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## Emergence of Stone Sculpturing art in Taxila Valley and contemporary Tools and Techniques

**Abstract:** Ancient Taxila is famous for the production of stone construction material and stone sculptures.<sup>2</sup> There are many stone artefacts reported from Taxila valley during, more than last hundred years.<sup>3</sup> Besides the stone architectural elements, sculptures, there is a large collection of utensils and other articles of daily use unearthed from Bhir Mound and Sirkap.<sup>4</sup> (Marshall 1951, Vol.II.:476) Most of artefact unearthed from early levels of archaeological sites in Taxila valley comprises pivot-stones, querns, mullers, pestles, mortars and grinding mills. Household vessels of various kinds, lamps, toilet trays and vases, burnishers, palettes, spindle whorls, potter's *konoras* and *thatwas*, amulets and sacred ring stones, moulds, stone for incrustation and inlay work and a few miscellaneous pieces such as knife handles and dies besides finger rings, seals, gems.<sup>5</sup> Locally available limestone was not encouraging medium for the production of small articles even *kanjur* was never used at all for small objects but mostly making the inner core of structure and some stucco heads discovered from Apsidal temple Sirkap. There for the soft stone or semi-precious stone used for production of artefacts either imported in raw shape from their respective provenances, located outside of Taxila valley or received in form of gift and donation.<sup>6</sup> (Fig.I Map)

Key Words: Taxila, Bhir Mound, Sirkap, Dharamarajika, Sculpture, tools, Techniques

### Emergence of Stone Sculpturing in Taxila Valley

Taxila enjoyed prosperity, glory and remained a centre of attraction in the history. It was a junction of three great trade routes; India, Western Asia and Central Asia. Taxila remained a famous learning centre of scientific and strategic teachings. Modern Taxila is located 30 km in northwest of Islamabad. On Eastern side, it is bounded by Murree hills which runs from north to south and from one side. There are two water tributary flowing through Taxila plain; Tamra nala and Lundi nala. (Katsumi Tanabe 212). Taxila valley was and is

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<sup>2</sup> . Takshasila in Sanskrit, Takkasila or Takhasila in vernacular. It was abbreviated from used by Greeks and Romans and from them commonly adopted by European writes. Takshasila signified "the city of cut stones". Aramaic translation of Takshasila was *Naggaruda* (lit. carpentry). Also known for the Rock of the Takkas or Rock of Takshaka, the Naga king. The earliest known settlement of the Taxila Valley is Sarai-Khola which yielded a cultural sequence from late Neolithic to Iron Age i.e. Neolithic period (4000 to 2800 BC), Early Bronze Age Culture (2800-2600 BC), and the Late Bronze Age and Early Iron Age Culture (1000 BC). This history pushed back the history of the region from 6<sup>th</sup> century BC to the 4<sup>th</sup> millennium BC. Early Historic period of the Taxila begins with the conquest of the region by the Achaemenians of Persia during the reign of Cyrus the Great (558-528 BC). Alexander the Great from Macedonia captured the region in c. 326 BC. In 305 BC; Greek were pushed out by Chandra Gupta, founder of Mauryan Dynasty of Ancient India. Ashoka, the grandson of Chandar Gupta Maurya (272-232 BC) is said to be converted to Buddhism and made Taxila the prominent centre of Buddhism. Buddhism. Taxila is famous for Gandhara Hellenistic art though not contiguous part of Gandhara region, but artistic activities was in full swing in this part of subcontinent, particularly it received great impetus during the reign of Kushan and afterward dynasties from 1<sup>st</sup> century AC to 5<sup>th</sup> century AC.

<sup>3</sup> . Sir John Marshall , Director General of Archaeological Survey of India, carried out archaeological excavations in Taxila in 1913-34. He exposed Three ancient cities and numbers of Buddhist Monastic complexes beside Jandial Temple the only Greek temple in the valley. His successor, the then DG ASI, Mortimer Wheeler also contributed in the history of discoveries of Taxila and followed by DOAM till 2011, when said department has been devolved among respective provinces under 18<sup>th</sup> constitutional amendment act 2010.

<sup>4</sup> . Marshall assigned the period between 300 B.C to 100 AC.)

<sup>5</sup> . There are two types of stone available in natural formation of Taxila itself, hard stone (flint like limestone) and soft stone ( very coarse and soft lime *kankar* or *kanjur*). These stone frequently used for construction.

