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THE INFLUENCE OF A PARABOLIC MOULDING UPON
THE BUDDHIST ARCHITECTURE OF WESTERN
INDIA.

THE island of Salsette, or of the Sixty Villages, owes the peculiar loveliness of its scenery to volcanic eruptions, which at some time subsequent to the commencement of the tertiary period, have at this place burst through the trap of Western India. In the centre of this island the trap rocks are high, and form a crater-like basin, which is open on its western side towards the ocean, and which is occupied by hills and undulations of volcanic tufa. Two of these hills are perforated by Buddhist excavations, which are known by the name of the Kenneri caves. Some idea of their extent and character may be formed from the description given by Anquetil du Perron in the third part of his preliminary discourse to the Zend-Avesta, and the ground-plan which accompanies it; some further account is to be found in Fergusson's "Rock-cut Temples of India."

The extent of these excavations is greater than that of any other Buddh remains in Western India, and the establishment of that religion in this place has been so large that erections have been made above ground. The Buddhite excavations of Western India are of three kinds; simple cells for the residence of individual monks; large square caves, apparently used as schools, and excavations containing a chaitya, which again are either small and are possibly the burial-places of saints, or large and evidently intended for temples. The caves of Kenneri are peculiar in comprehending a vast number of cells, only a few square caves, and but one completed temple.

This temple is marked 3 "of the first stage from south to north-west" in Du Perron's ground-plan, and a section of it

is given in the octavo plate 8 of Mr. Fergusson's work. It consists of an outer court, a vestibule, and an apsidal chamber, in the apse of which is the chaitya. The sides of the vestibule are niches, containing colossal statues, (A in the section,) each of which stands upon a basement, A C, fig. 1. One of the mouldings, D C E, on this basement is of a form which seems peculiar to Indian architecture. The line D C is nearly a parabola, of which D is the vertex, F G the directrix, and F D E the axis.

This parabolic moulding is not seen in the apsidal chamber. The walls of the aisle are quite plain. The roof of the body is hewn into a very obtusely pointed arched roof, and is partially ribbed, but otherwise unornamented. The pillars behind the chaitya are plain octagonal shafts, without base or capital. Those which separate the rectangular part of the chamber from the aisle, and from which the roof springs, are all of the character of fig. 2, with some slight variations, which will be specified below. They consist of an abacus, capital, shaft, and base. The abacus is richly carved, and varies much in the sculptures which ornament it. This portion of every Indian order is very conspicuous, and Sanscrit architects have made its kinds to be two, which they have named the vira-kanth and the phul-band; the former comprehending all those which represent objects belonging to the animal kingdom, and the latter having sculptures referring to vegetable productions. The Kenneri abacus is always a vira-kanth. The cushion capital D, the neck E, and the roll F, the octagonal shaft, the roll G, the neck(?) H, the singularly shaped base I, and the square mouldings K, are the same in all the pillars. The beads J, which vary in number, being 28, 33, or 34, are sometimes replaced by a rope moulding. The diameter of the shaft seems to be 2.42 ft., and the intercolumniation 2.5 ft. It is probable, however, that the intercolumniation is intended to be a diameter. For the rock being a volcanic tufa, is in some parts a crumbling sand and in others

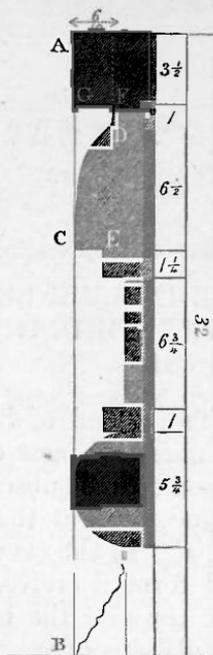


Fig. 1.

INDIAN ARCHITECTURE.

