

## Chapter: 3

### Crafts and Industries

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In the past, the foundation of India's rich economic life was not only agriculture; but also there were various arts and crafts. It was an important part of economic stability in northern India since the remotest past. Being an agricultural country there developed different types of agro-industries.<sup>1</sup> To date, no other industry or craft is given more importance. In the period from 600 to 1200 AD, called the early medieval period in Indian History, saw the development of new trends in the history of land system, industry, trade, politics, social language and religion. During this period, barring the rule of Harṣa whose rule was centred in North India, a variety of states and rulers had appeared in the political arena. In the said period, various industries flourished in northern India. The producers used advanced techniques, refurbished equipments and different kinds of materials. Of course, agriculture is even today the main industry. Today's leading industrialised nations were once traditionally agricultural. A rich and expanding agricultural economy formed the basis for the production of industry. It is correctly concluded by the economic historians that society is held together by the bond of production.

It may be presumed that ancient Bengal was enriched with industrial products based on agriculture. It played an important role in bringing economic stability to Bengal. The villages of ancient Bengal had been mostly self-sufficient and self-contained with respect to primary units, in case of both agriculture and crafts. It met the day-to-day requirements of the inhabitants of Bengal. In the initial stage, literary and epigraphic sources bear testimony to the villages and people of ancient Bengal. There were opportunities for production of all types of agricultural and industrial items for both rural and rural people of the country.

In ancient times, the river system divided Bengal into four grand divisions. The divisions are Puṇḍravardhana, Vardhanamāna-bhukti, Vaṅga and Samataṭa. In different periods of our history, there had been various types of industrial

development in different parts of Bengal. Among the factors behind the growth of industries, the most important factor was the agricultural surplus. It was produced enormously in the country. The high fertility of the land produced a huge agricultural production, which made Bengal a prosperous country. While agriculture was the main feature of the economy of Bengal, many industries and factories were formed. It had a significant contribution to lives of the people. It is proven from literary and epigraphic sources that the rural population was largely dependent on soil and its production. Although agricultural activities were not totally absent in the cities, different commercial, industrial, political and judicial activities were hallmark. In contemporary sources, it has been described that the most distinctive feature of the city was a relatively greater prosperity and luxury compared to that in villages. However, the most notable products manufactured in both rural and urban areas were textiles, sugar, metal work, stone work, woodwork and pottery etc.

One of the fundamental elements to aid in the establishment of industry is the availability of raw materials. Without natural, people can do little. India luckily has an abundance of raw materials, such as mineral, water and fuel, all which were found in plenty in different parts of Bengal, but not available easily in the neighbouring regions. At the same time, the financial factor is also to be considered. In modern times, we mainly rely on the functions of private or public financial service providers. Without necessary capital, it would be impossible to set up any industry. During the period under consideration, there were different financiers setting up the different industrial units. Occasionally, it was an independent entrepreneur, whereas the totalitarian state operated certain industries during the Maurya Era.

Industries can never be developed until demand and other forces needed for its growth are created among the people. The agricultural products are necessary for the survival of one's life, although there is also the need of industrial products to meet their aesthetic sense. Thus, the people, who have a great interest to enjoy something else, must buy such industrial products. There

is also the need of available money in the hands of consumers for purchasing the goods. The royal and rich men having surplus money purchased the industrial articles to fulfil the desires of an alluring life. Thus they always inspired themselves or others to produce products meeting their aesthetic desire. In this way, they played an important role boosting the growth of industries.

The sources of this era prove the superiority, the manual experience and the scientific knowledge of contemporary artisans and craftsmen, which was much better than the ancient Indian era. The origin of industrial growth might have granted a higher status to the labour class. Since the Gupta period, there was a broad and liberal outlook about the condition of the working class in society. The legislators of the period under review realised the dignity of labour. There were some contributions to the improvement of conditions of the labour class. The first and foremost among them was the emergence of a new religious movement in northern and eastern India, which levelled social differences, united upper and lower classes from the end of the 8<sup>th</sup> century A.D. The Buddhist monk Rāhula Bhadra, a renowned Nālandā scholar, the pupil of famous Haribhadra and also the contemporary of king Dharmapāla led this movement. It sought for a revolution in the intellectual tradition and the basic pattern of culture. Following the commitment of the social and economic spheres of life, the lower classes had welcomed the movement. During the period, the demand for the workers increased following the imperial policy of the royal powers. The feudal lords were also looking for opportunities for their region's expansion. This increased the demand for war equipments, and subsequently improved the condition of the workers for these products. The assimilation of the foreigners into the Hindu society had also reduced the distinction between the upper and lower classes and thus went in favour of the conditions of the working class.

Since, ancient times, many industries must have undoubtedly existed at different stages of development. It must be acknowledged that the term 'industry' is used here in a broad sense, to refer to various types of handicrafts and cottage and small scale industries. In the modern sense, the evidence of the

existence of heavy industries is rarely found in ancient India. The only industry current in the period in question that can be termed 'heavy' is probably mining. An attempt has made to enlist not only different types of industries here, but also to find out, where it emerged and how it evolved. Considering the natural resources of Bengal, its agricultural products and exports, we can classify the industries under the following categories:<sup>2</sup>

- a) Agricultural products such as textile, sugar, oil.
- b) Soil and stones.
- c) Metals such as copper, iron, diamond, gold and silver.
- d) Forest products such as wood, bamboo and cane, and ship building.
- e) Marine products: pearl, conch shell etc.

### **3.1. Textile Industry**

Literary and epigraphic evidences describe many industries. Among them, the most important rural craft of ancient Bengal was the textile industry. This industry had a magnificent history of ancient India. That fine wool was woven the Aryans is established from the advanced spinning and weaving instruments used by them. Buddhist literature has described the weaving industry. In the *Jātakas*, there is a reference to the making of fine cloth. It was practised by the indigenous tribal communities of the region such as the Vaṅgas, Puṅḍras, Niṣādas, Śabarās, Chaṇḍālas and Kirātas. The others, who belonged to the lowest order of the Hindu society, also contributed to the formulation of this industry.

The history of the textile industry of cotton and silk in Bengal goes back to the remotest antiquity. At the time when Kauṭilya wrote *Arthaśāstra*, it was a well-established industry with a wide reputation in the country. Textile and garments, no doubt, were available in ancient India mentioned in *Vedic* and other Indian texts. There was a great manufacturing centre of textile industry in Bengal. It can be inferred that almost all the major features of Indian dress from the early part of history were retained in Bengal, but some changes developed over the years. From Kauṭilya's *Arthaśāstra* we have a graphic account of textile

products of ancient Bengal. Both Pāṇini and Patañjali mention raw materials for cloth making and various kinds of textile.<sup>3</sup> Kauṭilya has made specific references to a variety of such products as *kārpāsika*, *dukūla*, *kṣhauma*, *patrorṇa* and *kauseya*.<sup>4</sup> Manu also speaks of different kinds of cloth, such as *kauseya*, *kṣhauma* and *kārpāsa*. Hiuen-Tsang also refers to woven cloths of *ofśana*, *kṣhauma* (hemp), and *kambala* (rug) made of sheep's hair.<sup>5</sup> Bāṇa<sup>6</sup> mentions dress materials as *kṣhauma*, *dukūla*, *laltantantiya*, *netra*, *aṁśuka*, *jatipatta*, *citrapatta*, and *stavaraka*. According to the *Amarakoṣa*, there were four sources, from which clothes could be produced. These were barks, fruits, insects, and hair.<sup>7</sup> Plant fibres such as flax and hemp provided *kṣhauma* fabrics, fruits supplied cotton fabrics and insects produced silk threads and hair yielded wool.

It is described by Kauṭilya that at least four of the clothes such as *dukūla*, *kṣhauma*, *patrorṇa* and *kauseya* were varieties of silk-cloth. These were made of yarn produced by worms. Among the products of silk produced in Bengal, *kauseya* ranked the first.<sup>8</sup> It was silk cloth manufactured from insects and worms. From the *Arthaśāstra*, it appears that *kauseya* was manufactured by fibres obtained from worm. According to Śaṅkar, it was a kind of silk produced from the saliva of insects. There was Dhauta-*kauseya*, which was bleached, and white *kauseya* attained from a particular variety of insect living on the leaves of likucha vata etc.<sup>9</sup> Bāṇa in his *Harṣacharita* refers to some other kinds of silk fabrics like *aṁśuka*, (*vastra* in general), *cinamśuka* (imported from China), *kosaja* (obtained from cocoons produced in Assam) and *netra* (short silk garment).<sup>10</sup> Motichand<sup>11</sup> argues that *netra* was a kind of silk manufactured in Bengal till the 14<sup>th</sup> century AD. Commenting on Manu, *Medhāthithi*<sup>12</sup> says that Kashmir was the main centre of the silk industry and the people of Kashmir had monopoly over it.

Another variety, *patrorṇa* was made of yarn of thread obtained from the spider's saliva. In the *Harṣacharita*, it is described as *lālātantujai*, i.e. made of yarn of spider's saliva.<sup>13</sup> It is further learnt from the *Arthaśāstra* that *nāgavṛkṣa* (a kind of plant being a resort of serpents), *likucha*, coral tree i.e. Artocarpus Likucha, Vakula and Vaṭa trees were the primary sources, from which fibres or

yarn were extracted. This description is also supported by Kṣīrasvāmī, the commentator on the *Harṣacharita*. Kṣīrasvāmī says on *patrorṇa*, 'lakucaṣaṭāḍipatreṣu kumilalorṇakṛtam patrorṇam'.<sup>14</sup> But Kṣīrasvāmī speaks of *lakuca* and *vaṭa* plants only. Kauṭilya also mentions that these fabrics have different colours, such as *pīta* or yellow from *nāgavṛskha*, wheat-colour from *likucha* (*artocarpus takoocha*), white colour from *Vakula* (*mimusops elengi*), and the colour of butter from *vaṭa* (*ficus indica*) and other (*Pītika nāgavṛkṣiku godhumavarṇa laikuco śvetavakulo śeṣanāvanītavarṇa*).<sup>15</sup> The *patrorṇa* fabrics used to be produced in different places of the country, such as Magadha, Puṇḍra and Suvarṇakudya. These products were named after the manufacturing places such as Māgadhika Pauṇḍrika Sauvarṇakuḍyaka *ca patrorṇaḥ*.<sup>16</sup> It has been clearly stated that the most beautiful variety of *patrorṇa* was made in Suvarṇakudya. The place is identified with Kāmarūpa. In this context, it may be noted that the red silk cotton tree grew largely in Assam.

