

CHAPTER –III

GROWTH AND DEVELOPMENT OF METALIC ART

As the use of tools is one of the marks that differentiate man from the lower animals, so the use of metals may be considered as a milestone on the road from barbarity to civilization.

¹ Initially metal was obtained from meteorites, which were regarded sacred; therefore very special objects were made from it. Working with metals was provided with mystery and attached with the wizardry, the blending and shaping of metal was a secret ritual and the blacksmith's forge was regarded sacred. The blacksmith was seen as a Shaman, a visionary, who could surpass given reality and reach beyond into the unknown. ² In view of the great consequence of metals for the development of the human cultures an attempt is being made in the present dissertation to make a detailed study of the metal objects found from several archaeological sites in the Indian Sub-continent, ranging from the earliest times.³ This chapter is considered to serve as a background to the main study, which will be the subject matter of the following chapters. The present chapter has three broad divisions; first, the geographical and geological features of the sub-continent, with an prominence on the metal ore rich areas; second, a brief review of the previous research done on metals and metal objects of ancient India; and third, an outline of the methodology adopted in the present dissertations.

India is fairly rich in minerals. However there is very unequal territorial distribution of minerals in the Indian sub-continent. The extensive alluvial plains of northern India are almost devoid of minerals of high economic advantage. On the other hand, the Achaean terrain of Bihar and Orissa is enhanced by the highest concentration of ore-deposits, such as iron, manganese, copper, aluminium etc. The second mine-rally rich state of India is Madhya Pradesh, where there are good stock of iron and manganese, limestone and bauxite. Tamilnadu has workable deposit of iron, manganese, mica, limestone, etc.; Karnataka has

yielded all the gold of India, besides yielding non-ferrous metals like copper, lead and zinc. West Bengal's mineral resources are limited to coal and iron ores. Manganese, iron and titanium are extricated in India in exportable surplus, whereas gold, aluminium, copper and chromium, etc. are obtainable in minor proportions.⁴

Since pre-Harappan cultures, metals have been used for manufacturing several objects, including weapons of different kinds, ornaments, utensils, etc. along with stone, ivory, bone wood, clay, etc. With the louch of metal technology, however, the exercise of non-metal artefacts, especially implements usually went out of trend. The cause for this change is obvious. Metal applications for agriculture, war and chase, hunting, fishing, etc. proved to be more useful in terms of proficiency and permanency than those of other materials. Thus the role of metals in transforming the material life of man can hardly be over highlighted. Among the metals which really increased the pace of material enlargement, mention may be made of copper, bronze (an alloy of copper and tin) and iron. The other materials like gold, silver and lead were only carefully used by ancient people, mostly for ornaments and decorations of handles of various devices.⁵

The history of use of metal in India is quite long, as exhibited by various archaeological excavations undertaken at various ancient sites of sub-continent, mostly during the present country. In the starting human societies were familiarized with a very limited number of metals, like copper. The attainable archaeological proof also suggests that even this metal was not very freely available, and was used very sparingly. It was only in the subsequent periods of history that man gained knowledge other metals like silver, lead and iron. It is a matter of common knowledge that with the advent of metal, cultures made remarkably prompt and all sided progress, while the growth of the cultures during the pre-metal stage was very static. Thus, the contribution of metal technology to the establishment of human cultures can never be minimized. Among the several metals acquainted to the ancient people it as actually

the iron which confirmed to be a real pace-setter. The appearance of iron brought about maturation of industries and provided more systematic and useful implements for good production. Thus the intensive use of the iron technology did not result in industrial and food surpluses in the lack of which the procedure of urbanization could have hardly introduced, nor could there have been any pronounced growth in trade and commerce activities. ⁶

Metal figures only next to clay in the formation of the Indian crafts and has been universally used in the form of brass, copper, bell metal, etc. covering a very vast range of articles from kitchenware to fine gold and enamel jewellery. The expertise attained in metal casting by Indian craftsmen is determined by the treasures dug out in excavation operations, which also exhibit how sophistication. So vast and varied is the area covered by metal ware in India that it would be almost an impossible task to itemize them in any comprehensive method. Moreover every area has its own notable designs and processes. In each metal there is a extensive diversity. ⁷