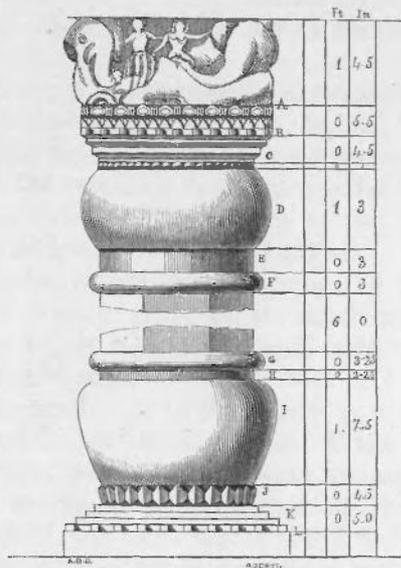


Fig. 3.

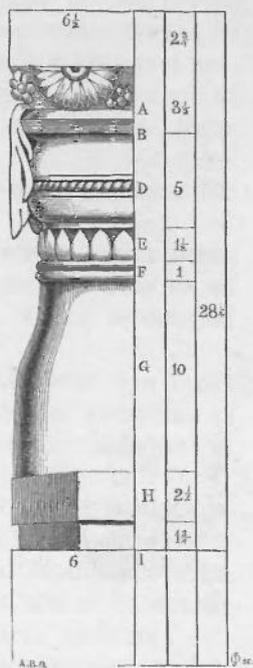


Fig. 6.

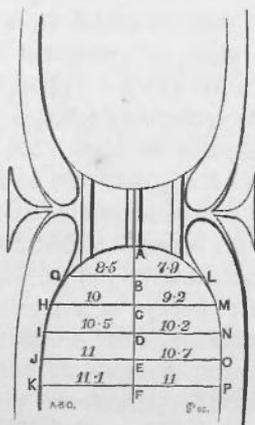


Fig. 5.

a hard jasper, and therefore as unfavourable to delicacy of work as can well be imagined. This circumstance seems to have caused the architect to despair of effecting his exact proportions, and to leave this to be accomplished by a coat of stucco, traces of which are to be found everywhere in these excavations.

Hence it is not possible in some cases to ascertain what the mouldings have been, as A, fig. 3.

This figure represents a portion of the screen which separates the vestibule from the apsidal chamber. It exhibits all the architectural characters of the screen, which is covered with sculptures and inscriptions.

The screen which separates the vestibule from the outer court is quite plain on its inner side, with the exception of some niches, which may have been subsequently fashioned in the naked wall.

The outer side of this screen is ornamented with sculptures of Buddhs and lotus flowers. A low screen at the entrance of the outer court is of a similar character, and of this a portion with its mouldings is given, fig. 4. This screen is strictly Buddhist, the lotus flower being their favourite emblem.

The parabolic moulding then has not been made use of in the ordinary ornaments of this temple. In the small cells, however, it frequently occurs, and its position is remarkable. In the excavations elsewhere, both of the Deccan and of the Concan, the rock being trap, the cells are openings in precipitous escarpments. But at Kenneri, the surface having a gradual slope, it has been necessary to form a little court in clearing away a sufficient height for the front of the cell; and into this court the water, during the rainy season, must pour down from the slope above. Just at the edge of the slope, where the water would thus run over, there is cut a parabolic moulding, remarkable for its magnitude and boldness.

The cells have very frequently, carved on a pillar or some smoothed surface, the emblem, fig. 5; sometimes it is the only ornament to be seen. The curve is evidently that of the parabolic moulding. In one instance the stone appeared so smooth and the lines so fine that it seemed possible to ascertain whether the curve is truly parabolic. Accordingly the measures $AB=BC=CD=DE=EF=3$ in. being laid off, and GBL , HCM , IDN , JEO , KFP , being drawn perpendicular to AF , the following measurements were made:

BG=8.5 inches.

CH=10.0

DI=10.5

EJ=11.0

EK=11.1

BL=7.7 inches.

