Gauhati Monuments : Rock Types and Sources

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Over the years, Indian art-historical studies have moved out of its traditional confines of style and chronology. A whole range of problems, considered inconsequential in earlier writings, started assuming greater importance. Attention is now being paid to what Philip Rawson termed as 'purely physical aspect of the techniques of Indian sculpture'1. In so doing, certain dimensions in particular have gained urgency. The linkage between the material, their findspot and the context of the monument is one such relevant issue in the context of expanding frontiers of Indian art-history.

The problem had been peripheral to the pioneering works on India art and archaeology. Nevertheless, these studies did identify the materials and their probable sources. For example, Chunar sandstone was identified as material par se for the Mauryan pillars and animal figures, as also for a great number of Gupta period sculpture from Eastern India. Similarly, Mottled Sikri sandstone was recognised as the material for Mathura statuary, bluish schist for Gandhara sculptures and Granite for much of the Deccanese art. However, very little attempt was made to relate the material to the findspot of a monument. Whatever scanty information is available till date, does not throw any light on the North-Eastern portion of the sub-continent. Even the recent works on art and archaeology of the region, published between 1978 and 1985, chose to overlook this dimension of the North East Indian art. It will be our endeavour, in the present paper, albeit brief, to focus upon an important centre of North-East Indian art and archaeology, viz. Gauhati and to examine the problem on the basis of field-data and excavated material. A word about the title. We have restricted our enquiry to the Pre-Ahom Monuments (detached sculptures, rock-cutfigures etc) of Gauhati on the Southern bank of the Brahmaputra river.

Historical Setting

Located between 91.34 and 91.49 East Latitude and 26.08 and 26.31 North Longitudes, Gauhati (Guwahati) in the Kamrup district of Assam is one of the most important settlement sites in North East India with its occupation history going back to the early historical period. Historians and linguists have long debated over the antiquity of the site and its possible identification with *Pragjyotisapura* and *Kamarupa Nagara*. The evidence cited in this connection is exclusively textual, and sporadic references to *Pura* and *Nagara* in the inscription fail to provide proper understanding of the nature of the settlement. However, out of the conflicting and often confusing mass of textual information two important features of *Prag-Jyotisapura* emerge, (1) it was a fortified settlement and (2) it was an important religious centre. Three texts, viz. Udyoga Parva of the *Mahabharata*, the *Bhagavata Purana* and the *Kalika Purana* cited by B. K. Kakati[2] bring out these aspects. Similarly, the *Garuda Purana*[3] oevidence relating to the location of Kamakhya within Kamarupa is sufficiently suggestive.

The problem should, however, be viewed from the more specific archaeological angle. The recent excavations at Ambari,[4] on the heart of the city has revealed at least three constructional phases of what was most likely a religious centre and a habitation site characterised by the building ruins, drains, ring well potsherds and stone sculpture. A perusal of its stratigraphical sequence reveals two broad cultural periods. Period I tentatively datable between C. 7th and 12th century A.D and Period II between 13th and 17th centuries A D. A more definitive evidence comes from a charcol sample collected at a depth of 1.02 m (Trench AG X-I-2161. Layer-3) which yielded a C-14 date[5] of 1030+150. Seventh century is,indeed, a significant period for the site, the epigraphic evidence and Hsuan- Tsang's account indicate the existence of a powerful Kamarupa state during this period. One can probably envisage Urban experience at that point of time. The Ambari excavation data has to be compared with the eye-witness account of Hsuan Tsang[6] who commented on the absence of any principal city and whose cryptic statement on the abune dance of 'streams and tanks' in the towns hardly indicate any distinct urban character.

Whatever might have been the nature of its settlement, the available evidence, though very scanty, indicate that the earliest settlements were located around Kamakhya, thus validating B. K. Kakati's assumption about the antiquity of the cult spot. Loca-

tion of one of the earliest record from Assam viz, Umachal Rock Inscription [7] is not without significance. Carved on the north-eastern slope of Kamakhya Hill, this cryptic 5th century inscription records the excavation of a cave for Bhagavata Balabhadrasvami by *Maharajadhiraja* Surendra Varman. The record was, in all likelihood, meant to convey a royal decision to the subject. One can, assume that by the 5th century A D. or even before that, this part of Gauhati was inhabited probably because of its cultic importance. The other important aspect is the use of iron tools (chisel and hammer) without which the inscription cannot be carved. P. C. Choudhury [8] dates the Kamakhya hill remains from 7th-8th century, but, clearly, the site goes back to a still earlier date.