It is generally believed that silk was introduced in all the countries from China. But the scholars are not in consensus over the matter. It can be noted that in China, silk was produced from the *tnut*-plant i.e., mulberry. But in India, it is obtained from the plants mentioned above excluding of course mulberry plant. Secondly, Chinese *reśam* is white and it is dyed if needed. But there are different colours of *reśam* obtained from the leaves of different trees in Bengal. It naturally follows that *reśam* might have an indigenous origin in Bengal or India. It was after Kauṭilya's time *reśam* cultivation might have started in other parts of India as well.<sup>17</sup>

The other variety of textile is *kṣhauma*. It is a coarse variety of linen mixed with cotton, or made of flax and hemp.<sup>18</sup> *Kṣhauma* was a kind of plant product.<sup>19</sup> According to Sarvānanda, *kṣhauma* was a variety of cloth made of *atsi* or linseed and known as *malla* in the popular language.<sup>20</sup> Kāmarūpa was the main centre of *kṣhauma* production or *malla* in the 7<sup>th</sup> century A.D. It was kept rolled in multi-coloured cane baskets. Its quality was that it could withstand washing and cleaning.<sup>21</sup> It is stated in the *Amarakoṣa*, *kārpāsam vadaram*

*praktvam dukūladyanaca balkalam dhautatasaravastram patrorṇam kṣaumiti paṭṭavastra*. The most famous variety of this textile has been specifically called Pauṇḍraka.

Among the varieties of cotton mentioned in ancient literatures, *kārpāsika* was produced in Vaṅga and six other regions. The item has been mentioned as the most excellent one of its kind.<sup>22</sup> There were seven countries producing cotton cloth of which the production of Vaṅga was one of the best. Vaṅga was a great centre manufacturing fine cotton fabrics proven by the testimony of the *Manasollasa*. It furnishes a long list of fabrics for the use of the king along with the places of their origins. In this list, we find the places, such as Vaṅga and Kaliṅga of eastern India.<sup>23</sup>

The *dukūla* textile was special kind of cotton and its centres of manufacture were East and North Bengal. In the *Amarakoṣa*,<sup>24</sup> *kṣhauma* and *dukūla* have been made synonyms. On the basis of texture and colour, the *dukūla* variety of textiles, was stated to be of three types, namely, *śveta*, *syāma* and *suvarṇa*, i.e. white, dark, and red or golden colour. These were produced in different parts of Bengal and the adjoining regions, but the most delightful, soft and white coloured *dukūla* was produced in Vaṅga. On the other hand soft and dark coloured *dukūla* was found in the Puṇḍra country, and the soft and red coloured ones, east and north Bengal or Kāmarūpa or Burma or Suvarṇadvīpa.<sup>25</sup> It has been further determined that the red *dukūla* was woven with wet mixed yarns.<sup>26</sup> There were three types of *dukūla* on the basis of techniques of weaving such as *maṇisnigdghokavanam*, *chaturasravanam*, *vyāmīśravanam* found in *Arthaśāstra*. These were made with mixed textures or yarns of different colours. An interesting aspect arising from the description of Kauṭilya is that all such *dukūlas* were actually named after the names of their production centres- Vaṅgaka, Pauṇḍraka and Sauvarṇakudyaka. Puṇḍra produced the country's best *dukūlas* linen.

From the accounts of Kauṭilya, it is quite clear that the villages of north, south and east Bengal were well-known for textile production. This is also proven

from the account of *Periplus of the Erythraean Sea* (1<sup>st</sup> century A.D) and the *Natural History* of Pliny (1<sup>st</sup> A.D. The finest and the most delicate of all fabrics was the *muslins*, also known as Gangetic *muslin*.<sup>27</sup> It has been said that “a piece of *muslin* was to be drawn through a finger-ring”.<sup>28</sup> The Arab merchant named Sulaiman<sup>29</sup> also comments that the dress of cotton cloth was so light and fine that it could go through a signet ring. Ibn Khurdadbah also claims that the cloth produced at *Rehma* i.e. Beṅgalā were imitation velvet of cotton.<sup>30</sup> The quality of weavers and the components were seen in the gown of men and women which was lighter than the snake slough. The clothes used by the rich women were transparent because of its fine texture.<sup>31</sup> These fine *muslins* were also known as *textile breeze*, Evening Dew or Running Water. These *muslins* in the Roman Empire were called *ventus textilis* or *nebula*.<sup>32</sup> Kālidāsa also refers to very fine cotton and silk cloth, which can be blown away by breath (*nihśvāsahaya*).<sup>33</sup> This certainly refers to *muslins*. Hiuen-Tsang even speaks of various materials of which textiles were made. There is a reference to Buddhist monks wearing silk cloth by I-tsing. The *Rāmacharita* of Sandhyākaranandī mentions *likucha*, *śrīphala*, *nāgakeśarī* and *vakulu* plants supplying raw materials for linen. The book also mentions diversified costly dresses and youthful heavenly courtesans wearing their veritable apparels.<sup>34</sup> Some Arab geographers and merchants like Sulaiman, Ibn Khurdadbah and others from the 9<sup>th</sup> to 11<sup>th</sup> centuries A.D. mention different varieties of various types of fine clothes in Bengal. Mārco Polo, Ibn Battuta, Chinese writers Wang-yuan and Fa-hien, Ma-Huan of the 14<sup>th</sup> and 15<sup>th</sup> century AD and Bārbosā of the 16<sup>th</sup> century AD have referred to Bengal. They mention that there were very fine cotton fabrics in Bengal. We find specific traditional royal parasol in the *Brihatsamhitā* of Varāhamihira, covered with new *dukūla*-fabric of white colour with ornamental decorations at the fabric ends. Such richly decorated white-coloured umbrella was considered as one of the *aṣṭamaṅgalas* or eight auspicious symbols. It was connected with paramount sovereignty. The white colour of the umbrella signified imperial authority.

In addition, contemporary literature also mentions the woollen textile. Hiuen-Tsang refers to blanket, which was made from sheep or goat's hair. He mentions another texture made from wool of wild animal. Its spinning and knitting operations were easy due to its flexibility and fineness. Sewing was a well-known art, because the tailor is mentioned in ancient texts as a man who earns his livelihood by stitching the clothes.

Apart from all these references, there is some reference to textiles in the inscriptions that have been discovered from different parts of Bengal and can be dated to the 5<sup>th</sup> century and after. It is recorded in the Deopārā Inscription of the 11<sup>th</sup> century A.D.<sup>35</sup> that Lord Śhiva is dressed with variegated silken garment (*citra kṣhauma*). The same inscription also refers to the cultivation of cotton, and cotton seeds (*kārpāsa-vīja*).<sup>36</sup> It is also said that cotton seeds were so well-known that people of Bengal could easily recognise pearls from their similarity with seeds of cotton. Literary texts refer not only to textile products, but also to the raw materials and techniques of their manufacture. In the *Charyyāgīti* of the 10<sup>th</sup>-11<sup>th</sup> century AD, we come across a vivid description of the blossoming of cotton flowers and their cleaning with *dhuni* (bow) and also of spinning yarn.<sup>37</sup> In the *Saduktikarnamṛita* we have a specific reference to the spinning of yarn from cotton-flower by a poor Brāhmiṇ lady.<sup>38</sup>

### 3.2. Sugar Industry

Sugar is another important industry that gained importance during the period. Bengal is probably one of the oldest homes for the sugarcane. The growth of sugar industry was seen within a very short period especially in North Bengal. *Periplus* refers to the export of sugar from India to East Africa. From Śuśrūta (45, 138-140), we come to know of various sugarcanes called *pauṇḍraka*. It was named after the region of the Pauṇḍra country, where sugarcane grew in abundance (North Bengal).<sup>39</sup> It is recorded in the *Rāmacharita*<sup>40</sup> and *Kāvya-mimāṃsā*<sup>41</sup> that Varendrī was famous for cultivating sugarcane. It may seem that Bengal had played a role in exporting sugar, since the large number of

*paunḍraka* variety of sugarcane grew in the region. Charaka mentions *paunḍraka* the cultivation of various types of sugarcane during his time.<sup>42</sup> The author refers to a kind of honey extracted from the reeds grown in the country of Prāsioi. Another author says that Indians near the Ganges used to quaff sweet juices from tender reeds. We find reference to sugarcane crusher as *ussaṇika* in the *Aṅgavijjā*.<sup>43</sup> Pāṇini<sup>44</sup> claims that that the very name Gauḍa, a division of Bengal in the ancient period, derived from the word *guḍa* (treacle). The *Saduktikarnamṛita*<sup>45</sup> records *guḍa* made from the juice of sugarcane and *ikṣu-yantra* device for pressing sugarcane. The distillation of alcohol from sugar, coconut and palm-juice seems to have been probably well-known. The *Charyāpadas* refer to drinking alcohol produced by the process of fermentation of fine powder derived from the root of a tree<sup>46</sup>. The *Śūsṛūta Saṁhitā* explains that wine made of grapes or sugar (*ikṣhu* or *drākhsā-sava*) was tonic and choleric.<sup>47</sup> It is said that *sidhu* (wine) was produced from flowers of Madhuka.<sup>48</sup> The exportable sugar seems to have been of a high quality to meet the demands of overseas markets. Hemachandra<sup>49</sup> has written us about *ikshunīpiḍanayantram* used in Bengal.

### 3.3. Oil Industry

Oil manufacturing was well-known in ancient India. We find mention of different types of oil yielding seeds such as mustard, sesamum, linseed, and *ingudi* in contemporary literature.<sup>50</sup> Oil Mill and mill owners are also referred to in the epigraphic sources. The process of preparing scented hair oil is mentioned by Varāhamihira. He mentions different kinds of perfumed oils extracted from equal mixing of powders of *manjiṣṭha* (*rubi cordifolia*), *vyāghranakha* (a tree or cuttle fish bone), *nakha* (shell perfume), woody cassia, *costus* (*saussurea lappa*) and *bola* (*commiphora myrrha*). Then the whole thing was mixed with the oil of gingelly oil (*sesamum indicum*), being heated by sun's rays.<sup>51</sup> Bāṇa mentions the use of cosmetics.<sup>52</sup> He also refers to the plants of Rodhra, Priyāngu and Bakul by which toilet pastes were manufactured.<sup>53</sup> The use of sandal oil is also mentioned

in Bāṇa's writings. There is also mention of unguents, camphor powder and lac dye used by the ladies of 7<sup>th</sup> and 8<sup>th</sup> century A.D. known from the references.<sup>54</sup>

Oil industry also flourished in Bengal. The Tailakāraka (oil-man) has been mentioned in the *Brahma-vaivarta Purāṇa*. The Mahāsthāngarh Stone Plaque inscription and the Vappaghoshavāṭa Inscription of Jayanāga mention mustard seeds and mustard channel (*yāṇaka*).<sup>55</sup> Grinding machine (*ghāni*) is known to have been used to make mustard-oil. Oxen were subjected to move *ghāni*. The indigenous oil manufacturing process was adopted by the sub-caste known as Kulu. The late Purāṇa refers to them as *tālika* or *ghanika*.