CM=9.2

DN=10.2

EO=10.7

EP=11.0

From these measurements it results, that the figure has been very roughly drawn, since it cannot have been made symmetrical to any axis. It is much nearer a circle than a parabola, and was probably intended to be a semicircle, IAN being produced in tangents IK and NP. It nevertheless has so parabolic an aspect, that these measurements do not raise a valid objection against considering it as a rude effort to construct a parabola; for the Buddhs, when they formed this symbol, must have had in their minds the idea of that curve. The above measurements, moreover, proving the inability of these monks to construct a parabola, shew that the conic sections were unknown to them.

In some instances, four of these symbols having been cut on opposite sides of a square pillar, their lines have been used as guides in cutting away the pillar, and thus an ornamented band has been formed round its centre.

Besides the plain octagonal column without base or capital, and the order (figs. 2 and 3) above described, there occurs at Kenneri only one other order, which for the sake of distinction will be called the balustrade order, and of which the varieties will now be described.

Fig. 6 is a balustrade pilaster, forming the side of a niche on the inner side of the screen, between the vestibule and outer court. The capital, D, is of the cushion form, but differs from the cushion capital of fig. 2. in having a rope moulding round its centre. It is also cleverly converted into a water vessel, its brim, AB, being formed from the basement of the vira-kanth (of fig. 2); this form of abacus being transformed into lotus flowers in full bloom, from the midst of which foliage depends. The neck of the column is ornamented with lotus leaves. The roll (F, fig. 2) is converted into a double roll, F. The shaft is not octangular but round, and is remarkably short, not being a diameter high; and further, it is not cylindrical, but sweeps off so as to have the parabolic character of the moulding. This shaft stands upon two octagonal plinths. Below these is a plain square pedestal about as high as the rest of the pilaster.

Fig. 7 is a pilaster in a cell adjoining the temple. In this the tall pedestal has been banded, which is an improvement upon fig. 6.

Fig. 8 is in a cell which forms part of a square cave. The shaft, neck, and capital are fluted. The neck is double. The foliage, pendant in fig. 6, is here raised, and becomes the true ornamental abacus called phul-band.

Fig. 9 represents one of two balustrade columns which attract the eye of the visitor as he ascends to the first platform. The excavation of which these columns form the entrance has been left incomplete. The intention of the monks had been to make another temple, but they have only just made a beginning. These columns themselves are unfinished. The abacus, A, has not been carved, B has not been moulded, the band round the cushion capital is plain. The neck is not cylindrical, but narrow below, and is separated from the shaft not by a single or double roll but by a canal. In the varieties of this order above described, the outline of the shaft is a curve of inflection, but this has the simple parabolic curvature of the moulding.

Fig. 10 is the outline of an imperfectly finished pillar, in a square cave, which has been commenced at the most remote part of the monastery, beyond the Asoka grove, which occupies the ancient artificial lake. The shaft is exactly similar to that of fig. 9, except that the upper half of the neck is converted into two mouldings, the canal E is omitted, and thus the lower part of the neck is confused with the shaft, whose outline then becomes a curve of inflection.

This comparison seems to shew that there is some intimate connection between the balustrade shaft and the parabolic moulding.

The columns (fig. 11) of the Elephanta cave belong also to the balustrade order. The abacus is a thin phul-band. The

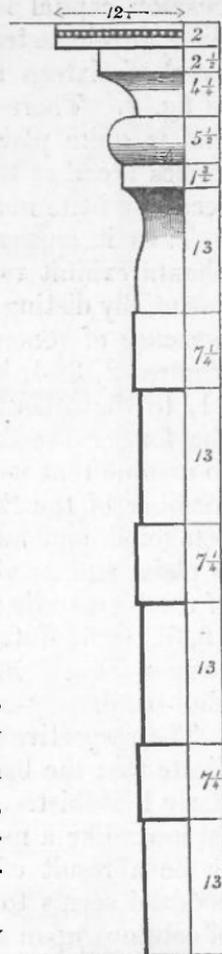


Fig. 7.

cushion capital is wider than usual. The neck is intermediate in character, between fig. 9 and fig. 10. A polygonal band of sixteen sides is substituted for the circular band G of fig. 2. There is no base. The pedestal is eight feet high, and is quite plain, with the exception of a band seventeen inches broad at the top, and the corners at A being cut off to receive a little image of Ganesh.