Archaeology can do no more than provide us with what earth has conserved in its crust. Objects made of perishable substance, such as wood work, leather work, textiles, etc. can hardly be expected to persist very long periods of time. Consequently, it is simply beyond the range of archaeology to enlighten us as to the art and craft embodied in objects made of such destructible materials, thereby leaving a gap in terms of crucial evidence. In literature we can regard to find direct illustration of the techniques of production applied and the aesthetic standards obtained by the people of the contemporary periods, whereas archaeology can only furnished us with objects and tools from which we have to assume the nature of techniques of production and aesthetic standards of the period which they are related. ⁸

Mans inventive talent and his urge to generate beauty found impression through a variety of media such as clay, stone and metal etc. but the most dominant medium that

revolutionized the economic and the social structures in several periods of history is metal. Stone tools through very fruitful and technically ideal could not help raise the productivity level. This invention of metal can, therefore, be assessed as one of the most incredible and revolutionary gain of humanity. It became instrumental in bringing about a vital move in production relations and the life of man in general besides giving rise to highly qualified productive energies.

Men might have invented the metal by accident. His inspection and manipulation of the physical environment might have empowered him to come across unfamiliar stone like material that was different in properties from the ordinary stone. It is possible that he might have noticed that when thrown in fire it becomes red hot and further that when the red hot metal is beaten and hammered it changes its actual shape, thus creating it possible to give it any desired form and still further that it maintains the transformed shape on being cooled.⁹

Evolutionary Stages of Metal Crafts

Some of this material might have dissolved due to being kept in furnace for long span. From these observation and trial and error methods the primordial man seems to have acquired the techniques of molding and melting suggests of copper, gold, silver or meteoric iron. At a later stage man mastered a new kind of material, called alloy by heating together some of these materials or ores. Distinct in properties from its constituent, this material was found more acceptable for making some kind tools and implements. From the point of technological growth, the evolutionary stages of metallurgy are divided into three periods by Forbes, which are: (i) Native metal as stone, (ii) Native metal stage and (iii) Ore stage. The passage from one stage to another indicates more and more refinement in technical skill.¹⁰

Matsyapurana, one of the ancient epics, narrates the use of a long range of alloys attained by varying the fusions and compositions of metals to meet several requirements, like

brass, and alloy of copper and zinc, and bell-metal, a mixture of copper and tin.¹¹ So far as India is concerned, it is noticeable that copper was known in the later vedic age and specially in the Brahman age and it is not surprising to have been mentioned in the Rig veda, the earliest of the Vedas. A copper age is interceded in Northern India later the Neolithic period, the copper tools being very likely used by the original non-Aryan natives of India, their Aryan conquerors being fully enlightened with the use of iron from the time of their first settlement in the Punjab.¹² Copper has not been narrated in the Rig Veda, the earliest of the Vedas. It has however, been mentioned in the White Yajurveda as loha (from lohita or red) in a list of six metals.¹³ That the word loha here unmistakably declare to copper is shown by the fact that this similar passage has been repeated in the Taittiriya Samhita – (IV,7,5,1) and also Maitriyani Samhita – (II,11,5 and IV, 44) with this distinction that in the last named Samhita the word loha has been replaced by the word lohityas or “red metal” meaning evidently copper. In Atharva veda, XI, 3, 7 lohityama has been used in difference to shyamama or black metal, audibly iron.¹⁴ In Atharva vedaVI, 141, 2, a knife made of “red metal” has been mentioned.¹⁵ In addition to the word lohita, the modern equivalent of copper viz. tamra happens in one passage (Atharva X, 2, 11)¹⁶ which has been translated by Whitney simply as “red” but by Griffiths as “copper-hued”. It is distrustful if the word really meant copper as we found that in the Brahmanas denominated as lohita or lohityas. The word tamra for copper prevails in the ancient medical treatises of Caraka and Susruta as well as in the Kautilya’s Arthashastra.¹⁷

In the Epic Age the consciousness of copper had much forwarded and we find copper entitled by its modern name *tamra* which occurs in the two Epics. The law-giver Manu in his Institutes denotes path for the purifications of copper utensils.¹⁸ Brass and bronze vessels are also mentioned in the same passage. Copper finds a position amongst the six metals in the

medical work of Susruta. The other medical treatise *Caraka Samhita* comprised at the same time mentions brass besides copper and bronze.