### 3.4. Pottery

Pottery was also an important means of subsistence for a group of people in Bengal. It formed an integral part of daily life in the early stages of our civilization. It is a window that shows the artistic success of an era. Among all industries pottery was the oldest. The main component of pottery is clay, which was easily available in Bengal. The clay found in the Gangetic plains was perfectly suitable for pottery. In addition to the easy availability of raw materials, clay elasticity had contributed to the development of the pottery industry. The archaeological remains discovered from Pāṇḍu Rājār Ḍhibi establish that pottery was known and practised in Bengal as far back as the chalcolithic period.<sup>56</sup> The excavations at other site such Mahāsthān, Chandraketurarh, Rājbaḍidāngā, Pāhārpur, Maināmatī and recently at Wari-Bateshwar also indicate its early existence. The *kumbhakāras* (potters) and *kumbhakāra-garta* (potter's ditch) mentioned in the epigraphic sources testify that pottery was an important industry in Bengal. There are different levels of different potsherds and ceramics found from the excavations. The scholars have been able to determine our culture and the specific dates of their invention. In fact, the potters were numerous and their products were highly valuable. They easily developed into a rich professional caste. The number of potters has been given in the list of beneficiaries of land donation found from the Copper-plate Grant of

Śrīchandra.<sup>57</sup> The inscription also refers to the guild of potters. Romila Thapar suggests that in addition to the pottery available in the house, abundance of copper and iron objects would also provide higher degrees of comfort in the urban centres.<sup>58</sup>

The archaeological excavations prove its popularity in domestic life. India being an agricultural country its rural population was poor, and they had not enough money to purchase the metal utensils for their daily needs. Thus the majority of Indian people used earthenware to meet their domestic and aesthetic purposes. To improve the economic and aesthetic needs of the villagers, the profession of making earthen wares was, therefore, a very profitable one. It is one of the oldest industries in India, whose origin can be traced back to the pre-historic times of Mahenjodara and Harappan culture. Excavations have unearthed a large number of items such as bowls, jars, and goblets that back to the Gupta and post-Gupta periods.<sup>59</sup> In Pāhārpur, narrow-necked bowls, inkpots, lots of vases, cups, saucers or dishes, jars, hāndī shapes, and lotā shaped vases of early medieval period were discovered. Hiuen-Tsang has described that most of the household utensils were made of clay pots.<sup>60</sup> Since its origin, the soil has been mainly the handmaid of the women.

Besides literary work, archaeological excavations have proven the evidence of clay pots. From the excavations at Pāhārpur, Mahāsthān (Bogra), Sābhār (Dhaka), Hastināpur, Ālamgirpur, Lālkot, Ahichchara etc. various clay utensils in the form of storage jars, lotus, saucers, lamp stands, dishes and terracotta plaques have been discovered. This is an art that serves every level of the society from a village *hat* to a royal palace. All these prove that pottery was an advanced industry and a major craft. Pottery and soil modelling were home industries which were fully operated by women.

The potters were aware of various types of objects and different designs and applied appropriate colours to improve their attractiveness and majesty. An early Jaina text<sup>61</sup> hints at a large production of pottery for a wide market. It further speaks of a wealthy potter named Saddalaputta who owned 500 potters'

workshops and a scary fleet. He distributed his earthenware throughout the Gaṅgā valley. The potters had a very busy time during the period under survey. They formed a caste assigned to the *uttamasāṅkara* group referred to in the *Bṛihaddharma* and the *Brahmavaivarta Purāṇas*.

### 3.5. Stone Industry

Stone industry made remarkable progress in making stone sculptures during the period under survey. Stone was widely used as a building material in the past. It is proven by the abundance of archaeological remains and literary references. The *Rāmācharita* mentions 'jewelled anklet bells'. *The Tabāqat-i-Nāsirī* has described that Lakhnawati was surrounded by wall of rough stone.<sup>62</sup> The Irdā Copper-plate of Nayapāladeva<sup>63</sup> mentions the 'golden rampart walls of the city of Priyāngu, which was as bright as fire'. Probably, the wall was built in red light stone. Most of the sculptures in the Pāla-Sena period were made of what was known as *kaṣṭhi-pāthar*, a sort of black stone. They were brought easily to Bengal from the Rājmahal hills. We find reference of *śilpīs*, who were proficient in engraving inscriptions on stones. Bhaṭṭabhadra refers to *śilpīs* as low castes. In the reference of the Deopārā Inscription of Vijayasena<sup>64</sup> we find Śūlapāṇi, a Raṅaka, chief of the guild of *śilpīs* of Varendrī.

The stone used to engrave images of humans and animals in the eastern region of the subcontinent. Excavations have unveiled small objects from various stages of the early historical period. It shows the use of stone for the use of ordinary people at different points of life. Stone objects have also been excavated in some places of present Bangladesh. Bāngarh in the district of West Dinajpur<sup>65</sup> revealed some objects which include stone sharpeners and Rājbaḍiḍāṅgā in the district of Murshidabad yielded a stone toy cart wheel<sup>66</sup>. A stone ring consisting of a *purṇakalasa* design<sup>67</sup> was recovered from Mahāsthāngarh in the district of Bogra, and a stone pestle was unearthed in Pāhārpur in the district of Rājshāhi. Some of the stones have been found in Maināmati, district of Comilla.

Stone workers and stone-makers created a large number of stone objects. They clearly reflect a superior creative talent and superb skills. Stones were used for many purposes, such as buildings, memorials, images etc.<sup>68</sup> There is a mention of stone excavation, breaking and installation of stone for constructing road.<sup>69</sup> The famous architect Chandaśhiva, son of Vīrabhadra had earned artistry in stone work. He constructed a large number of stone temples including the temple of Śaṅkara.<sup>70</sup> Stone was also used for mortar, pestle and other household objects. Archaeological excavations have discovered a large number of stone images and other objects from different places. The stone was also used as a writing material for its durable nature, and for this reason many land transactions were engraved on it. A large number of stone inscriptions have been recovered from different parts of India. Not only do the archaeological remains and inscriptions prove the largeness of the stone industry, but also contemporary literature has numerous references to it. The Pāla period of Bengal and Bihar was the glorious period of this industry. Two great artists and sculptors, named Dhīmāna and his son Vitapāla, made this period memorable by creating wonderful stone works.<sup>71</sup> Lāmā Tāranātha has also substantiated this truth. Moreover, another inscription of Jayapāladeva mentions an artist named Someśvara, who was eminent for his artistic skills in the field of colour-decorations.<sup>72</sup> This artist belonged to Magadha. The tanks were also made of stone as described in the inscriptions.<sup>73</sup> The throne of kings was mostly made of stone. Bāṇa mentions that the king sat on the throne made of stone, and it was bright like a pearl and the moon.<sup>74</sup>

Stones were usually used for making idols placed in temples. The stone beads were used for various purposes. Archaeologists have excavated different objects of stone beads from different places of northern India. Finding numerous incomplete beads, including sandstone crusher, showed that there was a little bead factory in this area. Since ancient times, the stones were used as permanent records. We come across inscription engraved on stones which are as follows:

1. Stone (Plain and coarse),
2. Pillars,
3. Pedestals of the images,
4. Stone slabs,
5. Lids of pots and boxes.
6. Marble slabs,
7. Walls of the temples and
8. Caves.

### **3.6. Brick Industry**

The art of brick making was also known in ancient Bengal. Baked bricks were made of clay, and we have enough evidence in this regard from the excavations carried out. These were decorated with many designs, such as lotus petal, the chess board, wavy and straight linear decoration, etc.<sup>75</sup> The sizes of bricks varied from place to place and probably did not maintain any recognised standards, unlike the trend in present times. From the excavations at Pāhārpur, it appears that one brick measures 4' 2'' × 3' 6'', while the other 3'' × 3'' only.<sup>76</sup> The temples discovered from the excavations at Pāhārpur clearly indicate that these temples were built stage by stage from different times, and often bricks used collected from the demolished older buildings in the construction of a new one. There is the mention of a brick-built Buddhist *stūpa* found in Bharatpur, and a brick-built temple of the Gupta period at Chandraketugarh and a brick-built tank at Tamluk. The *Purāṇas* refer to masons as Aṭṭālikākāras. A brick-firing site is found in Iṭkholā near Chandraketugarh. The temple, secular buildings and palaces or tanks, were made of bricks, thereby implying the existence of masonry.

### **3.7. Metal Industry**

One of the most desirable innovations in human history since ancient times is finding suitable medium to express human creativity, novel ideas and

expression of aesthetic feeling. The main media have been stone, wood, clay, metal etc. Stone tools are useful and durable, but they cannot improve productive forces. Wooden material is short-lived, and cannot keep the object of art alive for a long period. Clay is not a durable material. Therefore, metals are the most important and sustainable medium for expressing their creative mind and aesthetic sense. So, metal became a factor in the revolution of ancient, medieval and economic sphere. The earliest man used mainly stone tools. But with the progress of civilization, the use of advanced metal began to develop from one level to another due to technical evolution. During the early medieval period, it became a part and parcel of the production process. Among the industries developed in the early medieval period the metal industry took the highest position. In northern India, it became a fairly advanced craft, which is clear from the literary and preserved records in question. Different types of metals, such as iron (*lohā*), silver (*rajata*), copper (*tāmra*), lead (*śishā*), tin (*trapu*), gold (*hiraṇya*), brass, zinc etc. were used in the period of study. Apart from these, there were other metals produced through a specific mixture of metals. The blended metals were such as *buillion*,<sup>77</sup> steel,<sup>78</sup> *kāṁsya*<sup>79</sup>, *Teon-ShiH*, *Vartaloham* (combination of *kāṁsya*, copper, *pittala*, iron and lead) etc. Artisans and craftsmen of northern India as well as Bengal used metal mainly for making tools, weapons, ships, ornaments and other objects. It is also noticed that iron was the most used metal. Although other metals such as gold, silver copper were often used. These reflect the aesthetic aspect of the era on the one hand and the prosperity of society on the other. It is well-known that the development of art and crafts and socio-cultural development of society go always go hand in hand. These factors naturally led to higher standards of living in those times.

