Chapter-3  The Technique of Preparing Terracotta

Archaeological exploration and excavations have brought to light countless terracotta figurines from different sites in India. Since the production of this art involves negligible financial support and as there had been abundant availability of material and also because it required comparatively little technical knowledge, the art as such, became a popular medium through which the common man attempted to give shape to his artistic desires. The art has been designated variously as people’s art, peasant’s art, or poorman’s art. But, whatever simpleness it may exhibit, the art of terracotta requires certain technological background regarding properties of clay and its eventual firing. All clay is not suitable for modelling images. A good clay modeller knows his suitable clay and then he goes on processing the same. When the clay is ready, he gives expression to his thought-process and to make his own creation durable, he bakes it initially in the sun and then in kiln. The firing of clay-figurines required a sound knowledge of heat and fire and the potter artist should also know the duration up to which a figure should be burnt in a given temperature. The same holds good about the experience and knowledge, a clay modeller should have about the application of slip and colour, either before or after a figure baked and finally the making of moulds requires the artistic skill and a deft hand. The greater, the technological knowhow possessed by a modeller, finer the productions come out of him.
A systematic study of the method by which a particular object is manufactured may broadly termed as the study of its technique. The manufacturing process, method, style, etc. are the main elements that are involved in the technique. The technique is, therefore, involved right from the beginning of a particular object.

The art of preparing terracottas is a direct result of man’s ingenuity who models his ideas and thought in the form of different types of figurines. It is the relationship between art and mind which ultimately reflects the prevalent culture and level of civilization in form of baked earthen models. Thus from a study of the terracotta art one can find out the contemporaneous social customs, culture, religious background, dress, ornaments etc. Hence they provide valuable information to reconstruct the way of life during a particular period of the past history, besides the sensibility of the artist concerned about his environment and himself.

Terracotta’s are modeled out of clay, which is formed out of weathered rock, vegetation and organic materials. As a result of this there are several varieties of clay in nature. Some are rough, while others are soft; some require low temperature while other needs high temperature to become hard after firing. The potter artist carefully selects the clay out of which he had to model the figure. The clay is brought from the old dried bed of tanks, rivers, ditches etc.
The Process of the Preparation of the Clay:-

Varieties of Clay:-

There are three kinds of soil, namely jāngalā (arid), anūpa (damp) and miśra (mixed). The soil which is strong and too hard to dig is jāngalā. The soil which contains black sand and which does not create too much difficulty in digging is anūpa. The one having both qualities is miśra, which means the soil is neither hard nor soft and contains a small amount of sand or stickiness.

The mud or slime (pāńka) should be obtained from these three types of soil, but the place from where it is brought must be clean (śuddha), beautiful (manohara), and water should never dry up there. The mud also is obtained from rivers, tanks or lakes. Its colour may be white, red, yellow or black. The mud or slime, i.e. various types of clay, are called after the name of the soils from which they are obtained; in other words, the clay is called jāngalā, anūpa and miśra. These three types of clay should be prepared separately with the same process consisting of the following twelve stages.

Stages in the preparation of the clay:-

(1) In the first stage the mud is kept in pots (pātra) some water should be added to it. It should be stirred and then filtered with a new cloth into other pot. After the mud settles down in the pot the water is poured out and the mud left to dry till it thickens.

(2) The second stage consists of making decorations (kvātta or kvāthatoya). It is made from the barks of four different trees (ksīravṛkṣas). These are (1) Ficus indica (nyagrodha) (2) Ficus glomerata (udumbara), (3) Ficus religiosa (aśvattha) (4) Bassia latifolia (madhūka). The bark is taken and pound into the thickened
clay in a sufficient amount. The clay is once again stirred and then kneaded and left to dry.

(3) In the third stage the decoration from the barks of two trees—Acacia catechu (*khadira*) and Terminal arjuna (*Arjuna*)—is poured into the dried clay (from stage - 2). The mixture is well stirred and kneaded (*mardayet*) and left till it forms lumps (*pindatā*).

(4) In the fourth stage from three myrobalsams (*triphala*), viz. fruits of (1) Terminalia (cheleula), (2) Terminalia bellerica, and (3) *Phylanthus emblica*, a decoration is made and poured into the lumps of clay, which is then stirred and well kneaded. It is allowed to dry partially so that balls could be made of it while it is still wet enough to take the impression of the lines of the hand.