Copper is referred in many places in Kautilya's *Arthashastra* (3rd century B.C.) which mentions the ores of copper as heavy and green, grey and red in colour probably meaning thereby malachite, pyrites and red copper ore.¹⁹ The *Arthashastra* also refers the use of copper in creating alloys and in gold and silver coins and articles. It further describes the procedures of gilding by "covering the copper article with gold leaf and then polishing its outer surface and sides." From the narratives left by Greek ambassador Megasthenes who travelled India in 302 B.C. we learn how "vessels of Indian copper set with precious stones contributed to the brilliancy of the public ceremonies during Chandra Gupta's reign." From Megasthenes' narration of the court of Chandra Gupta and also from the big copper bolt explored in the Asoka pillar near the frontiers of Nepal we can undoubtedly say that the output of copper was quite noticeable in India as early as the 3rd and 4th centuries B.C.

India apparently has no bronze instruments are barely to be found. So far as Southern India is anxious, it is an accepted fact that the Neolithic period, during which time stone implements and weapons were used, passed directly into the Iron age, as no copper or bronze weapons have been appeared so in Southern India. In Northern India, however, including the Central province, copper tools and weapons have been discovered in several places besides two in Beluchistan which may be considered archaeologically as a part of India. Mr. Vincent A. Smith in an outstanding paper discusses these interesting finds and embraces that "in the greater part of Northern India a copper age intervened between the Neolithic period and Iron age."²⁰ The copper equipments were mostly celts, shovels, axe-blades, spades, etc. constructed for warlike, domestic and agricultural purposes.²¹ The primary use of copper of course lies in coinage and composition of useful alloys such as brass and bronze. Archaeological specimens, however, of pure copper are profuse in India in the shape of

statues, plates, caskets and utensils which fact unquestionably shows the use of copper in large numbers in ancient India. The most notable of these ancient samples of copper is a big solid copper bolt in the Rampurwa Asoka pillar near the frontiers of the kingdom Nepal. It was audibly implicated in fastening the colossal lion-shaped stone capital to the pillar itself. The bolt is barrel shaped in countenance slightly tapering at the two ends. It is 24½ inches long. The copper is magnificently worked into shape seemingly with hammer slight marks of which are still noticeable and altogether is a surprising piece of metal work for so early an age. The metal is pure copper and not bronze. The bolt seems to have been shaped by the hammer though genuinely made by casting copper, as the shape is quite flawless and flat ends quite smooth. Bearing in mind that this bolt was created as early as the 3rd century B.C., it undeniably confirms to the high metallurgical skill of the ancient Hindus in pre-Christian times.²² A notable copper figure of Buddha was discovered at Sultanganj in the district of Bhagalpur in the ruins of an old Buddhist monastery. Dr. Rajendra Lal Mitra, who first narrated this Buddha statue, says that, it was 7 feet 6 inches high and its weight is estimated to be nearly 1 ton. Dr. Mitra is describing the procedure of its erection says “the material is a very pure copper cast in two layers, the inner one in segments on an earthen mould and held together by iron bands which were originally ¾ of an inch thick, but are now very much worn down by rust. The casting of the face down to the breast was affected in one piece, the lower parts down to the knee in another and the legs, feet, hands and back in several pieces.” Two aspects are of metallurgical interest in association with this remarkable figure. In this first position of the virtual transparency of the outer copper garments highlights the greatest credit on the Hindu copper workers of the 5th century. In the second position the date naturally prompts one of the celebrated iron pillars at Delhi which was also established in the 5th century. This gigantic copper statue and the Delhi iron pillar jointly present to show that by the 5th century A.D. the ancient Hindus obtained notable efficiency in smelting and working

several metals. Moreover it is evident that the production of iron and copper in India at the time was quite operative.²³