Iron was certainly the most useful metal in everyday life. It transformed the society and economy of Bengal in an expeditious motion. This metal was mainly used for making agricultural equipment and implements. Since ancient times agriculture is the main occupation of the civilisation. Agricultural implements like spade, sickle, hoe, *arṁkuśa* (goad), hatchet, axes, ploughshare,

etc., were considered as an essential part of the community made of iron by the blacksmiths. So, they were considered as an essential part of the community. According to *Brāhma-vaivarta Purāṇa*, the *karmakāras* are included in the *uttam-saṅkara* group.<sup>80</sup> Kālidāsa's *Raghuvamśa*<sup>81</sup> mentions heating and striking of a piece of iron with the help of stem hammer (*ayoghana*). Different literary sources and archaeological excavations refer to the various implements made of iron. It may be added here that agricultural instruments mentioned above are used by Indian farmers even today. Iron can be used as an instrument working on wood, bamboo and leather. Among the useful iron objects were hammers, different types of chisels, axes, padlock, and iron plates. A plate with holes, a spoon, a dagger and a small iron pot have also been recovered from excavations.<sup>82</sup>

The demise of Harṣa in 647 A.D. led India to become a collection of small and hostile states. The period did not have any strong central authority to control the vast empire. Thus, it invited the foreign aggressors in the northern part of the country. North India then made significant progress in the field of metallurgy field. Iron was the most common and useful metal used for war weapons. Therefore, undoubtedly the introduction of iron was a step forward in the rise of human civilization. It led to the introduction of an industrial revolution in a limited sense. A study of metallic materials derived from scientific excavation ensures the nature and extent of the use of metallic objects. It played an important role in moulding the socio-economic life of various objects. In general, it is believed by the scholars that contact with the Hittites through the Aryans introduced the use of iron in India.<sup>83</sup>

Blacksmiths, coppersmiths, carpenters, sculptures and the architects made fine instruments with iron. The epigraphs refer to Lohār i.e. blacksmiths, who made the instruments were: I) needles II) rajors III) wrench, a tool of screwing IV) tong, an instrument for grasping and holding things, V) trawlers, a tool of masons used for spreading mortars, VI) tweezers for plucking up of small objects, VII) chisels for different types VIII) pincer, an instrument preserved in

Nālandā Museum, IX) scissors used by the tailors), X) saw, an instrument with a tooth-like edge used for separating wood, metal or stone (it was made of was made of iron and was probably used by carpenters mentioned in *Amarakoṣa*, XI) hammer, made of iron used by carpenters. Goldsmiths also used a small hammer and such a thing has been unearthed during excavation.<sup>84</sup>

Different types of machines used in various industrial professions were also made of different types of metals. The contemporary literatures mention instruments used for drawing water, extraction of oil, pressing barley, stone cutting, making up watches and musical instruments, making of ivory objects and silver products etc.

The blacksmiths supplied equipments to the farmers, gardeners, carpenters, wood cutters, grass mowers and householders. They also provided weapons to the armies for war purposes. In addition to the actual findings of arrowheads and spearheads at Pāhārpur, we can accept the account of the *Agni Purāṇa*, which states that Bengal was an important centre for the manufacture of swords. The quality of the sword was marked by sharpness of its edge and its power of standing blows. Social division of the *karmakāras* in Tamruk in Medinipur district is very interesting. The names of three groups are: Pitale Kāmār, Lohār Kāmār, and Tāmra Kāmār. Perhaps the Lohār Kāmārs supplied the iron parts needed for the construction of ships, boats and vessels.

The items used in war, such as spears, shields, bows, arrows, swords sabres, battle axes, lances, pāśa, gadā, chakra etc., were manufactured. Swords were an ancient Indian industry, as it has been referred to by ancient writers. The medieval writers also mention the use of swords. The author of *Śukranītisāra*<sup>85</sup> considered the makers of the swords to be the effective servants of the kings. Utbi<sup>86</sup> describes the use of white sword, which was the best steel sword. *Chau-Ju-Kua* states that the double-edged sword of Bengal was very sharp.<sup>87</sup> The swords made in Khaṭ or Khaṭṭara were beautiful those made in Surparaka were strong and, those made in Aṅga were sharp, and the ones made in Vaṅga were characterised both by sharpness and the power of standing blows.<sup>88</sup> The good

and bad swords were distinguished by the sound generated by them. The *Agni Purāṇa*<sup>89</sup> describes that a good sword must not be longer than 50 fingers in breadth, and not shorter than 25. The sword generating the sound of an ornament was the best. The examples of such swords were Padmapalasagra, Maṇḍalāgra, Karavīratalāgra, Chritragandha and Ākāśaprabha. The worst kind was known as *Sṛngāradhara*. *Yukti-kalpataru* maintains that the characteristics of a good and a bad sword are: “A good sword is one which is long, light, sharp, tough, and flexible. The chief characteristics of a bad sword are shortness, heaviness, sluggishness, thinness, penetrability and inflexibility.”<sup>90</sup>

Bow was a weapon used since the era of the Epics and the Vedas. It was known by various names, such as *dhanvas*, *jyahroda*.<sup>91</sup> It was made of strong stuff, which was usually bent into a curved shape. Its strings were made of hide. The sharp and the pointed bow have been used by infantry from time immemorial. The *Agni Purāṇa* says that the bow stick was made of iron. It was covered with a circular bite of gold, probably to make it beautiful. Sometimes, the bow rod was made of gold, silver, copper or black iron. The weapon used in the time of war was arrow. It was also made of iron. The sharp and pointed arrow was used by the soldiers. We came across various categories of arrows made of iron and some of them had silver.<sup>92</sup> In ancient times spears and spear heads were also used.<sup>93</sup> From the archaeological excavations in northern India, important discoveries reveal the head of the iron spear, which is related to the early medieval period.<sup>94</sup>

In the early medieval period, another weapon used in war was javeline. It was also called as Tomāra. It was generally made of a wooden body three cubits long and a bunch of metal heads. Long, sharp and pointed Javelins are mentioned by Hiuen-Tsang. The weapon used in the time of hunting was the knife. Daggers were also used in war. References of daggers have been found in ancient works. In the medieval period, people used to have spectacular long daggers. Shields were also used in the field of war weapons and used for self defence.

The soldiers used metal to cover their body during the war as a means of security called armour. The metal used in making armour was iron. But the kings and persons of the royal family used to wear armours equipped with diamond, precious stones and gold.<sup>95</sup>

The necessary utensils for cooking and serving food were made of iron, gold, silver and mostly copper and brass. The utensils made of copper were saucepans, frying pans and spoons etc. Varāhamihira has made reference to copper.<sup>96</sup> Copper emerged as the most useful metal in the succeeding period. A copper belt in Singhbhum district provided Bengal with as much copper as it needed. In the past, as in the present, copper seems to have been one of the most useful metals to serve *deva-mūrti* (statues of the Divinities), utensils and coins. Engravings were popular in ancient India. The names of kings were engraved on various metal objects. The names of the kings of the past are found in large silver bowls. The engraving of alphabets is done on the metal plates and the pedestal of images. Most of the royal records were engraved on copper plates by the artists (*tamit*), which was given to Brāhmiṇs for donation. Several gold coins found in Bengal show high degree of artistic ideas and technical skills in their engraving.

Copper was also used in plates recording land grants. Carving on copper plates was a special art. Engravers were probably hired by the state on permanent basis. Two copper plate inscriptions found in Medinipur can be mentioned as examples of showing meritorious services, such as engravers of the records. In the Lower Ganges Valley, a large number of punch-marked and cast coins made of copper testify to the use of metal for coin minting. A brass vessel obtained from Kālighat hoard, a celt of copper discovered in the village of Tamajuri in Medinipur district, a copper mould represented by a ship found from the ruins of Pāṇḍu Rājār Ḍhibi (Burdwan) point towards a significant progress in copper art in ancient Bengal.<sup>97</sup> A copper insect representing an amulet figure, a copper scab, copper vase, and miniature sea-going vessel of copper found from Deulpota on the eastern bank of the Bhāgīrathī river near Diamond Harbour

should be mentioned in this connection. *Bṛihad-dharma* and *Brahma-vaivarta Purāṇas* refer to *kāṁsakāras*, brass-workers.<sup>98</sup> But no reference has been made to the copper-smith separately. The evidence gathered so far can be seen that 'the growth of big copper foundries' is seen at the beginning of Bengal.

It seems that Bengal possessed a huge area for the production of diamond. Haima, Surāṣṭra, Pauṇḍra, Kaliṅga, Kośala, Vena, Gaṅga and Sauvira are places, where diamonds have been found. The Jaina text *Āchāraṅga Sūtra* refers to two divisions of Rāḍha as Suhmabhūmi and Vajjabhūmi. Vajjabhūmi is considered as the land of diamond. If Gaṅgā is the same as Gaṅges of Ptolemy, it can be assumed that the diamond was found in littoral Bengal. Another place named Ratnagṛiha was famous for diamond, and this place was perhaps the same as Tāmralipta. On the basis of *Periplus*, it is proposed by Rawlinson that Bengal diamonds were exported to Nelcynda.<sup>99</sup>