(5) The fifth stage consists of mixing in equal parts of sand and stone dust. The resulting mixture is then added to the clay. The amount of this mixture should be one fourth of the clay. The myrobalsams (*triphala*) decoration is poured from time to time into the clay followed each time by stirring and kneading. This operation is continued from 7 to 10 days.

(6) In the sixth stage equal quantities of barley corn (*java*), wheat (*godhūma*), *phaseobes radiatus* (*māsa*) and linseed leaves (*atasipatra*) are grinded together and the powder so obtained is added in one-eighth proportion of the clay. As in stage 5, in this process also the decoration is poured in the clay from time to time and well stirred and kneaded from 7 to 10 days.

(7) In the seventh stage the resin of *Pinus longifolia* (*srivesta*). The exudation of *Amyris agallocheen* (*guggulla*), the resin of *Alibanum* (*kunduruska*), and that of vatica robusta (*sarjarasa*) are taken in equal parts and ground finely. This powder is added to the clay. The
amount of the powder which is added is one sixteenth of the clay. Then Yoghurt (dadhi) is added to the clay and kneaded.

(8) In eighth stage dry ginger (śunthi), long peeper (mirāci) and Curcuma longa (rajanī) are taken in equal part and ground together and the resulting powder is added to the clay, the amount being equal to twenty-fourth part of the clay⁴. Honey (madhu) milk (ksīra) and clarified butter or ghee (ghṛita) are then added to it and kneaded.

(9) The next stage consists of taking equal parts of the secretions of two trees and grinding it well. The resultant powder is added to the clay in 15:1 proportion. The clay is then stirred and kneaded while sesame oil (taila) is poured into it.

(10) In the tenth stage saffron (kuṅkuma) sandal powder (caṇdana), yellow orpiment or sulphurets of arsenic, costus specious or arabicus (kustha), camphor (karpūra), Amyris agallocha (agaru), and bright yellow orpiment (gorācona) are taken in equal parts. These are well ground and added to the clay. The amount of powder taken is one thirtieth part of the clay. After this the mixture is stirred and kneaded, Extract of linseed wood (atasīkāsha) is poured into the clay.

(11) In the eleventh stage dust from (1) svarna and (2) rajata, (3) earth taken from crab dwellings (kulīrāvāsa), (4) white ants mounds (valmīka) (5) ploughed field (balasthala), (6) from the begrime of the stalks of the rice plant (sasyamūla) (7) the earth which has been scattered by an elephant with its tusks in a sportive mood. One should procure as much as one can of these variously scented earths and add them to the clay. Then one must stir and knead the clay for five days pouring into it the decoction made from the bark of Bassia Latifolia (madhūkatvak) as well as liquids prepared out of dried
secretion of the trees – *Feronia elephantum* (kapittha) and *Aegle marnselos* (bilva).

(12) In the last stage the fibres of the skin of well-ripened coconuts are cut into pieces (nārikelaphalapakvatvak) measuring an aṅgula, or else two aṅgulas. These pieces should be added to the clay and the amount should be one fourth of the clay. For final use the clay has to be knead again after adding all the above ingredients.

**The Technique of Manufacturing Clay Figurine:**

A close study of the terracotta object has revealed that following points are to be taken into account while studying the technique of terracotta objects. As regards the manufacturing technique of clay figurines, our literary sources do not provide adequate account but we can know well about the manufacturing technique of these figurines by examining such specimens. The ethno-archaeological parallel interpretations also help to understand the methods of manufacturing of ancient terracotta. The clay figurines are made either by hand, or in moulds, or by a combination of both techniques.

Terracotta has been one of the most popular mediums of artistic expression from prehistoric times. The art of terracotta is the best exponent of aesthetic, material, religious and secular life. It also throws light on the forgotten spiritual concepts and conventions of the people who lived in the past. In recent years a good number of terracotta figurines have been found from Bihar at Pātaliputra, Bulandibagh, Vaiśālī, Lauriya Nandangarh, Kumrahar, Champā, Chirāṇḍ, Sonpur, Chechar etc. These discoveries point out about the flourishing art in those days. It is presumed that most of the articles were made from indigenous material, but the drift nature of some of
the finds cannot be ruled out through in this respect the genuineness of a terracotta art can be checked by a comparison of the finds and their respective strata.