Thus it appears that the excavations of Salsette and Elephanta exhibit two distinct orders of architecture, which are essentially distinguished from one another by the absence and presence of something resulting from the parabolic moulding. Figures 2, 3, 4, belong to the one, and 1, 5, 6, 7, 8, 9, 10, 11, to the other. The latter has been called the balustrade; the former I will call the Early Buddhist, without intending to assume that it is earlier than the balustrade. The lowest member of the Early Buddhist order is a base; its shaft is octagonal, and has vertical lines straight; its cushion capital is plain, and its abacus is a vira-kantha. The lowest member of the balustrade order is a very high pedestal; its shaft has 16, 32, or 64 flutes, or is round, and vertical lines curved; its cushion capital is encircled with a band, and its abacus is a phul-band.

The respective peculiarities of these two orders seem to indicate that the balustrade is chronologically subsequent to the Early Buddhist. For, first, the band round the cushion capital looks like a modern addition. Secondly, the flutes appear to be a result of the simple octagonal form. Thirdly, the pedestal seems to be a recent idea arising from the elevation of columns upon screens or basements, which is very frequent, and has been quite necessary for comfort in the construction of cells; the wall forming the basement being afterwards all removed, except that which, being under the pillar, was necessarily left, a cell would thus have a front of columns upon pedestals. Fourthly, although the neck exists in the balustrade order, the architects seem to have been puzzled in attempting to adapt it to the essential characters of this order; since they have made it of every possible variety, as though they wished to retain it from old custom, notwithstanding its incongruity. Lastly, the presence of every architectural idea belonging to the Early Buddhist, with the addition of another idea (the parabolic) in the balustrade order, seems a reason why the more modern date should be assigned to the latter.

INDIAN ARCHITECTURE.