During this period, the fascination of the people for jewellery of gold and silver created a great demand.<sup>100</sup> Goldsmiths have been referred to by Varāhamihira.<sup>101</sup> In the *Purāṇa*, goldsmiths are called *svaraṅakāras*.<sup>102</sup> Smiths of ancient Indian society achieved great skill in articles of daily use. Goldsmiths excelled the manufacture of gold and silver articles for decorative and other purposes of the temples, royal courts and artistic circles. The contemporary sources provide us with interesting information. The *Rāmācharita*<sup>103</sup> has described 'the city of the Gods and the wealthy inhabitants' decorated with 'rows of palaces with plenty of gold therein'. The Deopārā Stone Inscription<sup>104</sup> refers to flowers made of precious stones, necklaces, ear-rings, anklets, garlands or golden bracelets worn by the wives of the kings' servants. The same epigraph also speaks of the temple girls wearing jewellery to enhance their beauty. The pearl necklaces worn by the women of the imperial family are referred to in the Naihāti Copper-plate grant of Vallālasena.<sup>105</sup> Couples inscribed in Pāhārpur reliefs were adorned with two lines of necklaces, armlets, bracelet, wide girdles and anklets<sup>106</sup>. Terracotta remains discovered in Rājghāt and Varanasi show that women's hair was tied with pearl festoons. Gold, silver, copper, ivory and both

valuable and semi-precious stones such as, jade, crystal, agate, carnelian and lapis lazuli were used for making ornaments. Evidences of different nature are coming from the author of *Tabāqat-i-Nāsiri*. He mentions that in one temple there were five golden idols, five yards or ells in height, the eyes of one of them were made of two rubies, and the eyes of another one were made of sapphires<sup>107</sup>. The same author speaks of utensils made from precious metals used in the royal palace of Lakṣmaṇasena. Sulaimān and Māsudi confirm that gold and silver were found in the country of Rahma.<sup>108</sup> Records and literary texts provide us about the fashion of the rich people to use jewellery made of gold and silver, sometimes pearls and precious stones. In his *Rāmācharita*, Sandhyakaranandī (verses 33-34) describes the costly ornaments, such as diamonds, lapis-lazuli, pearls, emeralds, rubies and sapphires. The south-western part of Chotanagpur Pargaṇā, near Mayurbhanj, was rich in mineral resources. The author of the *Periplus* states that there was a 'gold mine' near the Ganges which supplies available gold for currency and ornaments.<sup>109</sup>

Excavations at Pāhārpur of Bengal have yielded many bronze images, copper bangles, boxes with lid, cups, small bells and a flat rod.<sup>110</sup> Gold and silver metals were used for the making of utensils of the royal and rich families. Contemporary literatures as well as archaeological excavations give a brilliant picture of metal use for making our animal figurines. Though the pictures were made of all types of metal, most of them were copper and bronze. A bronze image of Viṣṇu and a standing image of Buddha mentioned in the literatures of Pāla era show the great progress of the metal industry during the 11<sup>th</sup> century AD. Not only bronze, there was also a wide spectrum of brass for the creation of various Hindu deities. Copper industry was a prominent industry especially in Bihar and generally in northern India. Hiuen-Tsang also saw a huge copper statue of Buddha in Nālandā, which was eighty feet in height.<sup>111</sup> During this period, the gold and silver industries emerged and many images made of gold and silver were products of this industry. Kalhaṇa<sup>112</sup> mentions that the kings' gold and silver idols were sold to meet the financial requirements.

During the early medieval period, there were coins of different denominations and designation circulation made of different metals.<sup>113</sup> That some of these coins were considered as standard values while others were known as token currency can be seen from different sources. During the early medieval period, all the features of modern currency were prevalent,, but they had not been developed like modern currency. Cunningham describes some of the North Indian dynasty's gold, silver, copper and bullions of coins. The North Indian coins generally had two values: 1) coins of 67 grains and (2) the coins of 58 grains.<sup>114</sup>

Drama, gold, silver and copper were used for minting standard coins in early medieval India. Other metals were used for minting the currency for relatively lower denominations. The Bodhgayā Inscription of Dharmapāla<sup>115</sup> of Pāla Empire contains the first reference to currency in the period. It mentions that 3000 *drammas* were spent to dig the tank. Vighrapāla of Pāla dynasty had issued Vināyakapāla *dramma*. The Asni Inscription of Mahīpāla<sup>116</sup> in 916 A.D. confirms that during the period of study, *dramma* was the main medium of currency under the most prominent dynasty.

Dināra was another medium of exchange in the early medieval Bengal. Indians are familiar with it from the early Christian era. *Rājatarāṅgiṇī*<sup>117</sup> talks about the *dinārs* of gold, silver and copper. Dināra is mentioned in the writings of Muslim historians and other literary works. The coin *rūpaka* was also present, which was usually made of silver, but sometimes gold was also used. Before the Islamic conquest, *tanḱās* were in circulation. Kalhaṇa refers to this coin as the currency of that time. It is difficult to reconstruct the regular history of Indian coins in the medieval period due to the absence of actual specimens of various types and categories.

It is true that the gold coins first issued by the Gupta emperors were well in shape and contained pictures engravings of kings, queens, animals, etc. Thus these were significantly artistic. It proves that the coin industry had achieved perfection in the Gupta era. But the gold coins of the early medieval period did

not have any quality as much as they were concerned about their spontaneous quality and aesthetic quality. Literary and archaeological discoveries provide adequate information about the type and quality of currency at this time. From the district of Malda, a gold coin of Śaśāṅka, with the image of Śiva reclining on a bull on one side of that of a seated Laxmi on the reverse, was obtained.

Copper currency was also common enough during the period under study. Copper and bronze coins were also issued by the rulers of northern India. The description of the different coins issued by the rulers of the medieval period clarifies that all the coins, except some of them, come under major five divisions: I) seated Goddess type, II) *gajaśārdūla* type, III) the horsemen and bull type, IV) hanumān type, V) lion type.

The above discussion clearly shows the wide use of metals for the making of objects of war, agriculture, family and ornaments. It was very essential for the metal industry that craftsmen should have knowledge of the melting, filtration and temperature of various metals. Thus, people of the early medieval era were not only aware of the art of making various articles of metals, but also paid meticulous attention to method of refining. Alberuni states that the people of the time had great knowledge of the purification of gold, silver, mercury etc.

### **3.8. Wood, bamboo, and Cane Industry**

Handicraft was another valuable industry in ancient Bengal. The people of ancient Bengal engaged themselves in various handicrafts, and we have inherited much of that are today. Among varieties of handicrafts, ones were wood, bamboo, and cane. Wood industry became quite popular over the ages. In various ways, its use was in vogue. Literary works and archaeological evidences point to the popularity of wood articles used by people of that time. Wood was used for making different kinds of materials, which were used in agriculture, homes, wars and commerce. Wood-workers made themselves busy working on durable and fine tools, work benches, saws, and chisel handles etc. Wood

workers created wood objects of different shapes and designs. Various types of boats were also made of wood. The traders used the boats for carrying goods. The king also used boats to carry the forces across the river, and on other military operations.<sup>118</sup> *Yuktikalpatru* refers to twenty types of boats of different sizes, and it gives a detailed description of a painted wooden room.<sup>119</sup>

Beautiful and attractive palanquins made of wood were made by the carpenters. These were used for transport. The brides usually used the palanquin. The palanquins are frequently mentioned in the medieval Bengali literatures. Wooden chariots adorned with jewels were also made for kings. They used to go to the battlefields in these chariots. The nobles also used chariots for hunting. Some Hindu deities, like the Sun, have been shown in their own chariots. Buddhist goddess Marīchī was portrayed on a chariot driven by a pig. All these indicate the existence of chariots. During this time, the wooden carts pulled by bullocks' were also made. These were used for transport of commodities from one place to another. Wheels were necessary for running the chariot and carts. These were always made of wood. Apart from it, the wooden workers made furniture like bedstead, couches, chairs, *piṭhas* (small seat) swings etc. Wooden bedsteads adorned with ivory were made for royal use.<sup>120</sup> The wood without nodules and cavities was considered auspicious. Comfortable bedsteads were soft, strong, beautiful and stable. *Yuktikalpatru* mentions eight types of bedsteads. These are: Maṅgala, Pusti, ksama, Tusti, Sukhasana, Pracaṇḍa, Vijaya, Sarvatovhadra. The sizes and designs of these bedsteads varied from one another.

Couches were made of wood and bamboo. Kalhaṇa mentions cotton-padded couches. The royal divisions used the couches decorated with gold and gem. Various kinds of litters were also manufactured. These were used by the royal family and the rich class of the society. The pen was used to write, and its body was definitely made of wood. Wooden board was used for writing. Painting boards were provided by the carpenters to the artists. Baskets made of cane, bamboo, reed, wood etc were among other items found in the early medieval

India. Combs designed for cosmetic purpose were made of precious and soft wood.<sup>121</sup>

It was *abhari* or *kāṣṭha kuddala* made of wood. It was a tool for scraping used by the craftsmen. Many wooden items were manufactured by workers or artisans. These were: boxes (for keeping belongings), bags (for keeping small house hold articles), cages (for pet birds), mortar and pestle (house hold articles), mats (sheets for sleeping), flutes (for the use of musicians), sandals (wooden slippers), mallet (for striking a bell-metal drum), plates and cups (for domestic use), lamp post and fan post etc. Wooden objects were also used in the buildings and houses. Various parts of houses such as windows, ramparts, gates, armours and gates, were also made of wood.

In addition to these above works, idols and images were also made of wood. Wooden swans were very popular. Hiuen-Tsang was so impressed with the Indian wood industry that he took with him two wooden sandals of Buddha. Among these one was 3' 5'' in height and the other was 1' 3''.<sup>122</sup> An interesting and beautiful statue of winged has been found in Raghurampur. These artefacts were made by creative and skilled craftsmen out of wood and clearly show that this industry was very advanced in medieval period in northern India as well as Bengal.

Indian forests supplied a large variety of wood, thereby aiding the art of carpentry. The wood was classified on the pattern of the *Varṇa* system of the Hindu society, such as *Brāhmaṇa*, *Kṣhatriya*, *Vaiśya* and *Śūdra*. Among these, *Kṣhatriya* wood was the most stable and sturdy and used for making ships for the high seas. The vessels made of inferior quality of wood, easily wore and so, were not suitable for the high seas. *Varāhamihira*<sup>123</sup> has divided wood for making furniture into groups: i) auspicious and ii) inauspicious. It is said that well seasoned wood and *devadāru* wood (*kathora kāṣṭha*) were used for making buildings.

Cane was used for stools and chairs;<sup>124</sup> bamboo was used for flutes, cages, and couches etc.<sup>125</sup> Coloured reeds and reed stalks were used for making

baskets, desks etc. Straw was mainly used for thatching purposes. Vātsyāyana<sup>126</sup> refers to the manufacture of chairs made of cane and reeds among sixty-four industries. *Amarakoṣa* speaks of a basket made of cane. According to Fa-hien, bamboo was usually used for the manufacture of cars, usually used on the occasion of festival. Cane and bamboo trees were used for flute, basket, mat, hand fan, and sun shades. Bamboo and cane were used specifically for the preparation of chariots, cattle carts and cottages. Moreover, taking advantage of the elasticity of the cane and bamboo, people used it to beatify their interior of the roof of home. The fine mats of *śital pāṭi* often mentioned in the literatures of the period was popular then.<sup>127</sup> At present, Doms or Chaṇḍālas have kept these handicrafts alive as their main occupation.