Also it must be realized that some of these figurines must have been used for worship as household deities. But the same point does not hold good for such terracotta which are purely decorative. The tradition of worshipping clay image on the eve of important festivals such as Diwali and Dasehera have come down even to the present day.

Clay is the basic material required for manufacturing a terracotta object. It has been noticed that during pre-Harappan times identical clay was used both for pottery as well as terracotta. Harappan used a superior quality of well levigated clay and mixed it with the ingredients like sand, lime or mica or both. During Chalcholithic period the clay used was usually unlevigated, as evidenced by a number of specimens from Gilund showing a tendency to crack slightly on surface after firing. But the clay used in Śunga period was of fine as well as medium quality. It has been found mixed with sand as ingredient. These have been found well baked in brick red color. Sometimes over baking has also been noticed. Kuṣana terracotta objects show use of ingredients like straw and husk of food grains. Usually locally available clay was used for modelling terracotta objects.

From the perusal of the cruder examples of Kuṣana period, it has been noticed that due to sheer negligence in the preparation of clay, it became impossible to achieve the finish and proper smoothness. The modellers of the Gupta Age knew that for a beautiful figurine the quality of clay was important. It was invariably, well kneaded and made levigated; no mixture of husk is traceable in these, unlike in the figurines of preceding ages. There is also the absence of air holes and grit in the clay. Its texture is of fine quality which always helped the modellers in making out the
desired shapes. But the post Gupta clay figurines are mostly made of coarse clay with considerable admixture of husk.

**Modelling:**

There are two methods of making clay figurines by hand. These are either found completely modeled by hand or may be partly hand modeled and partly by some scraper-like tool. In the former case the modeler takes up the clay and gives the desired shape with the help of his fingers. Such figurines are usually of crude variety but when the hand modeled specimen is trimmed with the help of a scraper, better result was achieved. Attention to such to such details requires greater skill, labour and patience.

Prior to early historic period the entire range of terracotta objects was hand modeled following the technique of pinching up and pressing down for giving the desired shape for further details, decorations and ornamentations, appliquéd, bands, pellets, incised strokes and pinholes were very commonly used. A close study of the terracotta objects has revealed that moulded faces and heads were introduced during early historical period and later on the entire figure was moulded in the shape of plaques. The maturity in moulding could be a noticed during the historical period.

**Moulding:**

However, there seem to have other simpler techniques of preparing moulded terracotta. The simplest kind was made by pressing the clay into the mould until it was level with the edge. The result would be a solid piece with a moulded front and straight back. This method was used for the manufacture of self contained pieces and also of human heads for attachment to hand or wheel made bodies or to vases. A variation of this type of figure was achieved by building up the clay in the mould so that it overlapped the edge thus producing a relief plaque instead of a free
standing figure. Earlier, there was a great controversy regarding the use of completely moulded figures in Indian terracotta art. Coomaraswami, V. S. Agrawal and Stella Kramrisch were of the opinion that completely moulded figure were made for first time in the Śunga period. They also tried to impress that, although, partial use of mould had started in Mauryan period, completely moulded figures could be made only in the Śunga period.

The moulded figures are passed out from the mould which in turn can only be made with the help of models. The moulds are made by squeezing clay on the model and are then baked and subsequently used for making copies or duplicates of the original figure. The types of models which were used to make moulds in ancient days it is difficult to suggest but these might have been made of some material like clay, wax, wood or stone.

The techniques of moulding, which has reached its zenith during the Śunga period and was almost extinct in the Kuṣana age, had its revival during the Gupta period. In consideration of its various methods, particularly in Gupta period it can be divided into the following subdivisions:

(a) Single moulded
(b) Double moulded
(c) Partly handmade and partly moulded

**Finishing and Surface Treatment:**

Finishing and surface treatment is a very important process in modelling of terracotta. In the final stage it was required to remove the blemishes and also retouch the figurines. Retouching is done by liquid clay. As this stage small details were also added. These consist of ear-rings, or
an object held in the hand for beauty. At this time, arms were added to give an appearance of bravery. During this early stage if some parts of the figurine were broken (e.g. arms etc.) these were fixed by the artist by making an altogether separate piece. The figures were finished in varying degrees of details. Prior to baking, the surface was covered with a thin slip of clay, which gave it a brick red color or rich black shine. The slip was either applied with a brush made of crushed bamboo, fiber or by dipping on the surface after baking the object. At the same time a thick black or red bright polish is also seen on the terracotta surface.