The foremost use of copper for state purposes is obligingly its use in coinage. In Kautilya's Arthashastra we find that copper was used not only in copper coinage but also as an alloy in the coins of the exalted metals as well. Copper was used in coinage in India from pre-Christian times. Some of the earliest Indian copper coins are those of the Indo-Greek and Bactrian Kings such as Euthydemus, king of Bactria (230 B.C.) and Demitrios, king of North West frontier of India (200 B.C.). The punch marked copper coins such as those of the old Mitra Dynasty of Ajodhya and many other kings of Northern India are also some of the primitive copper coins familiar in ancient India (first century B.C.). Copper coins of the Kushana kings such as Kanishka (first century AD) and the Gupta kings have also been found in different places. In Central and Southern India copper coins of the Andhra and Kshatrapa Dynasties are amongst the earliest. The location of mints in which copper used to be coined would be of convenience. The *Ain-i- Akbari* says that gold coins were coined first in the capital Agra, second Bengal, third Ahmedabad in Gujrat and fourth in Kabul. Silver and copper except being coined at the four above stated places are also struck in Illahabad, Surat, Patna, Lahore, Multan etc. Another use of copper in ancient India was in the formulation of copper plates generally for the occasion of making land grants by kings to Brahmins and others. One of the ancient copper plate is the Sohagaura Plate revealed in the village of Sohagaura, district Gorakhpur in the United Provinces, the inscription being in Maurya Brahmi characters of 320-230 B.C. The metal of the plate, however, appears to be an alloy of copper. The Taxila copper plate of Kaniska also amongst the earliest of copper plates brought to light in Northern India.²⁴

Copper vessels from ancient times have been taken by the Hindus to be consecrated and almost all utensils meant for use in religious rituals are consistently made of copper even at

the present day. Even archaeological evidence of ancient copper utensils are obtainable. One notable ancient copper ghoti or lota was found by Major Hay in 1857 in the village of Kundla in the Kangra district, Punjab. The vessel looks like a modern lota, but there is an engrave scene running round it which represents Prince Siddhartha (afterwards Buddha) going in a royal departure in a chariot drawn by four horses followed by horses, elephants and musicians. From the mode of the inscription of this legend Birdwood consider the vessel to be a specimen of copper work of the 3rd century A.D., but Mr. Vincent A. Smith considers it to be a sample of the first century B.C... At any rate this copper lota is an actual ancient specimen of Hindu art in copper utensils making. Utensils made of copper, owing to the peculiar modesty from ancient times especially in the performance of religious occasions. As wires, copper and brass have from early times been used in the creation of stringed musical instruments for which India has always been famous. ²⁵

We would now proceed to give here a short narration of the various alloys of copper used in ancient India, the most dominant being *riti* or *pittala* (brass) and *Kamsya* (bronze). The *Kamsya* meant bell metal, also used in making gongs and other articles, is evident from a passage in *Amarakosa's* lexicon (6th century AD) in which *Kamsyatala* is mentioned as one of the many musical instruments widespread in ancient India. ²⁶ Bell metal holds a greater percentage of Tin than Bronze. The proportion in which copper and tin melted together to form *Kamsya* is given in the *Rasaratna-Samuchchaya* (13th century) in which we find the eight parts of copper and two parts of tin were used in forming the ally and that bronze made in Saurashtra was outstanding. ²⁷ Brass was made in India at first by heating copper with calamine and carbonaceous substance. Alchemical works make reference of an alloy of five metals called *Vartalauha* made from *Kamsya*, copper, brass, iron and lead. We find reference of various alloys of copper in *Ain-i-Akbari*. *Kamsya* or “*Sefaidru*” was a formation of four seers of copper and one seer of tin melted simultaneously, the percentage of copper and one

and a half seer of lead. Brass, *berinj* or *peetal* was made of two seers of copper and one and a half seers of *ruh-i-tutia*. *Seem Suckhteh* was an alloy of silver, lead and copper, being of profound colour and very bright and was used in silvering “this perfect Majesty” Emperor Akbar was the innovator of another alloy of copper viz. “*Cowelputter*” compounded of two seers of bronze and one seer of copper, being a “very elegant and beautiful composition”.²⁸