### 3.9. Ship-Building Industry

Navigation art is known in Bengal from the very beginning. The *Periplus*<sup>128</sup> mentions a vessel named Colandia. Indigenous literary texts and inscriptions provide us with useful information on this topic. From the *Mahāvamsa* and other Buddhist texts, it is known how a prince named Vijaya travelled from *Lāla* to Ceylon along with 700 followers.<sup>129</sup> The texts also mention some express-boats in this regard. During Kālidāsa, the people of Bengal were famous for their nautical resources.

In the early 6<sup>th</sup> century AD, epigraphic evidences establish the existence of the port and the dockyards. The seals found from Chandraketugarh prove the existence of ship in ancient Bengal (Plate-2). There is also mention in the *Yuktikalpataru*<sup>130</sup> of the industry of shipbuilding which may be considered significant in this connection. Six pictures of the ship from Borbudur are reminiscent of the Bengal ship.<sup>131</sup> Although there is very little graphic documentation of the watercrafts of early Bengal, there are some seals/sealings/seal impressions and coins available from various places of archaeological excavation in Bengal, which are the only existing visual illustrations, speak of the traditions of Bengal's rich shipments.<sup>132</sup>

It may be mentioned here that initially the boats were mainly made of the woods of the trees. The geo-physical environment of Bengal supplied the available woods for the construction of ships. Different types of woods were used for building a ship, for example, Śāl, Piāl, Tamāl, Kāṭhāl and Gāmbhāri. These trees were found in large numbers in Medinipur district. The commercial vessels in early Bengal faced the gigantic, strong waves of the sea, and the stormy wind.<sup>133</sup> From this, it may be concluded that boat industry and naval prosperity started in Bengal at an early date.

An interesting account of ships of Bengal is found in the medieval Bengali literatures, which seems to remind the ships mentioned in the earlier traditions. In the *Manasā-Maṅgala*, we have the references to ships like Gaṅgā Prasād, Sāgar-phena, Haṃsa-rava and Rājaballabha. From the references of *Kavikaṅkaṇa Chaṇḍi*, we get the description of Dhanapati's fleet to Ceylon consisting of boats named Madhukara, Durgavara, Guaarakhi, Saṃkhachuda, Siṃhamukhi, Chandrapana and Chotamukhi. The information furnished by the *Maṅgala kāvyas* about the shipbuilding industry in medieval Bengal is relevant.

### **3.10. Industries of marine products**

Different products were manufactured from the sea-borne ingredients. Pearl fishery and collection of conch shells were known in Bengal. The mention of the Gangetic pearl has been done by the author of the *Periplus*. It is indicated that one of the pearl products was exported to Nelcynda. The conch-shell artisans were known in the Purāṇas as Śāṅkhika or Śāṅkhakāras.

The item needed in daily life was salt. We find reference to salt-makers (Loṇakarā) in the *Jatakas*.<sup>134</sup> It was extracted from the water of the sea. From the *Amarakoṣa*,<sup>135</sup> we learn of two classes of salt, one from the water of the sea, and the other from the rock. Salt production was limited only to the sea-coast or coastal areas and sometimes mountainous areas. The places near the sea coast of Medinipur district are still well-known for producing salt. Irdā Copper-plate Inscription of Nayapāladeva<sup>136</sup> (10<sup>th</sup> century AD) records the salt-ores

(Lavaṇakārah) in Daṇḍabhukti-*maṇḍala* of Vardhamānabhukti. It also refers to tax imposed on salt. On the other hand, in the 11<sup>th</sup> century AD, the Rāmapāla Copper-plate of Śrīchandra,<sup>137</sup> and the Belāva Plate of the 12<sup>th</sup> Century Bhaojavarmana,<sup>138</sup> record the donation of a village in Puṇḍravardhanabhukti along with salt (Sa-Lavanah). The Rāmapāla Copper-plate Inscription further (11<sup>th</sup> century A.D.) records salt production in the village of Nehakāshṭhi in Nānyamaṇḍala of the Pauṇḍra *bhukti*. The Chittagong Copper-plate of Dāmodaradeva<sup>139</sup> records some lands described as a salt-manufacturing area (*lavaṇotasvāśrama*). The archaeological excavations at Tamluka in 1954-55 have brought to light many salt pits that have been producing salt up to the coming of the Portuguese. But in this context, it should be mentioned that salt is not mentioned in the grants of Pāla and Sena kings. Possibly after the 10<sup>th</sup> century, salt was produced in some parts of Bengal, but it did not develop into a wide industry. Due to the abundance of water flowing from different rivers to the sea and climate moisture, this industry suffered a setback in Bengal.

### 3.11. Miscellaneous Industries: Leather Industry

People have been using leather for various purposes since ancient times. In the early medieval period, this industry had achieved a special acme in the state of art and crafts in northern India. A clear picture of the role and importance of leather industry is revealed through close examination of the objects found from various excavations and descriptions of the contemporary texts. There is a description of leather articles and cobblers in the *Bṛihatsaṁhitā*. The grant of Śīlāditya<sup>140</sup> refers to the village shoe makers. The Kuruspal inscription also mentions Chamaravādā and Mochivādā.<sup>141</sup> Some sculptural representations from Bengal, Bihar and other places represent Sūrya wearing boots or shoes.<sup>142</sup> These references indicate that the leather industry, which had been found in the Vedic period, achieved better status during this period. Various types of objects made of leather are described in contemporary literatures. This description has been confirmed by archaeological excavations

and sculpture of that time. The notable discoveries are bags, garments, covers, pillows, wallets, bucklers, bellows, leather seals, bottles, mats, foot wares etc. Leather workers formed an important part of society, although their social status was not high. Since their services were needed by the society, they could not always be neglected. Varāhamihira has mentioned cobblers in his book *Bṛihatsaṁhitā*. Kalhaṇa speaks of a tannery as a special profession.

### 3.12. Ivory Industry

Like other industries, the ivory industry was an important one. Organic materials, such as ivory, bone and horn were easily available for the early man and supplied the materials for fine craft. The use of these objects in proto-historic India can be seen in the Harappan culture. Early Indian literatures mention the use of different types of ivory and ivory products. Some sites in eastern India show the popularity of this organic substance for the preparation of artefacts and artwork. Ivory objects have been excavated from Bāṅgarh, district of West Dinajpur in undivided Bengal. One of them indicates an ivory stick and the other is a comb, both ascribed to the Suṅga era. There is found an ivory casket in Chandraketurgarh, south 24 Parganas district.

Literary works contain various references to ivory products manufacturing in that era. There was a ready market at home and abroad for this industry. The value of elephants is determined by the ivory weights supplied by them. Śabarasa (one caste) used to extract the tusks of elephants in forest areas. From these tusks, the ivory workers produced different types of objects.<sup>143</sup> The Bhātera Plate of Govinda-keśava mentions ivory workers (*dantakāra*) by name.<sup>144</sup> The Edilpur plate of Keśavasena<sup>145</sup> refers to palanquins supported by staffs made of elephant's tusk. Ivory was also used for making ornaments. It appears from the charter of 91/184 GE that there was Ājīvika monastery in Samataṭa possessing 8 ivory tools (*dantapiṭhika*) and 6 ivory palanquins (*dantaparyyāṅka*).<sup>146</sup> There was a high demand for ivory ornaments in all sections of the society. Ivory gates and towers are mentioned by Harṣa. Bāṇa mentions umbrella made of *danta*.<sup>147</sup>

Along with ornaments, other articles of different types were also made of ivory. Muslim travellers talk about the presence of elephant dealers in Multan. From different parts of northern India, some examples of ivories of this period have come to light. Ivory was used to make domestic articles, ornaments, and other miscellaneous articles, as is proven from contemporary works and archaeological excavations. An architectural structure has been discovered in Bengal, which is the best example of high quality designs made of ivory and is currently displayed in the Seattle Art Museum of Seattle.

The ivory ornaments were in high demand among all sections of society indicate its popularity. Beautiful pieces of ivory were made by skilled craftsmen. It proves to have been at a very advanced stage. Ivory items being exported revealed the skills, sophistication of aesthetic sense, maturity and taste of the artisans.

### **3.13. Glass Industry**

Glass industry was an important industry. There is no clear information in literature texts regarding the process of making glass objects. But the materials derived from various excavations and literatures reflect that the workers of glass were, fully aware of the knowledge of creating different types of articles. The skilful staffs were able to produce such things. It required scientific knowledge to smelt and shape glass components. The amazing high diversity of glass material proves that this industry had reached a very high level.

The details of various vessels of glass in contemporary literature show that the people of the medieval age had knowledge of the glass industry. Not only literature, but archaeological evidences and sculptures also prove the existence of glass industry. It was recognized as a great value for the people, because large quantities of objects were made of glass. The superior nature of this industry is evident from the objects described below, which were created in the period under research. Glass ornaments were made and used by the poor

part of the society. This indicates that glass workers are highly talented and artist jewellery makers.

Glass beads were used on a large scale for making different types of jewels. These are bangles necklaces, mirrors, jars, cup etc. Fragments of the glass bangles have been found from various excavated sites like Bhopal, Gwalior, Pāhārpur, Bateswar etc. Glass bangles during the 7<sup>th</sup>-8<sup>th</sup> century A.D. were well known for its abundance. Necklaces were also made of glass beads. This was used by ministers of the kings.

Mirrors were an important item in the household including toilets and it was usually made of glass. Rāḍhi-*darpaṇa*, a kind of mirror bright and clear on both sides is known from the sources.<sup>148</sup> Many toilet scenes in the temples of Kaṇḍāriyā, Mahādeva, Vāmana, Viśvanātha, Chitragupta etc. show women standing, bearing mirrors and cutting hair, applying *sindura* or collyrium in the parting of the hair or eyes respectively or even admiring their own beauty There are various types of mirrors described in literature, such as Bhavya (vitasti in length), Vijaya (four *āngulas* length), Pourusa. Glass jars were used in the family to keep water. A merchant named Padmarāja provided water to the water of Papsudana, which was filled with abundant glass jars.

The cup was also made of glass and used in society of that age. Glass was also used for making combs. It was a toilet item for women and Bhoja mentioned its use at that age. Liquid and wine items were served in glass. Bottles were also made of glass and used for keeping liquids, medicines, etc. The flask was a vessel in the long neck. The walls of the house, the palace, etc. were made, the work of the age group, the walls of crystal mirrors like slab have been mentioned. The floor of the residence of the kings was made of glass. It is proposed that the floor of the King's house should be made of glass.