<sup>6</sup> . A part from local lime stone, the hard stones used in the manufacture of many of the small articles : blue serpentine, pyroxene, granite, basalt, quartzite, hornblende, gneiss, epidiorite, carnelian, chalcedony, jasper, jade, turquoise, lapis lazuli, amethyst, garnet and beryl. All these imported from other areas i.e. central Asia, Afghanistan, India, Sind and Baluchistan, Khyber Pukhtoon khaw and Punjab.

famous for the unique art of stone carving. The artisans are carving history in stones since ancient times with different types of tools and materials. This paper is an attempt to encompass these tools and mediums used by artisans from ancient times till modern era.

Emergence of stone sculpturing in ancient Taxila Valley revolves around three major archaeological sites; Bhir Mound city (600-200 BC), Sirkap City (200 BC-200 CE) and Buddhist monastic complex of Dharamarajika (300 BC-500 CE). Investigation and astonishing discoveries revealed that till the invasion of Greeks, at local level art of stone sculpturing was not evidenced. In the light of investigation at Bhir mound city the hypothesis strengthen that stone sculpturing art introduced in Taxila valley after the invasion of Alexander the great. The stone artifacts found in the Bhir mound are daily use utensils but not sculptures of human beings or animals. After the Greek invasion, there is difference between the T.C figurines of Bhir mound city and Sirkap city. Mauryan influence faded out and it replaced by Hellenistic influence from west (Marshall 1951:Vol.II,440). Most common were terra cotta votive tanks adorned with terra cotta figurines.

Gandharan scholars seem to be convinced on the conclusion that this art was literally invented for the Buddhist patronage under the early Kushans. It was brought into being as the direct result of economic, diplomatic and artistic relationships between rulers of great Kushans and Romans. There is an enormous quantity of slate carvings which are the reflection of Hellenic taste. Stone was the most popular medium for the sculptors but excavations have revealed that there were some other materials that were in use. Under the patronage of early Kushans, rapid advancement of Buddhism in Taxila valley also gave the boost to construction activities, included lavish iconic and decorative art which had far reaching affects on the Buddhist art activities in the region. (Marshall 1951:73) Stone carvings formed the revetments of stupas and viharas in the religious establishments. Many of the reliefs were frequently installed to decorate the drum of stupa and risers of stairways (Rowland, 1965, p. 117).

#### **Stone employed for the stone sculpturing in Taxila valley**

There are two local stones frequently available in Taxila valley, hard lime stone and Kanjur. Both are found at the hill side and along the banks of Tamra and Haro River. It is significant to mention that lime stone is largely used for construction and rarely for sculptures. In the contemporary era, artisans are also working in different mediums and producing utilitarian objects i.e. grinding stones, water fountains, tiles, vases, grave stones etc. The characteristics of the stone type have influenced working methods.

Four kinds of sand stone used in the Bhir mound settlement, i.e. up to the beginning of the second century B.C.<sup>7</sup> Stone was not more frequently employed during the Mauryan period for household vessels and production of utensils was in all probability due to the religious conservatism of the people. It was certainly not due to any lack of skill on the part of the Maurya craftsman, who was unsurpassed in the cutting, carving and polishing of hard stones. After the invasion and settlement of Greek in the region, commercial demand increased for the production of stone artifact.<sup>8</sup> Local religious taboo weekend and local artisans got good space for the production of stone artifacts. Production of stone objects encouraged the local artisans. This opportunity and appreciation of stone sculpturing art not only opened the skilled hands of local artisans but also broader their minds to use Greek ideas and idols for people. Greek art and culture influence the stone production which led to the materialization of Buddhist images in the region. Provinces of schist and phyllite stone were in Gandhara, Swat. The stratigraphical chart which follows shows the generic classification of the stone objects and their

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7. Grey Taraki/kambial sandstone, spotted red stone and white sandstone came from Muthara near Agra India; buff coloured fine grained hard sandstone came from Chunar near Benares, and greyish quartz.