As indicated earlier, 7th century seems to be the most important period for urban expansion at Gauhati, as also in the Brahmaputra Valley. However, due to a variety of factors, including the re-building of the city after the British occupation, the face of the city has undergone drastic changes. K. L. Barua [9] observed : 'some 50 years ago, the foundations of an old stone and brick enclosure wall in the eastern part of this town were dug up in order to find out stones to be broken into road metal. Numerous carved and chiseled stones were broken into fragments to provide road-metal. Some were preserved, not by the authorities, but by individuals taking interest in relief of antiquities'.

The extent remains do indicate the consolidation and spread of settlement along the Brahmaputra as also into the interiors of the present city-limits. Kamakhya Hill continues to remain important. Along the three routes, leading to the present shrine, there are rockcut figures and architectural designs detable, on stylistic ground, between 8th-12th centuries.[10] The carvings indicate an extensive and standardised iconographic programme dominated by the figure of Ganesa. In addition, seated Visnu, Linga within shrine, Surya, Camunda are found carved along the main routes. There is a clear preference for rock-cut imagery due to the availability of excellent granite surface, but sculptures carved out of detached granite gneiss are also known.

Apart from Kamakhya, a number of cult sites developed along the banks of Brahmaputra. Availability of tractable rock as well as the sanctity attached to the river must have contributed to this stray remains have been noticed in different parts of the city. Uzan-Bazar, Jorpukhuri, Judges Field, Chalabil, Deputy Commissioner's residence and Sukresvar Ghat, to name a few. Certainly the most representative example are the Sukresvar Ghat figures[11]. Carved

on the granite gneiss cliff, the images of five principal deities of the Hindu pantheon indicate thorough standardisation of iconography. Datable to 8th-9th centuries A. D.,these sculpture further establish the impact of Post-Gupta and Eastern Indian idiom on the Kamarupa style. In the interior, rock-cut figures are noticed in great number in Kahalipara (Narakasur Hill) the dominant theme being Ganesa. Kahalipara has also yielded a hoard of metal images[12] some of which are product of distinctive local idiom, while some others are imports from neighbouring South-Eastern Bengal. One of the bronze image, according to the inscription, was cast during the time of Harjaravarman, whose reign period can be placed in the first half of the 9th century.

Rock-cut sculpture seem to be the natural choice of the artist, but the ateliers also made judicious use of the locally available stone. The most significant evidence comes from the Ambari excavation. The site is particularly rich in stone sculpture. So far three hundred and one sculptures have come out in course of three seasons' of excavations.[13] They represent all the four principal iconic types, viz Visnu, Surya, Devi, Siva as well as some of minor varieties like Agni, Ganga, Yamuna, Muni or Danapati etc.

There can be very little doubt that Ambari site represented an ancient atelier. Prof. T. C. Sharma has drawn our attention to two important finds : an iron chisel in badly corroded condition and a stone chisel along with a tool sharpening whetstone showing smooth grinding face. Besides, the excavation has also unearthed large quantity of finely carved and dressed blocks of granite and granite gneiss as well as undressed square and rectangular block of the same rock-types. We have tried to show in the following section (sec II) that these rock types are locally available. The entire corpus of sculpture can broadly be divided into two categories in terms of size. The bigger sculptures range in size between 1.98 to 1.80 m, while the smaller sculputer which are six time higher in number than the bigger pieces range in size between 15 CM-20 Cm. approximately. One can probably surmise that the bigger sculptures were carved in response to the needs of affluent patron and meant for installation in shrines. And the smaller sculptures, produced in bulk without much concern for details catered to the needs of common people, their use restricted to private shrine. [14]

II

Rock Types & Sources

In this section, our attempt will be to identify the main sources of rock-types used in the early monuments of Gauhati. We will

also examine as to how the physical features of the rocks contribute to the nature of the carving. The survey is a preliminary one, and the observations arrived at in the process should be viewed accordingly.[15]

Around Guwahati the inselbergs of granitic rocks occur as islands in a country of silt soil-clay. The sediments, carried by the mighty Brahamputra river are deposited in the flood plains. Rivers and streams flowing along gorges bordering the Meghalaya plateau also carry boulders, pebbles, sand, silt and clay in suspension which are deposited in the foothill regions where the streams debouches into the plains. Silt and clay are carried to the Brahmaputra river.