### **3.14. Beads**

Beads of various shapes, designs, sizes and materials were made from the earliest times. Discovery of these beads from all Harappan sites proves their

existence. The materials used for the preparation of various types of beads include soil, ivory, glass, various stones such as rubies, sapphires, diamonds, moonstones, emeralds, jades, crystals, pearls, gem, lāpis-lāzuli etc.

The bead makers of that era had the knowledge to produce many types of beads such as large shaped, barrel shaped, cylindrical, rectangular, tabular, oval, convex, disc shaped, conical, round, biconical, hexagonal cross shaped, short vase shaped etc. There is no specific technique for making bead that is prescribed in literature. But the species of beads found from excavations clearly shows that the makers had high quality skills to make them. Various colours of beads have been unearthed. Ornaments made by beads have been mentioned in contemporary works as well as obtained from excavation. Three kinds of beads are worthy of mention- agate, chalcedony and carnelian. Agate and chalcedony were characterised by the prominence of layers. Besides, when chalcedony is uniformly red is known as carnelian.<sup>149</sup> Perhaps the subtle difference led K.G. Goswami to identify agate as chalcedony. Agate appears to have been a common stone in all early historical sites of North India.

### **3.15. Terracotta, Sculpture, and Painting**

Terracotta means a model or cast of baked clay.<sup>150</sup> Since earliest times, clay was popular to people due to its availability or easy manipulation, and remains the primary plastic material. The idea of terracotta gives a solid form and expresses people's creative desires. Its origin was in pre-Harappan culture, and yet it continues to play an important place in society. It gives an enormous opportunity to artists to express their spontaneity. Terracotta statues have been discovered from various places in northern India. Most of them are toys and statues of men and animals. These remains are important tools in illustrating social-economic life.

Terracotta artefacts exhibit art and culture of different times with the activities and changes of customs and manners of mankind. Many such artefacts have been excavated from Pāṭaliputra (comprising Bulandibagh, Kumrahar and

Patna), Buxar, Vaiśāli (Basarh), Rājghāt, Mathurā, Kauśāmbī, Ahichatra, Bāngarh, Antichak, Gaya, Nālandā and Mahāsthān etc. These were prepared by hand. These were shaped and modelled by moulds comprising popular objects of household, decorative material, plaques and figures showing popular religious objects, seals for purpose of documentation, toys for children, ornaments, medals, amulets and animal figurines of domestic importance. On the whole, this industry was an important vehicle for human expression. It is undoubtedly of great socialist significance.

The main temple building at Pāhārpur is a specimen of terracotta plaques assigned to Pāla Art.<sup>151</sup> This is the first mould made by pressure of soil lumps. In the sun's dry conditions, they were baked with skill, and then painted with a thick red pigment. These plaques depict the Gods and Goddess. Many plaques were often used to depict non-religious figures, both male and female, sitting or standing, and carrying out various activities.<sup>152</sup>

Many terracotta artefacts figuring men, animals and other objects have also been found (Plate-3). The objects prove the existence of skilled potters. Among the Brāhmaṇical icons of Pāhārpur, Śiva is the most beloved theme in terracotta. The excavated terracotta fish in Tripura is two inches long. An elephant's statue is transformed very well, painted in red colour and the cloth on the back being indicated by thick black lines. A glimpse of the spread of the terracotta industry can be drawn from description of Bāṇa. At the time of Rājyaśhrī's marriage, many artists were appointed to produce the figures of fish, turtles, crocodiles, coconut, planting and beet soil.<sup>153</sup> Bāṇa refers to water utensils, cups, fire trays, ovens, pans, etc.<sup>154</sup> Furthermore earthen beads are excavated at different sites, such as Tripuri, Ahichatra, Bhita and numerous other places in abundance. These were used as ornaments by the common people. The plaques of Pāhārpur and Antichak are similar and can be dated to the second half of the 8<sup>th</sup> century A.D.

Thus, various terracotta objects of different shapes and designs prove the high skills of the workers and their high level of creativity (Plate-1/3). They also

show glimpses of social life. For example, gamesman depicted in terracotta implies that people enjoyed enough time to entertain themselves. Terracotta remains of different objects have been found from various places. Dinājpur (East Bengal) has yielded a large number of terracotta objects during the excavation of a Buddhist temple.<sup>155</sup>

Sculpture is an artwork engraved on stone, wood, or clay. Men had the desire to create beautiful objects being satisfied in their aesthetic sense. Since ancient times, the images were created and used on a large scale. The perishable object, such as wood could not exist for long a time. On the other hand, stones and metals are available from archaeological excavations, which reveal the skills of artists of the time. In the period under consideration, stone sculptures made significant achievements. A number of different stone images dated to this period excavated at different sites bear witness to the achievement of stone sculpture. A Pāla inscription in Bengal provides us with information about the Magadhan artist, Someśvara, who was an expert in high order and stone design.<sup>156</sup> During the reign of the Pālas of Bengal and Bihar, the Nālandā Pillar informs us about an artist named Subhadāsa.<sup>157</sup> According to Lama Tāranātha,<sup>158</sup> during the reign of king Devapāla and Dharmapāla, there lived a very talented artist Dhimāna and his son Vitapāla. Both had created various works of stone and painting. They spent the time with their wonderful creations. There were also some other artists who left their significant impression of their talent through their works. Tatata, Mañkha, Vimaladāsa, Vishṇubhadra Mahīdhara, Śāśideva, Śilpī Karṇabhara, Śilpī Tathāgatasāra, Śūlapāṇi are among them.<sup>159</sup> The Pāla period saw the sculpture industry rise to its pinnacle of glory. A considerable number depicts scenes from the life of Krishna. The *Mahābhārata* and the *Rāmāyaṇa* scenes have also been depicted. There is quite a good number that represents women in graceful dancing poses and incidents from the daily life of the village folk. These sculptures derived their inspiration directly from the life around through keen observation.

The art of painting was very popular and admired in the society during the period under survey. It had a place even in the highest sections of the society. This art is considered as fine art. It requires full attention both of mind and body. During the early medieval period, art of painting provided enjoyment and opportunity for self expression. It was one among the sixty-four arts. It occupies the fourth place in the list of arts.<sup>160</sup>

The art of painting was expressed particularly by members of the royal and prosperous families. There was a great interest among the members of royal families for this art and sometimes they held the brush to give lie to their aesthetic sense. Fa-hien tells that painting as a creative art was known and practised in the country as early as the 4<sup>th</sup> century AD. Temple walls were decorated with paintings. There were fresco or mural paintings. Illustrations on palm-leaf manuscripts of the Pāla period have been preserved. There were also engraved drawings on copper plates. These miniatures mostly represented gods and goddesses belonging to different temples and monastic establishments of the period. The colours used in these paintings are orpiment yellow, white, indigo-blue, Indian ink-black, cinnabar red and green. All these were used in different shades. The composition follows some well known schematic principles of balance. These paintings reveal a developed form and technique. Bengali painting is not an isolated chapter, but is rather a local version of the contemporary pan-Indian trends in painting.

### **3.16. The condition of Artisans**

Industries flourishing in ancient Bengal played an important role in bringing changes to society. Naturally the position of artisans is a matter of question, which comes to our mind. It is difficult to give detailed description of the nature and organization of industrial labour and artisans in ancient Bengal due to scarcity of evidence. But it may be said that industrial and commercial development must have brought along the necessary evils of exploitation of labour and artisans. Hiuen-Tsang provides information about people who used to

render free services in the 7<sup>th</sup> century A.D.<sup>161</sup> Epigraphic sources also attest to the practice of forced labour in specific circumstances.<sup>162</sup> It is evident that forced labour was a source of income for the state. It appears that the state by exploiting this sort of labour exploitation made an attempt to increase production.

On the other hand, commercial expansion gains ground only when there is surplus production. Surplus is sure to engender a sort of greed and unabashed lust for wealth. The network of communication along with the surplus in production gave immense incentive for commerce. Surplus was possible at the cost of the toilsome labour on the part of the workers. There is sufficient evidence of surfeit in production in early Bengal. Feudal feature of the society could not thwart the productivity for commercial expansion in early Bengal. The peasants engaged in agrarian activity and craft production exacerbated the production for brisk commercial activity. Briskness in commercial activity has certainly impelled the investors to exploit labour. There is little evidence of labour unrest in early Bengal, but there are pragmatic factors that forestalled the raising of outburst of the workers at that time. The time was not at all congenial in early Bengal to organise upsurge by labourers to vent resentment. But that does not mean that there was no inkling of resentment. The organised revolts were few and far between because of the lack of coordination between the peasants and workers in the backdrop of the society suffering certainly from stoicism in early Bengal. The Kaivarta revolt in Puṇḍravardhana has been described by R.S. Sharma as the organised revolt of the peasants against the arbitrary and outrageous rule of Mahīpāla II, the Pāla king.<sup>163</sup> It seems to have been a spontaneous expression of the feelings of the Kaivarta peasants against the oppression of the Pālas and their landed beneficiaries. Resentment of the workers, artisans and peasants was indeed there, but what they lacked was the spirit to coordinate with fellow beings in order to fight for justice and fair play. They lacked the elements which could have cemented their mutual resentment like that of modern times with the emergence of trade unionism. Thus, there is

no gainsaying the truth that amidst embellishment because of production and commercial expression, there was darkness that submerged the bulk of the people engaged in production. But it could not mar the total activity of production probably because the working community mostly decided to accept the matter of their deprivation as dispensation of Almighty on the ground that they are only paying for their deeds in the previous life. They must have considered themselves degraded and had low self-esteem. This idea of *karmaphala* must have played a greater role in impeding organised revolt against those enjoying bonanza.

Although they had got some rights from the owner of the industries, it was not enough to stay well. They were living in miserable conditions with meagre means of sustenance. Their position was almost like today. So, it can be said that though the development of industries brought prosperity in India, but it touched only the richer section of the society and royal men.

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<sup>1</sup> We notice to the regular industrial economy for the first time in Harappa and Mahenjodaro's Indus Valley sites which were urban centres. The economic well-being of the Indus Civilization was the result of the industrial and trade initiatives of the urban people, depending on the agricultural surplus of the hinterland region. Naturally, there was a diversity of crafts and industrial products, which were discovered during the archaeological excavation. The most important of the industries was house-building, pottery, metallurgy and textile. In addition, other industries based on antlers and bone, cone-shells and ivory also grew up in the Indus region, as we find that needles, bodkins and combs made of these articles played an important role in the field of industrial growth by forming the wheeled carts and boats as a means of smooth transportation of goods. The Āryans also maintained a flourishing economy based on agriculture, but other industry also existed. They inherited the tradition from the Harappans.