<sup>8</sup> The stone used for the production of the sculptures and other objects is mostly chlorite-schist, with fine grain size, varying from light to dark shades, erstwhile with an abundance of mica particles. It occurs in the area of the Swat valley, chiefly in the central part, with smaller amounts up to the area of Chakdara (Di Florio et al. 1993a, 1993b, 1995; Faccenna C. et al. 1993; Lorenzoni & Zanettin Lorenzoni 1994). In later times, the stone often used is talc-schist. It is available in a limited area along the Swat river valley; it is quite soft and easily worked, and is less resistant than chlorite-schist to external agents. In the area of Malakand as far as Taxila, chlorite-schist is replaced by another type of metamorphic rock known as phyllite, making it fairly easy to quarry in the form of slabs; its colour is dark grey, slate black (Malakand) or silvery grey, with very fine grain size. Precious and semi-precious stones were imported from Khyber Pakhtun Khwa, Afghanistan, Central Asia and South Asia. The stones that are transported were; blue serpentine, Granite, Sang-i-abri or Abri, Basalt, Quartzite, Hornblende-gneiss, Gneiss, Pyroxene, Diorite, Epidorite, Epidote Quartz, Dolorite, black Basanite, black and white Syenite, Lydian or touchstone and Chert stone. For ornaments Crystal, Agate, Porcelain Agate, Chalcedony, Carnelian, red and green Jasper, Agate- Jasper, Jade, Jade- Nephrite, Turquoise, Lapis- lazuli, Amethyst, Garnet and Beryl are also transported. (Marshall 1945/2006:476).

distribution in the successive strata of Bhir mound not included the stone sculptures of an ornament and mainly Buddhist character.<sup>9</sup>

### **Tools and Techniques**

Studying and cataloging the stone sculptures Buddhist art coming from the excavations in Taxila also need the basic knowledge of the tools and techniques used in past. The stone sculptures include figured reliefs, statues; architectural items (decorated or simply moulded) forming part of monuments. Different tools are used for stone chiseling, ranging from heavy-duty tools to more delicate instruments depending on the work to be carried out and the result to be achieved, such as percussion tools, cutting tools (percussion, abrasion, rotation); as well as measuring instruments (**Fig.4**). This paper lists the tools whose use is proven, or likely, in the Gandharan area, though clearly including reference to classical and Near Eastern areas. Sometime various pieces of stone sculptures, prepared off site, were placed in position (in a pre established sequence indicated by signs or marks cut into the single pieces), fixed and made good between them (using mortice and tendon joints, continuous bridle joints, cramps, dovetail cramps, nails) (**Pl. 3**).

Perceptive working methods and the shape and use of ancient tools is based on printed and figurative references, on original tools found on excavation sites, as well as on evidence of use which has survived until the present day (or which survived until the 20th century) on the supposition that such methods and tools have remained practically unchanged over time. The most important clues are still the stone itself which preserves traces of the ancient tools, revealing the process by which the work was carried out also making it possible to reconstruct realistically the operations of a workshop (Faccenna C. et al. 2007:23).

There are three main phases in preparing stone to be used for constructing and decorating buildings, which take place one after the other (Facchana 2007:23) We may divide stone sculpturing in three basic phases.

I. **Extraction of stone from quarry.** At early stage, from a quarry, the stone is extracted, rough-hewn and transported.<sup>10</sup>

II. **Workshop.** Then extracted stone probably shifted in a workshop where it has to be cut and roughly finished as required. (**Fig.2**) So for in Taxila valley archaeologist could not confirm such spaces/workshop where these Buddhist sculptures were chiselled. However find spots of such tools may be used for stone sculpturing can locate the workshop. The rough-hewn block of stone is squared off and turned into carved stone, as relief and statues, following a design scheme of which there are traces in the guidelines (see Faccenna D. et al. 1993: 313-16, figs. 107-108; Härtel 1993: 433-35, pls. on pp. 447-51; Zwalf 1996: nos. 451-452; Spagnesi 2001: 63-64, fig. 15).

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9. Archaeological remains of Bhir Mound are scattered over vast area and partially occupied by residential, commercial and industrial construction. Tamra Nala separates the lower extension of Bhir Mound from Sirkap, second historic city of ancient Taxila. Hathial, late Neolithic site is crowned between the Bhir Mound and Sirkap. There is evidence of remote past production of T.C figurines from Bhir Mound. The primitive looking little idols represent a type of Nude Mother or earth goddess came from the Bhir mound from stratum II & III. Couple of human figurines, moulding made of terra cotta frequently found from Bhir Mound.

**Stratum BH IV** **600-500 BC**

Stone artefact discovered from Bhir mound are domestic use objects i.e. door pivot stone, mullers, pestle, grinding stones and jeweller mould, loom weight, ear reel etc.(Marshall 1957:I/3/101-102)

**Stratum BH III** **400 B.C.**

It is important as the period also witnessed the invasion of Alexander the great and evidenced the Greek influence in some of ceramic ware, coins and other small antiquities. Domestic house ware of stone were reported and the stool quern from Muthura after Maurya conquest. Stool quern of plain Mathura sand stone appeared in this stratum.