**Decoration:**

Decoration is some extent was done before firing. Different colours were added to the vases at this stage. For this first, a base cream was used before applying the actual colour. The black and red glazed found on the vases is a result of such colouring. However most of the decoration was applied after firing, in the form of water colors. As a base of these a white slip was usually applied before firing. This differs from cream coloured slip described above in its extreme whiteness.

**Colouring:**

After baking the clay figurines, the most important feature of surface treatment was of coloring them. In India the art of coloring terracotta objects appears to have started around 2500 B.C. with the Indus valley people. In order to make their figures charming and attractive, the modellers of Indus valley decorated them not only with several ornaments, but also by bedaubing them. The colours served as preservative and also rendered a softer and beautiful tonal surface to the object. People of all ages have liked coloring objects and therefore, this technique has passed on from one period to the other with slight variation or modification.
During the process of firing the colour of the terracotta objects changed. This was because of the chemical reaction in the clay. The most common change was to a red colour because of oxidation of iron from the air which may get into the chamber during firing. In case of incomplete combustion the terracotta got grey or black. Under natural atmospheric conditions the clay got cream, yellow, ochre, brown or green colour.

Therefore, the change in colour seems to be due to atmospheric reaction in the kiln. In order to intensify the colour of the terracotta, a slip of deeper colour was applied to the figure. Almost all these shades are noticed in the numerous terracotta figurines, discovered from the various ancient sites of the country.

Colour was applied to terracotta to preserve it from decomposition and also give it a beautiful appearance. There was no religious feeling attached with coloring. In earlier terracotta, no colour was applied. Decoration was done by some modelling tools. However, whenever colour was used it was applied only on the front side. Before applying the color, the clay was first brushed properly and a white coating was done.

The following pigments served as colouring material:-

<table>
<thead>
<tr>
<th>Colour required</th>
<th>Material used</th>
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<tbody>
<tr>
<td>Red</td>
<td>Red ochre, cinnabar</td>
</tr>
<tr>
<td>Pink</td>
<td>Red ochre mixed with white</td>
</tr>
<tr>
<td>Yellow</td>
<td>Yellow ochre</td>
</tr>
<tr>
<td>Blue</td>
<td>Blue grit</td>
</tr>
<tr>
<td>Green</td>
<td>Malachite</td>
</tr>
<tr>
<td>Black</td>
<td>Charcoal soot</td>
</tr>
<tr>
<td>White</td>
<td>Chalk, gypsum</td>
</tr>
</tbody>
</table>
The colouring was mainly naturalistic. Hair was red or yellow, sometime black. Female flesh was often white, while male flesh was coloured black. Yellow and red were the common colours, while blue and greens were rare.

Painting in terracotta seems to be in vogue since the Harappan or Mohen-jo-daro times. Strongly it still persists in modern times in one or another form. According to ‘Kramrisch’, some of the terracotta from Patliputra has traces of polychrome\(^6\) coloring similar to Mohen-jo-daro terracottas but they are not distinct. In the Mauryan and Śunga period, generally black and red\(^7\) color was used, though other colors were sometimes applied. Further during Kuśana period a large number of terracotta figurines were baked to various shades of ochre\(^8\) and red. The popularity of the light yellowish slip was noticed in the Gupta period. During Pala period once more they were probably painted in various colors. Still red and black colors predominated. Thus painting was an important aspect of the terracotta figurines. These colours were applied by means by a brush or by dipping the entire piece in the pot containing the colour.

**Firing:**

After the surface finishing, by slip or a wash, the clay plaques, panel and figurines were baked in fire. The majority of them are fired in two sheds of colors of red colour. There does not seem to be much difference in firing of terracotta and potteries. The source of firing in terracotta was wood and the temperature attained was in the neighborhood of 750°C to 950°C. For most of the terracotta figurines the temperature was kept considerably lower due to fire disfiguring and breakage of the figurines. The kiln used for firing the terracotta consists of two chambers, one for keeping the material and the other for keeping the fuel. Three openings
were kept in the chamber, one at the bottom for adding fuel, the other at the side of the terracotta and the third at the top for escape of un-burnt bases.