The inselbergs have developed deep brown soil due to alteration of rocks. Soil profile in many places show gradation from unaltered rock to deep brown soil. Fresh unaltered rocks are exposed almost in all of these inselbergs. Such fresh rocks and exposed surfaces of rocks have widely been used for sculpture. There are a number of quarries some of which could be identified as ancient, (See: Map) These quarries have supplied rocks for sculputure. The Ganesha carving of Phatasil-Ambari quarry exhibit same degree of alteration as also the stray boulders of the abandoned quarry. Some of the quarries were later reworked. The pinkish and white coloured very course grained porphyritic granite are easily quarried and all the present day quarries, except the one in the foothill of Lankeshwar are on porphyritic granite. Granite gneiss is most suitable for sculpture and old quarries are situated mostly on granite gneiss. Some of the ancient abandoned Quarry sites are :

1. Phatasil Ambari
2. Southern foothill of Nilachal Parbvat.
3. South of Durgasarobar.
4. Maj Bargaon.

Guwahati and its surroundings expose a suite of Granitic rocks. Other rock types have limited occurance restricted to particular locality. These include highly foliated flaggy gneiss, amphibolite and Feldspathic Quartzite. The rocks of Guwahati used for sculpture can be grouped under the following categories.

I. Granites and Granite Gneiss : This includes
   a) Granite gneiss.
   b) Porphyritic granite.
   c) Fine grained Granite.

II. Amphibolite

III. Highly Flaggy Gneisses.

Physical propertiies of the rock types have determined the nature of sculpture. Main physical properties determining suitableness include,

1. How easily boulders of desirable size could be obtained.
2. Splitability or flaggyness. Less the flaggyness more the rock is suitable for sculptors. A flaggy Quartzite has been used in Ambari for carving a huge Nataraja, currently on display at Gauhati Museum.
3. Natural surface texture of the rock. A character directly related to the mineral constituent and fabric relation of the mineral constituents.
4. Nature of polish the rock can take.
5. Susceptibility to chemical alteration. This determines the softness of rock surface and durability of polish.
6. Geomorphic expression of the rock type. A particular rock type is exposed with a particular Geomorphic expression. For example, the Porphyritic granite terrain is very rugged, typically with narrow streamlets and the exposures are in the form of spherical to subspherical boulders; while the granite gneiss one expressed as smooth hills, and provide smooth walls for rock sculpture.

I (a) Granite Gneiss.

It is a compact light grey to light pinkish grey rock with strips of dark coloured constituents mainly Biolite and Magnetite. The rock has a wide spread distribution along the Northern face of Nilachal hills, Urbashi Hills, Shukleshwar Ghat, Phatasil Ambari, South of Durgasarobar, Narkasur Hills and the hills around Dispur.

The rock wall on these hills have a smooth surface. The surface shows presence of fracture which are not closely spaced and big boulders can be obtained. Compactness is very high and it is not possible to break huge boulders without high power blasting. Loose rolled boulders only were taken for carving out the figures. The rock is made up of an aggregate of very fine to medium grained (less than one mm to 5 mm) quartz and feldspar. The artist working with this rock have a good control on chiseling and it is possible to affect desirable degree of polish. The rock does not alter readily, as a result the polish given is long lasting. Smooth surface texture and very fine grained nature make it possible to produce fine sculpture. Consequently sculptures carved out of

this rock have finer details like beeds of ornaments or Jewels in rings etc. Texture of the rock surface is disturbed to varied extent by presence of other rock types. In Shukleshwar Ghat the pegmatite vein within six inches of the (Fig. 2) Vishnu figure is one exaample. Rock walls, rolled boulder on hill slopes and also quarried blocks-are used for sculpting images.