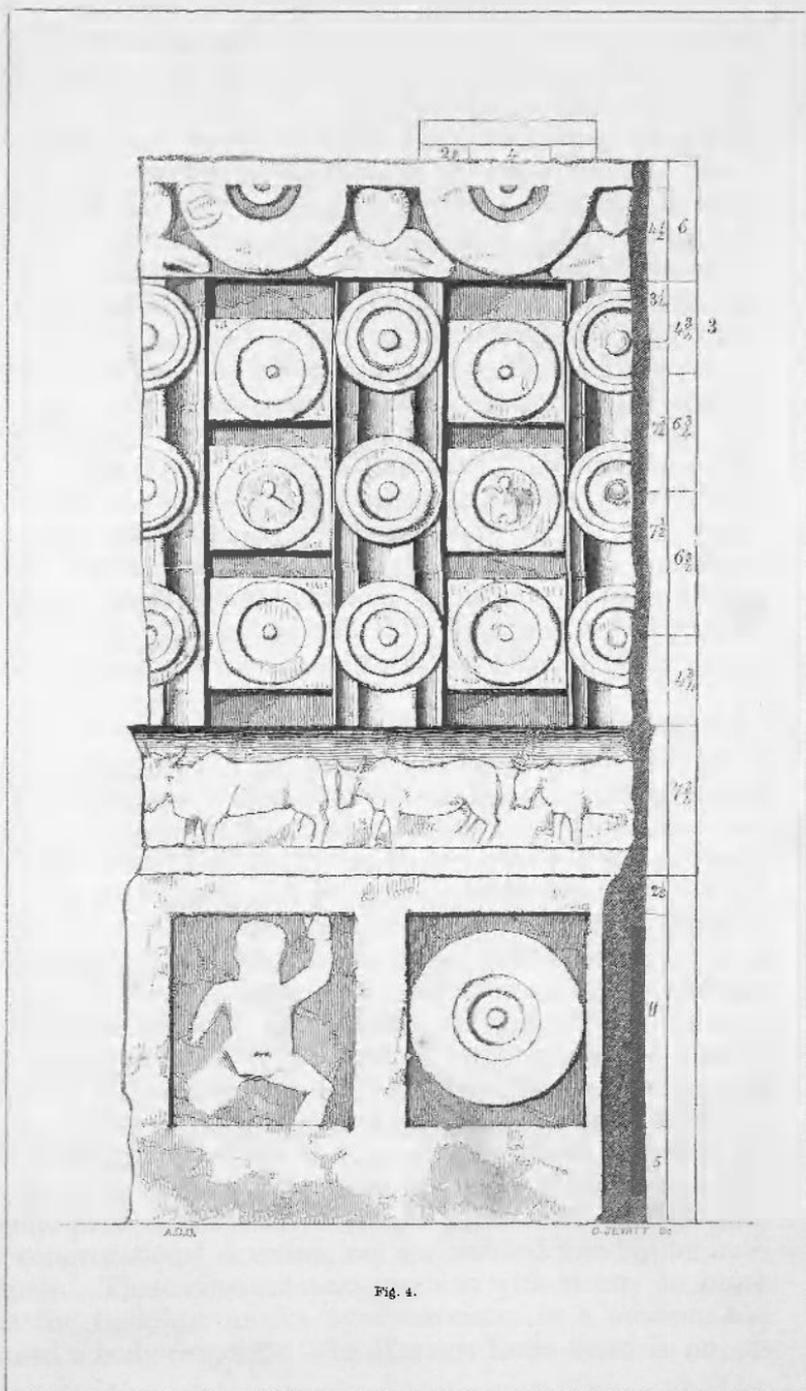


Fig. 4.

Again the balustrade order appears only in that part of the great temple which must have been the subject of the excavators' most recent labours. The manner in which the monks commenced and proceeded with their excavating operations for a temple may be learnt from the unfinished work to which the column (fig. 9) belongs. First, an outer court was cleared; then the vestibule was excavated, the walls being left bare to be cut hereafter, as might be convenient; next several adits were simultaneously commenced; one at the top to form the roof for the nave, and to fashion the opening for light; and others below into the aisles and body of the building, under the upper adit. Thus all expedition was made to complete the essentials; but the ornament was left for after work. As many workmen, indeed, could not have been simultaneously employed on the adits, some might be engaged on the next important parts of the vestibule and outer court. The image niches, however, would have been last attended to. And since the great temple has the parabolic form only in these niches, and its essential parts are all Early Buddhist, it follows that these are earlier than those which have traces of the parabola.

The nature and purpose of these excavations cannot be satisfactorily known until the Buddhist history has been more fully investigated. Enough, however, has been already ascertained to bear upon the relative antiquity of these two orders. Buddhism originated in the north-eastern provinces of India, and was propagated thence by missions composed of large bodies of monks. The numerous excavations in western India bear internal evidence how the operations of the missionaries were then carried on. Throughout the Concan are found single caves, or small clusters of caves, consisting each of a room and verandah, adapted for the habitation of a single person. If the cluster is large a chaitya will be found; and if the cluster is yet larger a large chaitya temple is added. The arrangement of the clusters of cells shews that they belonged to a cœnobitic, and not to an eremitic body. The ground-plan of the chaitya temple proves that it was used for congregational devotion, not for isolated worship by individuals. These circumstances combine with history to prove that the Buddhist monks were associates in a mission, and formed a body corporate. In Western India there is no ex-

cavation which seems so likely to have been the head quarters and original settlement of the western mission as Kenneri. No other large excavations have yet been found in the Concan. Above the Ghauts the nearest large monasteries are Nassick, Jooneer, and Carlee, neither of which can be compared to Kenneri. All these, therefore, and all the little cells, were probably dependencies on Kenneri. Here probably the first mission fixed itself; and its first care would have been the excavation of a large chaitya temple, the centre of Buddhist adoration, and the means of preserving unity among the whole body. Hence it is reasonable to suppose that the Early Buddhist columns and screens were the very first efforts of Buddhist architectural skill in Western India.