**Stratum BH II** **300 B.C.**

This period is completely dominated by Mauryas influence and their culture. Small objects were still imported from western world(Marshall I/3/106) and local artists were trained in the traditions of the Hellenised Orient. For the most part local were drawing their inspiration from the East.

Stone was used to make household vessels, in cutting, turning and polishing of hard stones the Mauryan craftsman was exceptionally skilful and some of specimens, i.e shallow dishes, saucer, cup etc from Bhir mound circular ring stone are superb pieces of work (crystal tray, circular ring stone amulet depicted with tree of life and fortune III/504/25). Workmanship and exquisite finish of this are as fine as any specimens of stone carving in ancient India.

**Stratum BH I** **200 B.C.**

Structural remains in this stratum are disturbed and fragmentary. Domestic use stone objects continued here too. Recently DOAM carried out a trial trench inside Taxila museum campus and found the factory of beads at this level. Archaeological remains of Bhir Mound are scattered over vast area and partially occupied by residential, commercial and industrial construction. Tamra Nala separates the lower extension of Bhir Mound from Sirkap, second historic city of ancient Taxila. Hathial, late Neolithic site is crowned between the Bhir Mound and Sirkap.

<sup>10</sup>. Schist is not locally available in Taxila valley therefore most probably it was imported from far quarries i.e. Swat, Gandhara etc.

In the workshop the block has to be transformed into a sculpted piece (**Pl.3**). It is probably squared, rectangular or round off and then, by degrees, worked until the surface is smooth and shaped according to the shape required.

III. **Fixation of Stone sculpture.** Sometimes sculpture is required to keep at the place of use, fixation, therefore sculptor chiseled it on spot to avoid the complication of large size or proper fixation. 493 start.....

### **Tools**

The artisans of ancient Taxila valley principally worked with different kinds and shapes of chisel and hammer. In contemporary era artisans are using modern tools for carving stones. There are some basic traditional tools which are still being practiced. In the following table, the tools listed with their usages and shapes. For the purpose of stone carving following types of tools are used.

**Stone Tools.** There are some basic stone tools that are used in the carving stone.

**a. Stone Point Tools.** These are used to rough out the surface of the stone.

**b. Stone Claw Tools.** Stone claw tools are used to remove the peaks and troughs left from the previously used tools.

**c. Stone Pitching Tools.** These are used to remove large quantities of stones.

**d. Stone Nickers.** These are used to split the stones by tracing a line along the stone with progressive strikes until the stone breaks along the line.

### **Metal Tools.**

A: Percussion Carving Tools (Chisels).

B: Measuring Tools.

C: Abrasive Tools.

#### **A: Percussion Carving Tools**

Percussion carving tools are used to hit and carve unnecessary areas of stone to sculpt a sculpture. There are different types of tools used to shape the stone.

- i. **Chisels:** Chisels are used to carve or cut stones. Chisel is designed with a blade on its end. The handle and blade of some types of chisels are made of metal or wood with a sharp edge in it. The most common way of using a chisel is that the artist strokes it with hammer, approximately at 90 degree to surface in an organized sweep. It shatters the stone beneath it and each successive pass lowers the surface. The lettering stroke, in which the chisel is used, along the surface at approximately 30 degrees to cut beneath the existing surface. (M. Ashraf, 2015, p.273) Different types of chisels are including, lettering chisel, fishtail carving chisel, masonry chisel, steel chisel, toothed chisel, flat chisel, pointed chisel with rectangular shaft, round edge chisel.
- ii. **Mallet.** This mallet is used for the softest strokes in sensitive areas. It is used to reduce the force applied by the artist to cut and carve extra stone. While carving the stones, wooden mallets are of much important and easier to use than a hammer because it is wider and therefore eliminate quite a number of mishit that goes on to sculptors' hand instead of chisel. Chisels which are used with the wooden mallets have a widened head. Wooden mallet with a cylindrical drum on the top and handle in centre or side, with flat face.
- iii. **Hammer.** A hammer is a very useful tool, meant to deliver blows to chisel on a specific point during carving the stone. There are different types of hammers used according the kind of stones and artist requirements. Compared to working with a wooden mallet, the impact is greater and carving goes faster, especially in medium hard stone such as marble. Hammer with a rectangular head is fixed in the centre. It is used for hard strokes. Toothed Hammer is used to hit on rough areas.
- iv. **Axe.** Axe is also used to treat large slabs of stones. Its head is made up of steel and its handle is of wood. It is used on large stone slabs where rough strokes are required.
- v. **Wedges.** Wedges are used to split the stones. These are often thin and wide edged tips.
- vi. **Pitching tool.** Pitching tools are used to remove large quantities of stones.
- vii. **Pick.** Pick tip is sharp and from the rare end, it is wide. The sculptors normally use it to stroke on a specific point.