1 (b) Porphyritic Granite

Porphyritic granite consists of Quartz, Feldspar and Biotite. It is a very coarse textured rock. The surface has a granular rough expression. Feldspar, a mineral constituent of this rock which is easily alreted by the chemically active natural reagent occurs as large tablets as big as 4 cms x 2 cms. feldspars have good clearage, the spacing between two clearage plane is of the order of few angstrom. Biotite grains are also larger and occurs in farely good amount. The rock is less compact than granite gneiss and present day quarries are all making use of this rock. The rock is easily weathered. Fresh unaltered rock can be given good polish but when exposed to moist air of Guwahati the polish does not last long. Very coarse texture with insets of soft feldspar grains and interstices filled by finer grained aggregate of Quartz, Feldspar and Biotite is a characteristic which prevented the sculptor in using for sculpture with finer detail.

Only in selective places rock walls of porphyritic granite have been used. Nowhere drifted rock boulders or quarried boulders have been taken. The sculptures include crudely finished Ganesha, Temple model, (Fig. 3), Shiva linga etc in Kamakhya Hills. An attempt was taken to give bright polish which have survived in areas on the sculptured surface sheltered from weathering process. Polish is lost from most part and the rugged surface has resulted from weathering.

1 (c) Very fine grained Granite

The rock aparently looks like compact sandstone and where altered may be mistaken for sandstone. It is a very fine grained light grey to light pinkish grey rock. The mineral constituents of the rock include Quartz, Feldspar, Biotite and Magnetite. Stain due to leaching of iron from Biotite and Magnetite often imparts a brown coating to the surface.

Softness and very fine grained texture of the rock enables one to use it for smaller sculpture with finer detail. The artist can have good control over his tools while chiseling the surface. For sculptures around half foot or less in length this rock type have been exclusively used. Bigger sculptures collected from Ambari excava-

tions have made use of this granite. This granite has restricted occurrence and extensiveness is also limited. Roeled rock boulders are avaiable very rarely : Unlike Granite Gneiss the rock does not offer wide smooth rock wall. But for Shiva Linga inside the main temple of Shukle-swar Ghat, rock walls sculpture are not found anywhere.

II. Amphoiblite

Amphibolite are dark grey coloured mineral. In the surrounding of Guwahati amphibolites occur in a number of places. Granites and granite gneisses forming the hills and mound of Guwahati contain small patches of Amphibolite which vary in width from few metre to 20 meter. The rock is softer than Granite and Granite Gneiss but it is very difficult to obtain blocks of considerably big size. Loose boulders available on the hill slope or streams have been collected and used for scuplting. Idol of Ganesh acollected from Ambari, Indra and Brahma collected from Bharalumukh are made up of similar rock types. (Fig. iv) The rock can be very coarse or very fine grained. The rock when polished gives the appearance of basalt or dolerite. Presence of Amphibole and Biotite distinguishes them from Basaltic rocks. However in some examples disloged Amphibolite boulder of reasonably big size have been used for a sculpture with finer detail. A property polished finish is its characteristic feature. It is worth mentioning that basalts and doloerites are not found in the vicinity of Guwahati town.

III Highly flaggy Gneistes

Flaggy Gneisses have considerable areal extent. This rock type being very soft cannot be used for cerving figures.

The yellowish buff coloured Nataraja of Phatasil is a unique example where flaggy Quarzite has been used. A dislodged slaby boulder of Quartzite is chosen for the sculpture. Aparently the rock looks like siltstone. Careful observation at a broken place exposing fresh rock surface has revealed the rock to be a muscovite quartzite speckled with deep pink garnet. Generally quartzite by virtue of its property to break with conchoidal fracture and being very hard, is not used for sculpture with fine polish. This quartzite is soft due to muscovite content and a smooth polish could be given. Around Guwahati Quartzites are found only rarely.

Acknowledgement

We are thankful to Prof T. C. Sharma of Gauhati University for allowing us to utilise Ambari material; to Dr. R. D. Choudhury,

Director of Museum, Assam for access to Gauhati Museum sculptures, and to Shri S. Nandi for the potographs. Financial Support for the work has come from the Indian Council of Historical Research, New Delhi.