Following out this historic idea, it may be supposed that the essentials of the great temple being completed, the monks proceeded with their own dwellings. In these the parabolic moulding is conspicuous, and in a situation where a reasonable account may be given of its origin. The rains in the Concan are very heavy, and the nature of the rock exposed them in a peculiar manner to their violence; on which account the monks have put out much ingenuity in constructing channels to drain off the water into cisterns, where it has been stored up against the dry season. Engaged with peculiar interest on the phenomena of hydraulics, contemplative minds, which delighted in the study of nature and art, observed the parabolic curve in which the water poured over the eaves of their dwellings. At the first settlement those eaves may have been cut square, presenting an architrave of the same style as fig. 3; and when they saw the water wearing away the edge and marring their work, they would naturally conclude that this would not occur were the rock cut in the same curvature as falling water. Such seems to have been a natural origin to this peculiar moulding; and if there be no mistake in the above reasoning the parabolic moulding must have originated in the Kenneri caves.

After their own dwellings, the ornamental part of the great temple probably engaged the attention of the monks: and the colossal statues of the vestibule may have been sculptured where the parabolic moulding is used, fig. 1.

Underneath a statue in a niche, the sides of which are ornamented by pilasters, of which fig. 6 represents one, is an

INDIAN ARCHITECTURE.

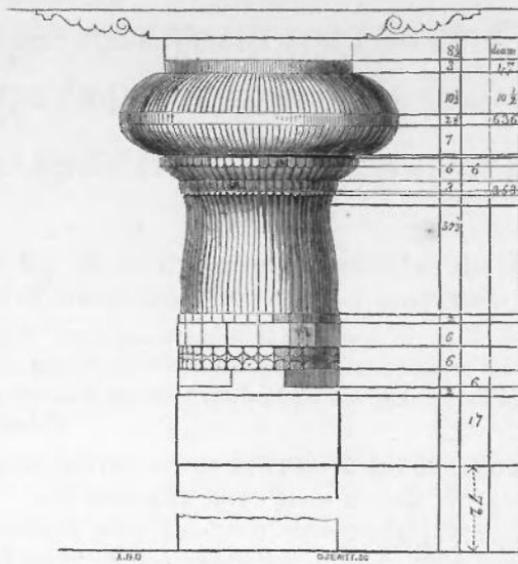


FIG 11.

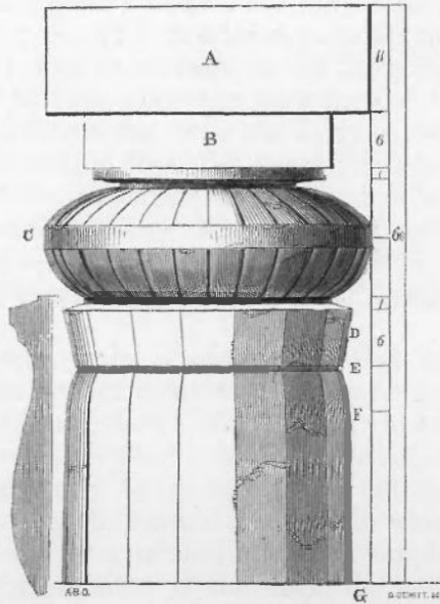


FIG 10

FIG. 9

ॐ बुद्धाय नमो भक्तकर्मणः
 सुप्रसादात्पद्मनाभः
 शक्येण भिक्षुः
 शक्येण भिक्षुः

Fig. 12.

inscription, fig. 12, in the cave character, in the Sanscrit language, and of which the following is a translation :

“ A pious offering to the image of the Blessed, by the Shakya mendicant, Buddh-Ghosh, inhabitant of the house of sweetest smells, the beloved disciple of the doctors and spiritual teachers for the imitation of the discipline of the blessed Buddha.”