In another process of firing, charcoal was kept glowing around an earthen vessel in which the clay object was to be burnt which was surrounded and covered with dusk. In this process, there was very little chance of the objects being damaged, and as such it was most suitable for terracotta figurines. Moreover the potter could easily control the heat and save the objects from wear and tear.

From the study of terracotta figurines, it appears that during the prehistoric and Proto-historic periods, the earlier process might have been followed. But from the Mauryan period onwards and especially from the Kuṣana period the latter process appears to have adopted. The above processes are being followed even today.

During the process of firing the colour of the terracotta objects changed this was because of the chemical reaction in the clay. The most common change was to a red colour because of oxidation of iron from the air which may get into the chamber during firing. In case of incomplete combustion the terracotta got grey or black. Under natural atmospheric condition the clay got cream, yellow, ochre, brown or green colour. Therefore, the change in colour seems to be due to atmospheric reaction in kiln. In order to intensify the colour of the terracotta, a slip of dipper colour was applied to the figure. Almost all these shades are noticed in the numerous terracotta figurines, discovered from the various ancient sites of the country.

The system of measurement and proportions of the Human Body:

For making the śūlas or component parts of the armature properly out of the selected wood a definite knowledge of the proportions of the
human body was considered highly necessary, as the latter determined the size of the former. This was because after making the armature, it was not possible to make even minor alterations in the final forms.

The earlier artist knew not only a system of measurement but also he had to know the anatomy of human beings. Though there are misconceptions about such knowledge in the older days, it is believed that such was the case even in time, 2000 year before.

**The system of measurement:**

According to Varma\(^9\) the different proportions for measurement were expressed as number of tālas. The pañch (five) tāla figure, sada (six) tāla figure, sapta (seven) tāla figure, asta (eight) tāla figure, nava (nine) tāla figure and dasa (ten) tāla figure. Tāla literally means ‘of the palm’, the measurement of the length of the palm or precisely, from the wrist to the top of the middle finger. A tāla consists of 12 aṅgulas and this aṅgula is the basic unit in the Indian system of measurement.

Varma has described that in ancient days several methods were followed in order to determine the size or length of the aṅgula according to purpose. In most cases, however, there was uniformity in adopting a given standard of multiplication and a particular terminology. In the field of image-making or figure drawing the measurements denoted by these words are not absolute but relative. They are determined in the following way. The total height or vertical length of an image or figure is decided first. This is then divided into equal a part by that number by which number of tālas the figure has to be measured. For example, if a ten tāla image has to be made the total height of the figure should be fixed first and then be divided by then. The resultant length of one part would be tāla which is further divided into 12 equal parts in order to get the length of aṅgula.
The āṅgula is the basic unit of measurement, though it has several varieties of fraction. In the field of image making or painting the āṅgula is mentioned as debalabdhāṅgula which means the āṅgula which is obtained from the body is implicitly from the total height of the body. Thus it indirectly specifies this system of measurement as a relative one.

The following vocabulary as given by Varma was used:-

*Uṣṇīṣa* – Originally head-gear or turban, later a part of the height of the skull or an upper part of the parental bones.

*Keśānta* - Literally the end of the hair, the line of skull beyond which no hair grows.

*Akṣisūtra* - The horizontal line running across the ear or inner corners of the eyes.

*Nāsikānta* - Lower end of the bottom of the nose.

*Hanusimā* - Lower edge of the chin.

*Gala* - A thin sheet or pad-like muscle hanging below the mandible in short double chin.

*Kaṇṭhā* - Neck, more precisely the front portion of the neck.

*Hikkā* - Pit of the neck.

*Hṛdaya* - Generally heart.