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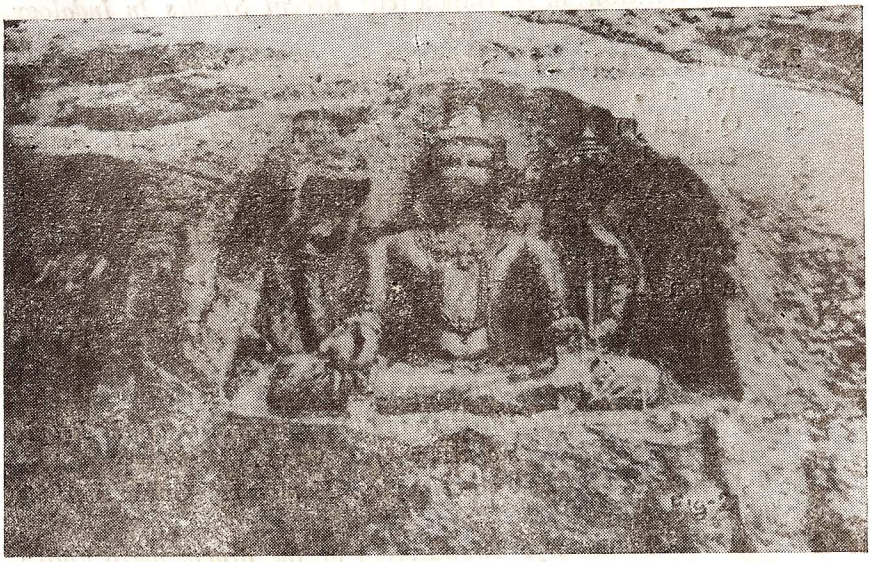


Fig. 2

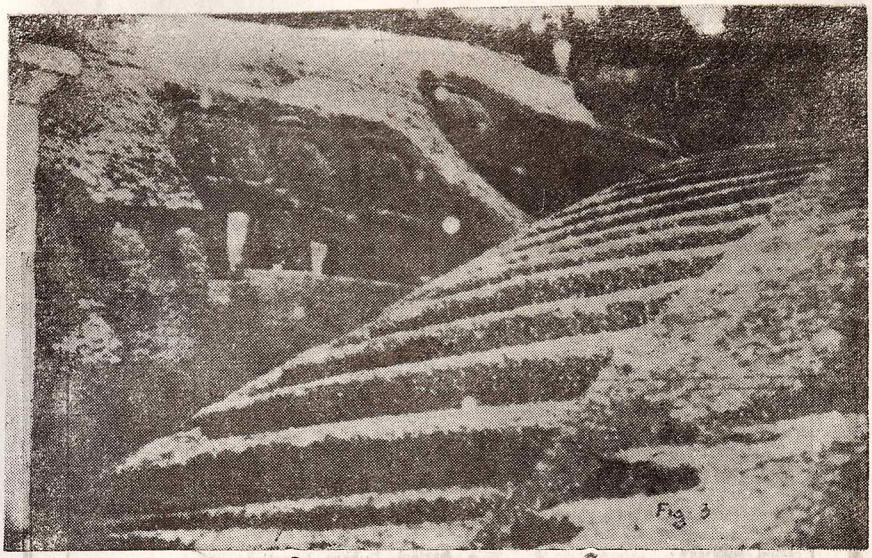
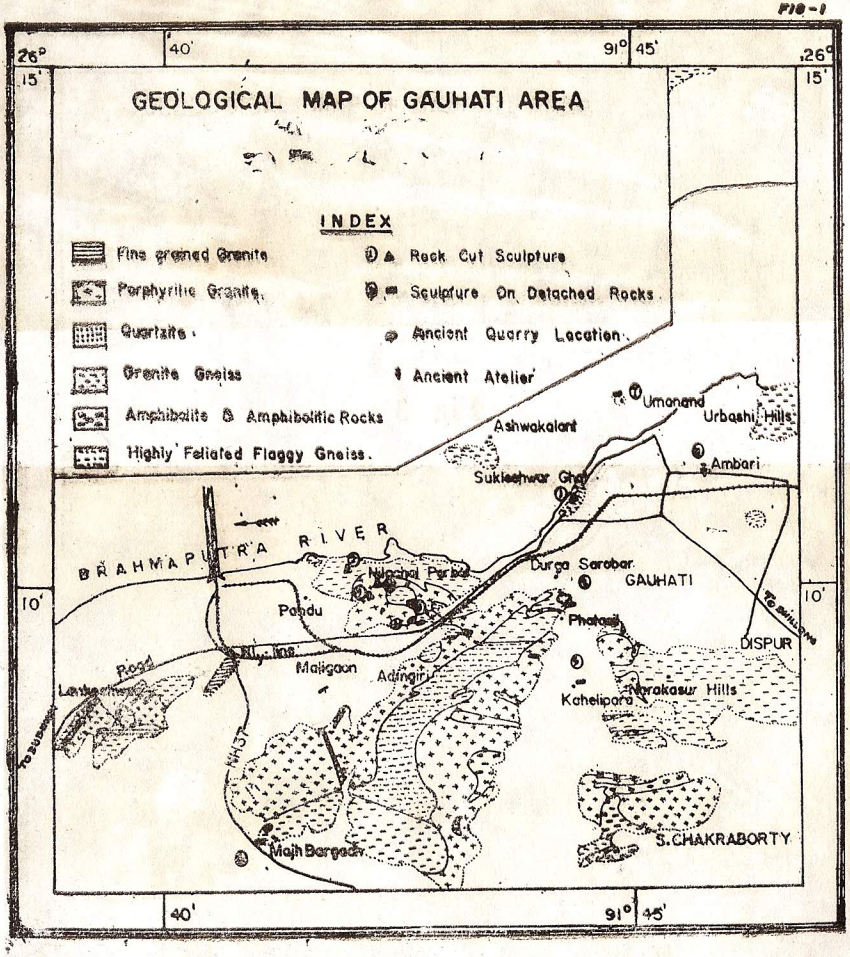