This statue serves no architectural, no devotional object in the temple. It seems to have been merely the grateful offering of a devotee, who has been enabled to place his gift in an unoccupied part of the vestibule. Such offerings would not have been made before the missionaries were quietly settled in their abode, and all which could satisfy the eye had been completed in the great temple. For these reasons the pilaster of Buddh-Ghosh must be considered posterior to the parabolic moulding fig. 1, and much more to the Early Buddhist work. But it seems to have been the very first of the balustrade order, for it diverges less from the Early Buddhist than any other. The transition from the ancient cushion capital to a water-pot, and the conversion of the vira-kantha into a phul-band with pendant foliage is pretty and simple ; and this truly Buddhist conception affords a satisfactory explanation of the peculiarities of the other varieties of balustrade capitals and abaci.

As the objects of the missions succeeded, and the neighbouring princes became converts, it became necessary to construct halls, and in these we find the order to be balustrade.

When the monastery had reached its maximum importance it was found necessary to excavate both a new hall and a new temple. Following the natural direction in which the excavations had spread from around the first temple, these were opened at the extremities of the town, the latter as near the original temple as possible, the hall in a beautiful, but rather remote spot, beyond the ancient artificial lake now occupied by an asoka grove. Unfinished as the columns in them are,

their proportions have diverged more from those of the Early Buddhist than any other of the Kenneri balustrade order. Such excavations would not have been designed except in the most flourishing condition of the mission; nor would it have been suspended voluntarily under such circumstances. It is necessary therefore to suppose that the monastery was suppressed by violence, and that figs. 9 and 10 exhibit the style of architecture at the epoch of suppression.

The excavation at Elephanta has been made by worshippers of Shiva, of whose worship and legends not a trace exists in the Buddhist caves hitherto discovered. According to tradition, the worshippers of this god and the disciples of Buddha long contended for the exclusive patronage of the Indian princes, until the chieftains who supported their respective pretensions met in a general assembly, where the wisdom and eloquence of Shankaracharya, the Shivite leader, gained so decisive a victory that the disciples of Buddha were compelled to emigrate. Proof has already been given that the Buddhist caves of Kenneri were suddenly deserted at a time when the architecture in fashion there was of the same character as that in fashion at Elephanta. This then may have been the epoch of Shankaracharya's victory. At all events the existence of the same style, belonging to opposed religions, within a few miles of one another, proves that the one religion must have subverted the other; and the desertion of Kenneri at that time shews that the Shivitic faith did then achieve some victory in the Concan.

Perhaps the moulding, fig. 13, may afford some clue to this date. It runs round the doorway of a temple in the smaller excavation at Elephanta. Probably, however, this is of later

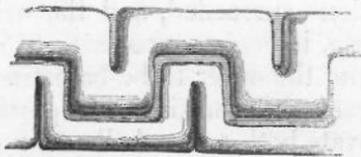


Fig. 13.

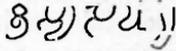


Fig. 14.

date than the large excavation, since the small basement- (fig. 14) is added to the foot of the pedestal of some of its pillars; and the object of this addition seems to have been to relieve the unsightly uniformity of the fashionable pedestal.

The lotus and the elephant are the most frequent and conspicuous subjects of Buddhist sculpture. The former is the flower and the latter the animal which Hindu legends associate especially with water and rain. The parabolic moulding therefore seems to have an intimate connection with the mystic ideas of the Buddhists; and hence it seems to have obtained such an extraordinary ascendancy in their architecture.