*Nābhi* - Navel or umbilicus.
<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td><strong>Lingamūla</strong></td>
<td>Sometimes mentioned as medhramūla, the beginning of the genital organ.</td>
</tr>
<tr>
<td><strong>Ūru</strong></td>
<td>Thigh</td>
</tr>
<tr>
<td><strong>Jānu</strong></td>
<td>Kuch</td>
</tr>
<tr>
<td><strong>Janghā</strong></td>
<td>Shank</td>
</tr>
<tr>
<td><strong>Poducca or Pārsmi</strong></td>
<td>Height of the heel</td>
</tr>
<tr>
<td><strong>Kakṣā</strong></td>
<td>Armpit</td>
</tr>
<tr>
<td><strong>Bāhumūla</strong></td>
<td>A part of the arm</td>
</tr>
<tr>
<td><strong>Madhya or madhyodara</strong></td>
<td>As our texts described it in connection with clay modelling, both indicates the lion.</td>
</tr>
<tr>
<td><strong>Kaṭi</strong></td>
<td>Hip</td>
</tr>
<tr>
<td><strong>Urumadhya</strong></td>
<td>Middle portion of the thigh.</td>
</tr>
<tr>
<td><strong>Ūrumūla</strong></td>
<td>The beginning of the thigh.</td>
</tr>
<tr>
<td><strong>Janghāmūla</strong></td>
<td>The beginning of the shank.</td>
</tr>
<tr>
<td><strong>Gulpha</strong></td>
<td>Ankle.</td>
</tr>
<tr>
<td><strong>Manibandha</strong></td>
<td>Wrist joint.</td>
</tr>
<tr>
<td><strong>Korpara</strong></td>
<td>Also spelt Kūrpara – Elbow joint.</td>
</tr>
<tr>
<td><strong>Prakostha</strong></td>
<td>Or prabābu poreasm.</td>
</tr>
<tr>
<td><strong>Hasta</strong></td>
<td>Hand.</td>
</tr>
</tbody>
</table>
A different technique seems to have been followed in the Pala period. These types of images have been found from Vikramaśīlā, Bhagalpur. Such images have been depicted as free standing figures. In these first a frame of stone was prepared as per measurements of the figures and subsequently it was covered with clay showing different features based on the anatomy of the material prepared.

The terracottas found from different sites of Bihar show that definite system of measurement and proportions have been followed in the matters of their anatomical features. But it is interesting to note that the same system and proportions have not been universally followed in the terracottas found from all the periods. From the following account. It may be observed that for each period a different system of measurement was used as a result of which difference in the proportions of their body is noticed. The following few examples will illustrate this point.

The female figurine of a dancing girl\textsuperscript{10} from Bulandibagh measures 27cms. The figure is divided for the purpose of measurement, first into two parts- the upper part of the body and the lower part of the body. The upper part measures 14 cms., while the lower part is 13cms. In the other words, the figurine is divided into more or less two equal parts. The upper part of the body may be subdivided into two parts – the head and the body. The head from the top of the forehead up to the chin measures 4.3 cms, while the measurement from chin to the navel is 9.7 cms. The neck is 1.7 cm. The upper arm is 7.5cms, while the fore-arm is 6.9 cms. When the ratio of the head, body and lower limbs are worked out, it comes to 1:2:3, while the ratio between the upper and lower body is 1.1 approximately.
From the same site another figurines measures 25 cms. The body and the head together measures 13 cms, while the lower part from naval down to the toe comes to 11.7 cms. In this case the ratio of head, body and lower part comes to 1:2:3. In other words, in both the cases the same proportion has been followed for the measurements. Both these figurines described above belong to the pre-Mauryan period. The terracottas of the Mauryan period also show their characteristic system of measurements. It may be inferred here on this basis that a system of standard measurement for the manufacture of terracottas was followed during the different periods. Thus a figurine belonging to the Śunga period from Pātaliputra gives a different proportion and ratio for the measurement of the body. The total height of the figurine is 11.7 cms, the upper part of the body comprising the head and the portion from the chin to navel measures 5.6 cms, while the lower part from the navel to the toe is 6.1 cms. Thus, unlike the figurine from Bulandibagh belonging to the Mauryan period, the proportion of the upper and lower parts of the body in this figurine, though belonging to the same region but of a later period gives an altogether different ratio. It seems that in the Śunga figurine the upper part is shorter than the lower part. This is vital point as it gives a new concept or a new flight of imagination to the artist of the periods which though not separated much in time yet possessing different notions for depicting the human body. It seems that in the Śunga period extra-Indian art-motifs had dominance. As we know the most important event of the Śunga Empire was the fight between the first Śunga emperor Puṣyamitra with the Yavanas, who were most probably Indo-Bacterian rulers. The influence of Perso-Hellenistic art on the Śunga art appears to be a historical fact. It is in this context that the figurine from Pātaliputra described above assumes great importance, because it shows that the lower limb (from navel to toe)
comprising the leg has been shown to be larger as in Greek and other western sculptures, a point which has to be borne in mind while dealing with the plastic art and terracotta figurines from Maurya and post-Maurya periods. The Mauryan terracottas possess the character of Indianness while those of the Śunga period are un-Indian, more akin to the western style.