<sup>2</sup> Sen, Gour Pada, *Some Aspects of the Economic Life of the Lower Ganges Valley C. 1<sup>st</sup> Century A.D. to 8<sup>th</sup> Century A.D.*, (thesis), The University of Burdwan, 1977, p.156.

<sup>3</sup> *Aṣṭādhyāyī*, V.24; 3.158; IV.3.134; VII.3.5; VI.282; IV.2.82; Agarwala, V.S., *India as Known to Pāṇinī*, Lucknow: University of Lucknow, 1953, pp. 211, 214, 248; Patañjali, *Mahābhāṣya*,

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- IV. 1. 55; V. 1. 3; 1.111; V. 13; V. 2.43; Puri, B.N., *India in the Time of Patañjali*, Bombay: Bharatiya Vidya Bhavan, 1968, pp. 103, 128, 134,185.
- <sup>4</sup> Shamasastri, R., (tr.), *Arthaśāstra of Kauṭilya*, Ch. XI, Bangalore: Government Press, 1915, pp. 83-84.
- <sup>5</sup> Watters, Thomas, *On Yuan Chwang's Travels in India*, 629-645 A.D. Vol. I, London: Royal Asiatic Society, 1904, p. 148-149.
- <sup>6</sup> Cowell, E.B., & Thomas, F.W., (tr.), *Harṣacharita of Bāṇabhaṭṭa*, London: Royal Asiatic Society, 1897, Chapter-VII, p. 203-217.
- <sup>7</sup> Colebrooke H.T., *Coṣha or Dictionary of the Sanskrit Language by Amara Simha with an English Interpretations and Annotations*, Serampore, 1808, p. 127.
- <sup>8</sup> Bengal produced surplus silk that was exported. It was the port of Tāmralipta from where the products were exported elsewhere. Perhaps a large number of employments were created in Bengal through the flourishing silk industry. A large number of people liked to be involved in the cultivation of *kārpāsa* and silk-worms. From the Ganges Valley the method of silk-worms spread towards West-wards and spread in Persia, Khotan and other parts of Central Asia. *The Encyclopaedia Britannica*, Vol. XX, London: The Encyclopaedia Britannica Company Ltd., p. 663; Chakravarty, H.P., *Trade and Commerce of Ancient India*, Calcutta: University of Calcutta, 1967, p. 223ff. It is interesting to note that the secrets of silk industry were learned from the Gangetic Valley in Khotan and other Central Asian countries.
- <sup>9</sup> Oak, K.G., (ed.), *Amarkoṣa of Amarasimha with Ksīrasvāmin's Commentary*, Poona, 1913, II.6, 3; II, 6, 14.
- <sup>10</sup> Cowell, E.B., and F.W. Thomas. (tr.), *op.cit*, p. 125.
- <sup>11</sup> Motichand, *Sārthavāha (Hindi)*, Patna: Bihar Rāshtrabhāṣha Parishad, 1953, p. 215.
- <sup>12</sup> *Medhātithi* on Manu, VIII, p. 227.
- <sup>13</sup> Kane,P.V., *The Harṣacharita of Bāṇabhaṭṭa, Text of Uchchhvāsa, Vol. IV, Notes*, Bombay, 1918, p. 55.
- <sup>14</sup> *Ibid.*
- <sup>15</sup> Shamasastri, R., (tr.), *op.cit*, p. 110.
- <sup>16</sup> *Ibid.*
- <sup>17</sup> Chattopadhyaya, Annapurna, 'Some Crafts of Ancient Bengal (Textile)', *Essays in Ancient Indian Economic History*, New Delhi: Munshiram Manoharlal Publishers Pvt. Ltd., 1987, p.133.
- <sup>18</sup> Sastri, Haraprasad, *Prāchin Bānglār Gaurav*, Burdwan, 8<sup>th</sup> Vangiya Sahitya Sammelan, 1914, p. 14.

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- <sup>19</sup> *Matsya Purāṇa*, 82. 8; Watters, Thomas, *op.cit*, p. 148; Cowell, E.B., & F.W. Thomas (tr.), *op.cit*, p. 227; Sastri, B., and K.P. Parab.,(ed.),*Tilakamañjari*, Bombay, 1903, p. 51, 79.
- <sup>20</sup> Ṭikāsarvasvam by Vandhyaghatiya Sarvānanda on Amarkoṣa, Vol. II, Manuṣyavarga, 113, p. 371.
- <sup>21</sup> Sastri, B., and K.P. Parab., (eds.), *op.cit*, p. 51.
- <sup>22</sup> Samasastry, R.,(tr.),*op.cit*, p. 84.
- <sup>23</sup> Shrigondekar, G.K., (ed.), *Mānasollāsa of King Someśvara*, Vol. III, Baroda, Oriental Institute, 1961, pp-107-120; Majumdar, R.C., *The History and Culture of the Indian People. Vol. V: Struggle For Empire (1000-1300 AD)*, Bombay: Bharatiya Vidya Bhavan Series, 1957, p. 518.
- <sup>24</sup> Williams, A, & Norgate, *Abhidhanaratnamālā of Halāyudha*, Edingburgh, 1861, Chapter-II, p. 549; Sharma, H.D., *Ksīraswāmi-Commentary on the Amarakoṣa*, Poona, 1941, p. 157.
- <sup>25</sup> Shamasastri, R., *op.cit*, p. 109.
- <sup>26</sup> *Ibid.*
- <sup>27</sup> Schoff ,W.H.,(tr.), *The Periplus of the Erythraean Sea*, London: Longmans, Green & Co, 1912, p. 256; Majumdar, R.C., *The Classical Accounts of India*, Kolkata: Firma K.L. Mukhopadhyay, 1960, pp. 308, 313.
- <sup>28</sup> *Ibid.*
- <sup>29</sup> Elliot and Dowson, *The History of India as Told by Its Own Historians*, The Muhammadan Period, Vol. II, London: Trubner & Co, 1869, p. 136.
- <sup>30</sup> *Ibid*, p. 14.
- <sup>31</sup> *Harṣacharita*, p. 332.
- <sup>32</sup> Schoff, W.H.(tr.),*op.cit*, pp. 256; Chanda Moti., *Journal of the Indian Society of Oriental Art*, Vol. VIII, 1940, p.189.
- <sup>33</sup> Upadhyaya, B.G., *India in Kālidāsa*, Allahabad: Kitabistan, 1947, pp. 198-199, 270.
- <sup>34</sup> Majumdar, R.C., R.G. Basak and N.G. Banerjee. (eds.), *Rāmacharitam of Sandhyākaranandī*, Rajshahi: The Varendra Research Musuem, 1939, pp. 87-93.
- <sup>35</sup> Majumdar, N.G., ‘Deopārā Inscription of Vijaysena’, *Inscriptions of Bengal, Vol. III*, Rajshahi: The Varendra Research Society, 1929, Verse-31, pp. 45, 49, 55, 56; Mukherjee, R.R. and S.K. Maity, ‘Deopara Inscription of Vijayasena’, *Corpus of Bengal Inscriptions*, Calcutta: Firma K.L. Mukhopadhyaya, 1965, pp. 248-249, 255-277.
- <sup>36</sup> *Ibid.*,
- <sup>37</sup> Dasgupta,*Bauddha-dharma-o-Charyyāgīti*, Kālikāta, Mitra O Ghosha,1965, p. 123.
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- <sup>53</sup> *Ibid*, pp. 210.
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- <sup>74</sup> Cowell, E.B. and F.W. Thomas.,(tr.),*op.cit*, p. 56.
- <sup>75</sup> Dikshit, R. and Bahadur K. N. 'Excavations at Pāhārpur, Bengal', *Memoirs of the Archaeological Survey of India*, No. 55, New Delhi: Archaeological Survey of India, 1938, Vol.55, p. 78.
- <sup>76</sup> *Ibid*, p. 79.
- <sup>77</sup> It was a base metal and alloy of copper, tin or similar. It was used for making coins, which is found in the coins of many northern Indian dynasties. The early Muslim aggressors accepted this coin.
- <sup>78</sup> It was a very powerful metal, which was used for making various types of weapons such as swords, spears, blades, etc. Steel (*tiksna*) had six varieties which were i) Khara ii) Sara iii) Hrinnals iv) Tarabhata v) Vajira and vi) Kalalauha. It indicates that iron industries in northern India were highly developed. The white sword indicates the best steel sword. The idol in the Somanāth temple was made of brilliant steel, as noted by Muslim authors. Useful domestic objects were also made of metal.

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- <sup>138</sup> *Ibid*, p. 5.
- <sup>139</sup> Majumdar, N.G., 'Chittagong Copperplate of Dāmodaradeva', p. 162.
- <sup>140</sup> Kielhorn, F., 'A copper-plate Grant of Śilāditya I of Valabhi', *Indian Antiquary*, Vol. XIV, 1985, p. 329; Knosow Sten, 'The copper-plate Grant of the Valabhi King Śilāditya I', *Epigraphia Indica*, Vol. XI, 1911-12.
- <sup>141</sup> Lal Rai Bahadur Hiralal, 'Kuruspāl Stone Inscription of Someśvaradeva', *Epigraphia Indica*, Vol. X, 1909-10, pp. 30-31.
- <sup>142</sup> Sachau, E.C.(tr.), *op.cit*, p. 181.
- <sup>143</sup> The objects made of ivory, bones and horns can be divided into two broad heads: those used as weapons and those used for some utilitarian purposes in daily life. Arrow-heads and bone points were basically instruments for killing the animals and probably used for hunting animals. However, this might be used as weapons against the enemy. Arrows-heads were probably connected with a wooden stick and rods to be used as flying spears. After the discovery of iron, perhaps black metal was widely used in war and ivory tooth or bone was considered second to it. Most items such as combs, lamp stands, bangles, rings, pendants, nose-studs, caskets, dice, pins and antimony rods are domestic in nature. Some of these were used as ornaments.
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- <sup>145</sup> Mukherjee, R.R., and S.K. Maity., 'The Edilpur-plate of Keśavasena', p. 340.
- <sup>146</sup> Furui, Ryosuke, 'Ājīvikas, Mañibhadra and Early History of Eastern Bengal: A New Copper-plate Inscription of Vainyagupta and Its Implication', *Journal of Royal Asiatic Society of*

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- <sup>161</sup> Watters, Thomas, *op.cit*, p. 176.
- <sup>162</sup> Fleet, J.F., *Corpus Inscriptionum Indicarum*, Vol. III, Calcutta, 1888, p. 170.
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