Bronze does not occur to have been known during the vedic Age, as it is not presented in any of the Vedas. It is, however, definite that it was an article of common use in the 3rd century B.C... It is mentioned in both the medical discourse of Caraka and Susruta as well as Kautilya’s *Arthasastra*. Susruta gives paths for drinking water in bronze vessels. Bronze continues to be pronounced as *Kamsya* in *Amarakosa*’s lexicon, though the latter stands for bell-metal also. Both brass and bronze came to be considered as alloys by the thirteenth century as we find that the author of *Rasaratna-Samauchchaya* while classifying metals writes that, “brass bronze and *Vartalauha* are three alloys”.²⁹ In Europe and specially in Eastern Europe bronze age moderated in the middle of the stone and the iron age; but so far as India in a pensive, attainable evidence is entirely inadequate to formed and Indian bronze age. The use of bronze for the motives of ornamentation was not unknown, as can be gathered from the notable discovery of ancient bronze articles at Tinnevely in the Madras Presidency whilst excavating the ancient prehistoric burial sites in which it plentiful.³⁰ Bronze articles were found together with iron swords, daggers and weapons are of superior workmanship and do not include any bronze weapons. The bronze articles embraced ornamental vase stands, bowls, jars and cups of several forms with ornamental bowl lids. Bronze bangles, necklaces, ear ornaments and diadems were also found. These utensils and ornaments exhibit how bronze, on account of its colour, was considered as a highly prized article in ancient India. In India besides being practised as art ware, bronze was also implimented in casting sculptures of several Gods and Goddesses. The Eastern school of bronze - casters of Bengal in the

eighth or ninth century was renowned and it was from this school that Nepal and Tibet acquired their knowledge of bronze casting. Lama Taranath, the eminent Tibetan historian of Buddhism, is of belief that “the Naga productions of Nagarjuna’s time were revelled by the formations of Dhimana and his son Bitapala, natives of Varendra (Bengal) who stayed during the reigns of Devapala and Dharmapala (8th and 9th centuries). Both father and son were mastered indentially as painters, sculptors and bronze founders. Bitapala, who resided in Bengal, was considered as the principal of the Eastern school of bronze casting.³¹ The author of *Rasaratna Samuchchaya* of the thirteenth century mentions that, bronze was created by melting together eight parts of copper and two parts of tin.³²

As Herskovits points out: “The study of technology is an important key to the understanding of a people’s culture”,³³ a narration supported by an even powerfull one made by the architect, Buckminster Fuller, contained in the June, 1958 issue of *Design*, to the result that in man’s struggle for survival, resources and methods are his greatest assets. The following collection of the historic role played by cire perdue casting in India was made by Dr. Ananda K. Coomaraswamy about Indian bronze and brass ornamental work for the *Encyclopaedia Britannica*:³⁴ “The establishing of copper, brass and bronze by the cire perdue procedureis universal in India and of high antiquity.” Proof of Dr. Coomaraswamy’s short but unambiguous assertion is given by still another Indian scholar. In a note to the author, Dr. B. B. Lal, Archaeological Chemist in India, wrote: “The earliest known Indian bronze figurine was revealed at Mohenjodaro where a highly manifested urban civilization emerged in the third millennium B.C. Mohanjodaro has yielded a large number of copper and bronze objects which were created by forging, hammering and casting. The art of metal casting and working had reached a level of technical perfection as exhibited by the notable bronze statue of the ‘dancing girl’.³⁵ The excavations at Mohenjodaro have not yielded any moulds used for casting bronze and in the absence of such finds; it is stubborn to be accurate about the actual

method of casting viz., direct casting from moulds or the casting by cire perdue methods. The complicated patterns and designs reproduced in casting the 'dancing girl' would however, indicate that most possibly the 'lost-wax' process recruited as direct casting from a mould would not produce a bronze of such a fine finish.³⁶ Not only does this bronze figurine illustrates the first technological landmark in India of the cire perdue solid casting methods for producing bronze, but it also establishes the first countenance of the figure in Indian metal art. Except for the 'dancing girl' of Mohenjodaro no other truly remarkable instances of Indian metal art produced by cire perdue casting methods come to light in Western India, the Punjab, Kashmir, Chamba and the Gangetic basin, until the great Gupta period (4th – 6th century A.D.). From this, however, it is not to be possessed that during this span of centuries the art of metal figure casting by the lost wax technique had gone absolutely underground in India.³⁷ Sir Jhon Marshal who fairly excavated the ruins in Sirkap, reports that cire perdue metal casting techniques were known and used at that time to produce gold and copper ornaments and other objects, but was predominantly of Hellenistic design styles.³⁸ In the North West, the Indo-Greek and Indo-Persian dynasties (c. 150 B.C. – 60 A.D.) had enticed many foreign metal smiths and these too reveal imported styles which did little to flourish the high commitment of metal art founded by the 'dancing girl' of Mohenjodaro. Mr. Chintamani Kar, in his book, 'Indian Metal Sculpture' (illustrated) comments in on its failure to show any vigour or movements.³⁹ The cultural renaissance that illuminated itself during the Gupta period (4th – 6th centuries A.D.) brought into being Indian's Golden age. During this period a few superb instances of Cire Perdue hollow casting methods are still presence, the most remarkable of course being the famous Sultanganj Buddha. It was also during this period that the cire Perdue bronze casting process were first introduce in the Silpasastras, the technical cum-canonical texts used by the metal craftsmen in their production of bronze images. Mathura in the West, Sarnath, Magdha in central zone and Bengal in the eastern zone were

