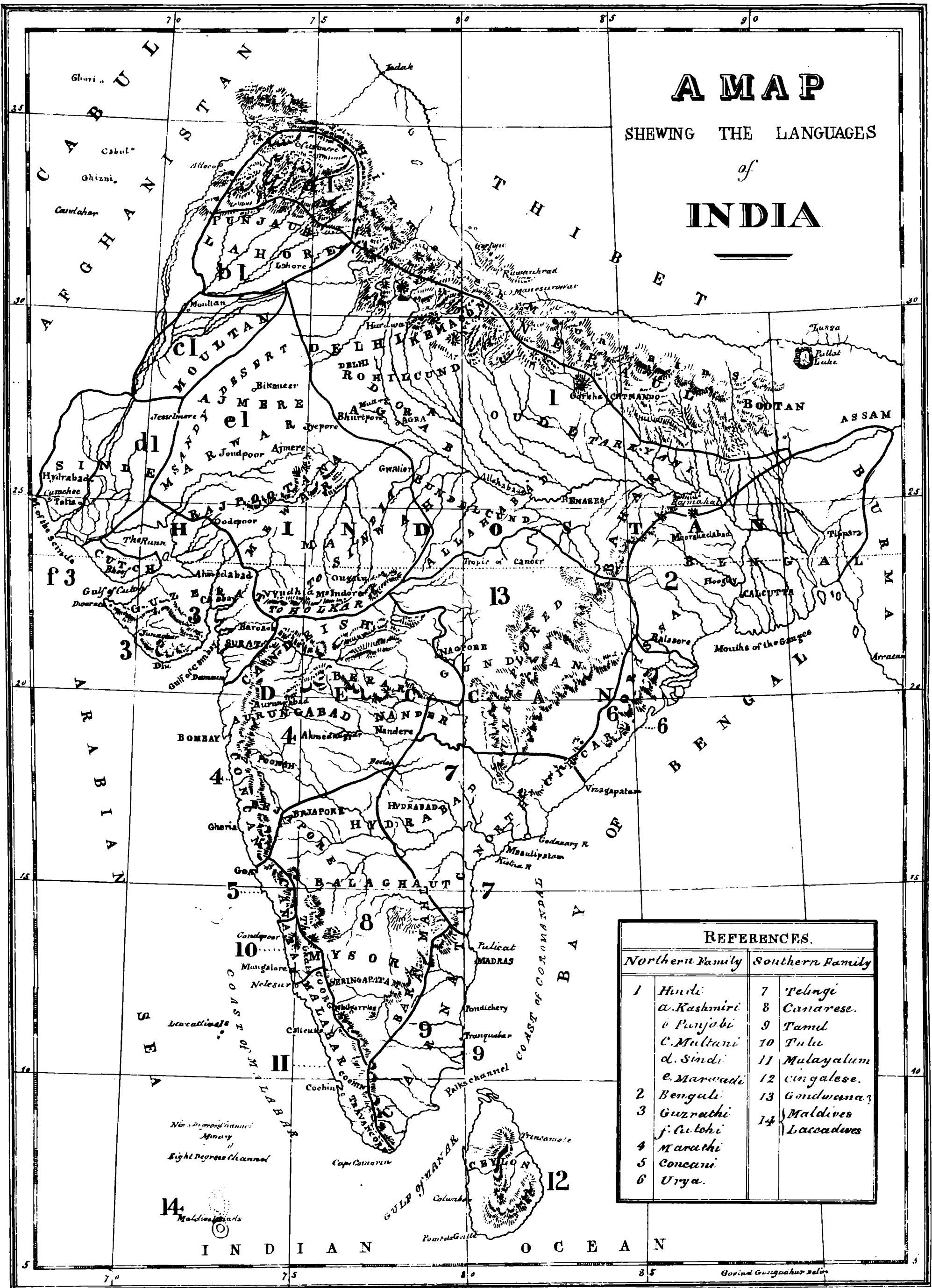
“ E. A.”

A MAP

SHEWING THE LANGUAGES

of

INDIA



REFERENCES.			
Northern Family		Southern Family	
1	Hindi	7	Telugi
a.	Kashmiri	8	Canarese.
b.	Punjabi	9	Tamil
c.	Multani	10	Tulu
d.	Sindi	11	Mulayalam
e.	Marwadi	12	Cingalese.
2	Bengali	13	Gondwana?
3	Guzrathi	14	Maldives
f.	A. tohi		Laccadives
4	Marathi		
5	Concari		
6	Urya.		