A female figurine\textsuperscript{15} from Patna College area is 6.8 cms. in total height. The head in this figurine is only 1cm and the portion from the chin to the navel is 2.4 cms. Thus the total height of the upper body is only 3.4 cms. On the other hand, the lower body from navel to the toe is 6.5 cms. This ratio of measurement for a human figurine seems very uncommon and in no other figurine from any other site of Bihar such a ratio has been followed. There seems to be two reasons for such a deviation from the fixed principle of measurements. The first one is that the artist had in his mind some particular famous dancing girl of the time and the second is an extra Indian influence on the contemporary terracotta art. In this connection Coomaraswamy\textsuperscript{16} has rightly observed that in the Mauryan terracotta human figurines there were two types, one representing an official or court art and another a purely indigenous art. He opines that the official or court specimens have an extra-Indian influence\textsuperscript{17}. When the dress of this figure is taken into consideration it confirms the theory of extra-Indian influence.

A figurine\textsuperscript{18} belonging to the Gupta period recovered from Kumrahar is partly broken and gives the following measurements for the different parts of the body. Head -1 cm body (from chin to navel) - 2.4 cms, lower part of body (navel to knee) - 3.1cms. On reconstructing the lower part with the help of the above proportions the ratio of head and upper and lower parts of the body comes 1:1:6:4. Such a ratio is entirely different from the terracotta figurines of the Mauryan and the Śunga periods. However, the
lower body of this figurine closely resembles with that of Vaiśāli\textsuperscript{19} which is of the Śunga period but with respect to the head and the body from chin to navel it is very close to a female figurine found from the recent excavation of Sonpur. The age of the Sonpur figurine has been tentatively fixed in between 200 B.C. and the beginning of the Christian era. This is an important point as it denotes that some type of exchange of ideas among the artists of the different regions was available may be, through religious gatherings or large fairs.

From Antichak a figure\textsuperscript{20}, belonging to the Pāla period gives an altogether different type of measurement. The total height is 7.5 cms. The portion from the top of the forehead to the chin measures 1.5 cm. While that from the chin to the navel 2.2cms and the lower part from navel to toe 3.8 cms. The ratio of the different parts of the body comes to 1.1. 4:2.5. This seems to be a very characteristic feature of this period. In this way the ratio of the upper and lower body of this figurine is similar to those of the Mauryan period, but as far as the ratio between the head, the upper body and lower body is concerned this figurine is entirely different from the Mauryan period. The main feature of this figurine is that the difference between the measurement of the head and the portion of the body from the chin to the navel is very little.

The two terracottas figurines from Buxar are also interesting for the study of principle of measurement of different anatomical features. One of the figurines\textsuperscript{21} is 14.1cms in height. The upper body from the top to the navel is 7.9 cms. Out of this the head is 2.5 cms. and the body from the chin to navel is 5.4 cms. The lower body from the navel to the toe is 6.2 cms. In proportion of the upper and lower body, this figurine is closer to the Mauryan figurine from Bulandibagh.\textsuperscript{22} But in general proportion, the
ratio of the different parts of the body shows peculiarity of its own. This ratio is 1:2.1:2.4, which is closer to pre-Maurya figurines.

Another figurine\textsuperscript{23} from the same site measures 14.5 cms. It is partly broken. The head measures 2.5 cms, the portion from the chin to the navel 4.6 cms., and lower part which is broken is 7.4 cms. After giving some allowance for the broken part, the ratio of head, upper body and lower body comes to 1:1.9:3 (approx). This ratio is very much similar to the figurine belonging to the Śunga period found from Pātaliputra described above. The similarity in the measurement but difference in proportion of this figurine with that of the Mauryan figurine described above indicates that there was a significant difference between the terracotta art of Mauryan and pre-Mauryan period.