Fig. 3

Fig. 4

FIG-1


GEOLOGICAL MAP OF GAUHATI AREA
INDEX
Fine grained Granite
Porphyritic Granite
Quartzite
Granite Gneiss
Amphibolite & Amphibolitic Rocks
Highly Foliated Flaggy Gneiss.
Rock Cut Sculpture
Sculpture On Detached Rocks.
Ancient Quarry Location
Ancient Atelier
26°
40'
91°
45'
15'
10'
Umanand
Urbashi Hills
Ashwakalant
Ambari
Sukleshwar Ghat
BRAHMAPUTRA RIVER
Durga Sarobar
GAUHATI
Pandu
Phatasil
DISPUR
Maligaon
Adingiri
Kaheliparo
Narakasur Hills
Majh Bargaon
S. CHAKRABORTY
To Shillong
To Guwahati

Explanation of Figures

Figure 1. Geological Map of Gauhati area. Nature of Sculptures and locations indicated on the Map.

Sculputures on rock cut face of Granite Gneiss

Location 1. Sukleshwar Ghat. Sculptures show finer details of carving.

Location 2. Cliff on Northern Entrance of Nilachal Parbat.

Sculptures on detached Granite Gneiss

Location 3. Eastern entrance to Nilachal Parbat. Also see Fig. 4.

Location 4. Southern Foothill of Nilachal Parbat Also a probable ancient Quarry.

Location 5. Kahelipara. Sculpture of Ganesha. Some. of the Sculptures are unfinished.

Location 6. Majhbargaon. Sculpture of Ganesha.

Location 7. Umananda. Shivalinga, Vishnu, Ganesha and other.

Location 8. Ancient Quarry north of Phatasil-Ambari. A Ganesh sculpture is stil llocated in the Quarry.

Sculpture on rock cut face of Porphyritic Granite

Location 7. North East of Pandu. Ganesha, Temple face Imitation, Shiva linga. A big piece of Granite Gneiss sculpted for Flying Vidhyadhar is found lying here.

Location 10. South of Kamakhya Devalaya. Carving of Bhairava on prophyritic granite is the lone example where porphyritic granite is used for fine carving.

Sculpture on detached Fine Grained Granite

Location 11. Atelier of Ambari. Sculpture of small size with fine detail found in this excavation are mostly on fine Granied Grnaite. Use of other rocks including Quartzite and Amphibolite are also evidenced here.