#### **B: Measuring Tools**

The sculptors use these tools to retain the size, maintain the proportion and symmetry of the features. There are some basic measuring tools used as mentioned below.

- i. **Caliper.** It is the first and foremost important tool for measuring the stone. It is used to measure the inner and outer length and width of the art piece to be produced.
- ii. **Ruler.** Ruler has a scale on it to proper measure lines and fix the desired size.

#### **C: Abrasive tools**

Abrasive tools are used to give a finished look to a carved piece.

- i. **Saw.** Saw is a tool that has an edge with a sharp teathed blade.
- ii. **Rasp.** A rasp is a flat tool made up of steel. It has a rough surface. The sculptor use bold strokes of rasp to remove excess stone as small chips or dust.

**D: Lathe:**

The reconstruction of the lathe is hypothetical, but its use is shown by evident traces left by the tools on the pieces (bowls, toilet-trays, reliquaries, small columns). (Fig.5) For the bowls, a vertical lathe was may be used: the roughly shaped vase was fixed to a rotating disc (reconstruction by Franca Callori di Vignale); for the inside of the vases, a horizontal lathe with one clamp was used; for cylindrical pieces such as a small column, a horizontal lathe with two clamps was used (the ends of the column have holes for fixed pivots connected with the rotating parts); both lathes operated at fairly high speed under the action of the bow and the cutting tool (point and flat chisel). (Fig.6) For comparison with the traditional horizontal lathe still in use, see Kohl 1977: 121, fig. 25.

**Modern Techniques of stone Carving in Taxila Valley**

While working in stone medium, the modern local artisans observe the following steps

2. In the first step, the artisans select the stone slab. Artisans of ancient Taxila preferred Schist because it was the most durable stone as compared to other stones.
3. In the second step, the artisans observe the direction impression of waves casted on stone and then draw a rough sketch of the image to be drawn.
4. After the completion of drawing, the sculptor starts working on the stone with the help of a chisel and hammer. To carve stone artisan use pitching tools and pointed chisel. However modern artists use electric grinders, pneumatic hammers, toothed and flat chisels and many other tools.
5. After the image is carved fully, it is refined by rubbing it with sandpaper. Contemporary artisans use modern techniques like they wear safety glasses, dusty masks, ear plugs and anti-vibration gloves. Artists also use rasp and raffles in finishing process
6. In the fifth and last step, the artisans also polish the carved pieces.

**Conclusion:** In contemporary era, the modern craftsmen of this valley do not prefer to work in schist stone as carving in the material is time taking. It is interesting to note that it is still in continuity. Main reason of lack of devotion is probably because modern so called artisans of stone sculpturing are professional and commercial minded not sentimental about their skills. Broadly speaking modern artisans involved in stone sculpturing in Taxila are preferably working in a stone cast chemically prepared. They also use powder of schist stone in manufacturing the artificial slab stone. This kind of stone slab is much softer to chisel or carve then a real stone of schist. Use of such material is time saving and a commercially easy way for large scale production. Skill and command of such an artisan is inferior then real stone sculptors.

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DOMENICO FACCENNA .ANNA FILIGENZI.IsIAO – ROMA 2007

REPERTORY OF TERMS FOR CATALOGUING GANDHARAN SCULPTURES BASED ON MATERIALS FROM THE ISIAO ITALIAN ARCHAEOLOGICAL MISSION IN SWAT, PAKISTAN

The term Relief is ambiguous since it refers both to the finished product and to the process by which carved figures are made to stand proud of the stone slab background, of which they are an integral part (Pls. 8- 9). A relief, intended as an object and finished product, is of a size that can be immediately encompassed by a glance. Another class of this production is the Statue in its various types (Pls. 11-13): frontal statue, statue in the round, and statue with back-to-back figures (Pl. 11); stele statue, when the rear part is flat and shows the stele's structural elements on the lower part (Pl. 12); figured stele, when the structure is made up of a rectangular block, usually set vertically, with the figure standing out from one face, or from a panel with figured composition on one face (sometimes on two), resting on a support.