the radiating centres of the renaissance of graphic and plastic art activity.⁴⁰ The most creative era of South Indian icon production was during the Cota period from 9th to 13th century. It is because so many instances of them have remained alive that it is a particularly rewarding one. These were large produced in Tamil country and all are accomplished by the *cire Perdue* solid casting method. The most popular images of this period were ‘Siva, especially the dancing Siva – the Nataraja - his consort Parvati as well as krsna, Rama and also images of the royal donors of the temples. With the eclipse of the Cotas in the 13th century A.D., this era of metal image are consolidated, as far as design styles were perturbate, into that of the less artistically noted one of the Vijaynagar period (14th- 16th century A.D.)⁴¹ The *cire Perdue*, or lost wax methods of casting, has been emerged into a fine art in India. Images made for worship all over India were earlier made from an alloy known as Panchdhatu, give metals. The metals were mixed in the proportion requisite by the image to be prepared. Nowadays, however, bronze or copper and brass are used for this intention. The art of metal casting as it has been conventionally practiced is according to the *Silpa Sastra*. Each image has its own proportion and the traditional metal-caster known as the *Sthapati*, casts the image according to what he learns from the *Silpasastra*, during his apprenticeship.⁴²

Various techniques of metal Casting

The traditions and skills of metal casting in India are documented in manifold texts of the medieval period i.e., from 7th to 12th centuries A.D. and even later. These are religious texts and also *Silpasastras*. The *Visnu Samhita* (Chap.XIV) mentions that “if an image is to be made of metal, it must first be made of wax, and then coated with earth; gold and other metals are purified and cast into (the mould) and a complete image is thus obtained by capable workmen.”

When evolution of metal skills during Pre-Harappan and Harappan periods is closely experimented it becomes quite discernible that a very presentable upliftment was made during the latter period. The Harappan period was truly the 'metal age', not because of enormous generation of metal artefacts but because of the remarkable impact of metal technology on the economics of the various Harappan industries and growth of notability in terms of technical knowledge how relating to various jobs in metal industry. Unnumbered metal techniques have been mastered in India. The techniques used for decoration are described as follows:-

Repousse:- This method was employed for raising pattern in relief on any piece of metal and engaged giving of blows on the underside of the piece, while the side to be decorated was allowed to rest on wood, lead or pitch.

Stamping:- The gold smith utilized stamping technique. It entangles filling and grinding the design on the face of bronze or lead and then to lay on it rightly tempered gold or silver. This technique is usually applied making necklace etc.

Filigree and Granulation:- This technique is applied for decorating a metallic surface. Use of this technique entangles soldering sheet cut wires or grains of metal on to the sheet surface.

Inlaying:- By this technique pieces of shell, stone, bone or some other such material are filled into the stagflation space of another metal to produce design.

Wire making:- Harappan goldsmith knew the art of making wire of gold. It was done by stretching out sufficient heated pieces of gold through the holes of several sizes. The same technique is pursued by the present day goldsmith who has a thick metal plate having much holes of varying sizes (this plate is called JANTRI in local dialect of Delhi Suburb).