On comparing the letters of the inscription (fig. 12) with Mr. Prinsep's table of "Modifications of the Sanscrit Alphabet," (Journal of the Asiatic Society of Bengal, vol. vii. pl. 13,) it appears that two of these belong to the fifth century, B.C.; two to the third century, B.C.; and six belong decidedly, and seven may be referred, to the second century, A.D. The pilaster of Buddh-Ghosh, and consequently the commencement of the balustrade order, may therefore be unhesitatingly referred to the second century.

On the rough wall of the unfinished hall to which fig. 10 belongs is cut an inscription in Sanscrit and cave characters. It is a mere scribble. Ball  Gangadhar Shastir, a learned brahmin, who had long been engaged on these antiquities, (and who furnished me with a translation of the other inscription, which I have lost, but which I believe is identical with that I have given above,) could make nothing out of it. But the second letter seems decidedly to refer it to a time not very long after Buddh-Ghosh, so that the balustrade order could not have existed long at Kenneri.

Subsequently to the suppression of Kenneri the balustrade seems to have undergone the following modifications:

I. The square pillar of fig. 11 was cut octagonally. See Vihara Cave Adjunta, No. 7; Fergusson's Rock-cut Temples of India.

II. To apply another remedy to the same defect the pedestal was cut pyramidally, as in the Doomar Lena of Ellora.

III. A rich ornamental girdle encircled the balustrade shaft, which is thereby obscured and confounded with the pyramidal pedestal. This variety is very stumpy in its proportions, and this character is increased by a rich deep border which edges the pedestal. Lanka, Ellora; Fergusson, pl. 16.

IV. Neither the pyramidal form nor the octagonal shaft being sufficient to relieve the extreme plainness of the immense pedestal, the flutes of the shaft were continued down it, which thus became nearly cylindrical. Consequently the

balustrade shaft has more the appearance of a capital, and the pedestal of a shaft resting upon the ground, without the intervention of either base or pedestal. In some instances the figure of an animal is inserted below the fluted pedestal, and seems like a base similar to the *vira-kanth* under a shaft. *Adjunta* and *Mehavellepore*; *Fergusson*.

The above varieties of the balustrade order represent it in a state of degradation, and the effect of the balustrade shaft is destroyed by other ornaments. This may be considered as the third Buddhist order, and called the post-Kenneri balustrade. Subsequently the balustrade shaft was entirely omitted, and thus a fourth order of Buddhist architecture was invented, whose varieties appear as follows:

I. The pyramidal basement of the second variety of the post-Kenneri order remaining and cut octagonally, it immediately supported the cushion capital. *Adjunta*, No. 11; *Fergusson*.

II. The cushion capital has disappeared. The polygonal pedestal has become a true shaft, which sometimes supports a plain square abacus and mouldings, (No. 17, *Adjunta*; *Fergusson*;) in other cases there is a *phul-band* and a second ornamented abacus, besides rich mouldings, (No. 16, *Adjunta*; *Fergusson*;) and in other cases figures replace the foliage of the *phul-band*, which thus becomes a degraded *vira-kanth*, (No. 19, *Adjunta*; *Fergusson*.) In all these cases the pedestal stands upon a small base, similar to the upper part of the pedestal of *Elephanta*.

Such are the changes which Buddhist architecture has undergone. It seems to have passed into Western India from some foreign land. Introduced there, however, it assumed in the second century a new form, owing to the invention of the parabolic moulding, and to the conformity of this with some mystical principles of Buddhist faith. Thus were originated the varieties of the Kenneri and post-Kenneri balustrade orders. In them human ingenuity vainly laboured to reconcile the balustrade with principles of architectural beauty; and after many efforts was at length constrained to reject this peculiarity altogether, and produced the post-balustrade order. This is in fact a return to some of the simple principles of beauty in the Early Buddhist. And yet it was not a satisfactory return; nor has the Hindu architect ever since been able to recover the comparative excellencies of the Early Buddhist pillars in the Kenneri caves.