Figure 2. Vishnu on Rock cut face of Granite Gneiss at Sukleswar Ghat. Uniformly fine grained texture of the rock enabled the sculptors to carve fine details. The pegmatite Vein (P) to the left of the figure dictated the lateral limit of the sculpture. The pencil on the left knee measure 20 cms. (Location 1, Fig. 1).

Figure 3. Temple Model and Shiva linga (L) on Rock cut face of Prophyritic Granite, east of Pandu, Carvaings with no fine detail. Other carving in this location is Giant Ganesha. The smallest Shiva linga in the Photograph is 40 cms high. (location 9, Fig. 1)

Figure 4. Sculpture on rolled boulder of Granite Gneiss found along eastern entrance to Nilachal Parbat. Sculpture mainly of Vishnu, Shiva, Genesha, and Parvati. The sculptures characteristically show considerable details. The upright statue indicates that the rolled boulders stood untilted even after a number of major earthquakes which were otherwise quite disastrous. (Location 3, Fig. 1).

Additional Note : In the body of the text, we have referred to Sukresvar Ghat and Shukleshwar Ghat to denote one and the same site. The terms are interchangable, and both the versions are widely used in popular parlance.

TABLE - 1. **Main rock types around Gauhati, their Physical properties and suitability for sculpting**

Rock Types	Mode of Occurrance and Geomorphic Expression	Physical properties					Kind of Sculpture
		Quarribility	Flaggyness	Surface texture	Polishibility	Susceptibility to chemical alteration	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1. Granite and Granite Geneiss.							
a), Granite Gneiss	Wide spread occurance in Nilachal Parbat Urbashi Hill, Phatasil Ambari, Narakasur Hill and Mounds around Gauhati Town. Hills have smooth surface, Stream distecting the hills are negotiable. Rock walls offer smooth chiff for sculpting.	Quarrying is very difficult need use of high power explosive.	Boulders are smooth slabby and non-flaggy blocks	Smooth Striping and/or banding due to presence of Biotite.	Takes long lasting fine Polish.	Alters but less readily than I.b) and I.c).	a) Rock cut sculpture. b) Sculpture on stray dislodged Boulders. c) Sculpture on isolated rock piece
b) Porphyritic granite	Occurs widespread-Kamakhya Develaya, its eastern, western and southern vicinity in Nilachal Parbat. Rugged hill with rounded, hummocky bouldery outcrop are characteristic. Streams dissecting the hills are very irregular and difficult to negotiate.	Less compact and comparatitively softer than I. a).	Boulders are rounded hummocky and non-flaggy.	Irregularly Pitted surface.	Fresh rock takes good polish, Polish is quickly lost when exposed to weather	Alters readily	a) Only rock cut sculptures with crude finish b) Sculpture on rolled boulder not possible c) Sculpture on isolated rock picee not possible.

Table Contd.

c) Fine grained granite.	Limited occurance, Few metren in width, Occurs in terrain of I. a) and I.b).	Softer rock. Easy to break. Quarrying is diffcult	Boulders are smooth and rounded	Smooth surface texture	Can take good polish Polish is long lasting	Alters readily	a) Sculpture on rock cut surface not available. b) Rolled boulders not available. c) Sculptures on isolated rock piece, around half feet in height with finer detail are exclusively made of this rock type.
II. Amphibolitie	Limited occurrance Few metre in width, occurs in terrain I. a) and I. b).	Softer rock easy to break Quarrying is difficult.	Boulders are subrect angular blocks.	Pitted to smooth surface.	Takes very good polish easily, Polish is long lasting.	More resistant to alteration.	a) Big rock surface convenient place for sculpting is not available b) Sculptures on rolled boulder are not available c) Rock boulders, collected are used for big sculptures with good polish and finer sculture details. Such sculptures are rare.
III. Flaggy Gneiss	Occurs in areas bordering I. a) and I. b).	Difficult to Quarry due to very soft and friable nature.	Highly flaggy.	The rocks break readily.	Impossible to to give good polish.	Only altered rocks are available.	No sculptureis made from this rock type.