A figurine\textsuperscript{24} found from Vaiśālī gives the following measurements—total height - 9.5cms, head - 1.2cms, the portion from chin to navel-2.8cms and the lower limb from the navel to the toe 5.5cms. The proportion of the different parts of the body of this figurine comes to 1:2.4:4.5. this figurine has been assigned to Śunga age. But the ratio shown by this figurine reveals that it is more close to that of the Kumrahar figurine belonging to the Gupta period. In this connection it may be pointed out that the Śunga figurine described above show the influence of western style. It has already been pointed out that in the ratio of the upper and lower parts of the body, the Śunga figurine are quite different from the figurine of other periods found from Bihar. Like Śunga figurine, the Vaiśālī figurines also give similar measurement of the body. It would, therefore, be correct to place this figurine in the Śunga age.
In excavation at Sonpur a female figurine has been found which measures as follows: - total height - 13cms; head - 2.3cms, upper body-3.8cms and lower body - 6.9cms. The ratio of head, upper body and lower body comes to 1:1.6:3. In respect of the ratio of the head and of the upper body this figurine is similar to a Kumrahar figurine which belongs to the Gupta period. But taken as a whole this ratio is closer to the ratio obtained for the figurine from Pāṭaliputra described before.

In order to ascertain whether regional bias in measurement and proportions dominated over the general contemporary art style of the period, two figurines from Mathurā have been examined. The first is a male figurine\textsuperscript{25} of pre-Mauryan period. Its total height is 12cms. The ratio of the upper and lower body is exactly 1:1. The head is 1.6cm. The upper body, from chin to the navel is 2.7cms and the lower body from navel to the toe is 3.7cms. The ratio of the different parts of the body comes to 1:2.7:3.7. In a pre-Mauryan figurine from Bulandibagh, already described above the ratio of the different part of the body, head and the portion from chin to navel and lower body from the navel to the toe comes to 1:2.5:3. It is found that though these two find spots, Bulandibagh and Mathurā are very far away from each other, the artist have adopted almost the same ratio in preparing the terracotta figurines. In other words, these seem to be little regional effect in the measurement and proportions of the figurines belonging to the same period.

Another example from Mathurā is of a female figurine\textsuperscript{26} belonging to the Śunga period. This figurine measure 7cms, out of which the upper body including the head and the portion from the chin to the navel is 2.5cms, while the lower body, from the navel to toe is 4.5 cms. The ratio of these three parts of the body comes to 1:1 5:4.5 when the measurement,
proportion and the ratio of different parts of the body of these figurines are compared with another figurine of the same period obtained from Pāṭaliputra very little difference is noticed, though it is more akin to the Gupta figurine obtained from Kumrahar. From this example also it may be noticed that the terracotta art was governed more by prevalent contemporary art rather than regional or local influence. This is an important observation because according to this concept similarity of measurement proportions can also be one of the criteria for correlating the different terracotta figurine belonging to similar ages but found from different sites.

From the study of terracotta figurines, it appears that during the prehistoric and the proto historic periods, the earlier process might have been followed. But from the Mauryan period onwards and especially from the Kuṣana period the later process appears to have adopted. The above processes are being followed even today.

References:-

10. Patna Museum, Arch No. 8510 Pl. V. Fig. 4.
12. Patna Museum, Arch No. 7996. Pl. XVIII, Fig. 2.
15. Ibid, Fig. 69 Pl. V, Fig. 2.
20. A.I.H. and Arch. Department Pl. XXV, Fig. 2.
21. Patna Museum, Arch No. 6303 Pl. IV, Fig. 1.
22. Patna Museum, Arch No. 4197
23. Patna Museum, Arch No. 6300 Pl. VI, Fig. 1.
25. Agrawal, V. S., *J.U.P.H.S* Fig. 24, 1936.
26. Agrawal, V. S., *J.U.P.H.S* Fig. 31, 1936.
27. Patna Museum, Arch No. 7996 Pl. XVIII, Fig. 2.
Process of making