Wrapping:- This process entangles wrapping thin sheet of gold or silver on ornament made of some other metal like lead so as to give it the look of golden or silver ornament. Like the present day goldsmith the Harappan goldsmith also used this methods to cover the ornaments made from lace, copper and bronze. The Harappans also acquainted with cementing, abrasion, polishing and burnishing in making ornaments. The technological progression acquired by Harappan metallurgists will amaze anyone who appries himself of the complex task of smelting different kinds of ores.⁴³

It is the largest metal work of ancient times present in India and remains a monument to the early capability of the Hindus in melting and casting metal. The metal pillar standing in the courtyard of the Kutb Mosque at Delhi dates from about 400 A.D. After an exhibition of over 1500 years it remains unruled and the inscription is as clear and unambiguous as it was when first made. The beautiful hammered gates of the tomb of Shah Alam at Ahmedabad are another remarkable instance of the great efficiency of Indian craftsmen in metal work. Assuredly a feeling of the significance of metals and a primordial perception of the ‘marvels of science’ in cohesion with the working of them and of their mechanical gentleness reacted powerfully upon early man. The body of faiths about metals and minerals is abundant and endures in present psychology to this day. In Manipur, for instance, the iron-ore deposits are under the protection of an Umang-lai (forest god) who is propitiated before the iron is worked. The Chinese deliberate ores, when in the ground, to possess a “shen” (soul) of animal or human shape. The philological properties of metal have also been significant in religious ritual. The idea that sound of brass or iron has power to put spirits to flight triumphed in classical antiquity and carry on even today. The temple bells of India are eminent for the depth and purity of their tones and also their accomplished architectonic forms.⁴⁴ Since bell-metal is regarded to be purest of all materials, it is not only used for ritual intentions but also for utensils of everyday use. Unlike people of Europe and middle-Eastern

countries, Indians do not traditionally use glass and porcelain, with the outcome that all essentials of the household glasses, cups, plates, serving dishes and containers are normally made of metal.

The 32 Silpasastras viz., visvakarma, visvsa, probodhaka, vritaMaya, Tvashtri, Manu, Manakalpa, Manasara, Prastara, Manobodha, Mahatantra, Vastuvidyapati, Parasaroiyaka, Kalayupa, Chaitya, Chitraka, Avarya, Sadakshara, Branu, Indra, Lokajna and saura, etc., were expressed by the great and eminent visvakarma (Lord of the Arts and Architect of the gods' from whom all sthapatis claim descent); therefore, only the most skilful sculptors (sthapatis) who abide by the traditional exercises laid down in these texts should be chosen for executant works of metal art engaged in the building of temples (and used in their rituals.

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Brass was known in India possibly a few centuries earlier as it is stated in the egregious Aurvedic treatise *caraka-samhita* (c.3rd century B.C.) along with gold, silver, copper and tin.

⁴⁶ The word is stated as “riti” possibly derived from “*harita*” or yellow, through the word “*harita*” was used in Vedic literature as a synonym for gold, which is also yellow. Brass articles of the 1st century B.C. have been found on the excavation of the stupas at *Manikyalaya* in 1830. It deliberated of a copper box enclosing a brass cylindrical box cast and beautifully turned on the lathe. Brass coins of different wings living at that time have also collected. The modern name “*pitala*” seems to have produced at a later date, for instance, we come across the latter word in the *Rasaratna-samuchchaya*, an alchemical work of the thirteenth century, in which brass is denominated as “*pittala*”.⁴⁷ The most remarkable and gigantic work of brass has been narrated by the Chienese traveller *Hiuen-Tsang* who saw near the eminent Nalanda convent “a Vihara of brass built by Siladitya-*raja*”. This plenary vihara or monastery made of brass by Raja Siladitya also known as king Harshovardhana who ruled

from 606-647 A.D.⁴⁸ of the seventh century, when accomplished, would admittedly have been a generous instance of the efficiency of the ancient Indians brass work. The Moghul guns and cannon were also built by casting brass and bronze. With the advance in the wisdom of the technique of gun manufacture, the size of the guns increased immensely (long as 30ft.) and the materials used were chiefly wrought iron and brass or bronze. Amongst the most remarkable brass guns of the Moghuls may be stated the “great gun of Agra” which was an abundant howitzer about 14 ft. long and 22½ inch in the bore into which men could easily enter crouching. Another Moghul gun made of an alloy of copper is the famous “*Malik-i-maitan*” or “Monarch of the plain” which has justly been perceived by Meadows Taylor and Fergusson as “the largest piece of ordnance in the world”.⁴⁹

Some of the most glorious and interesting copper and brass wares of India are those directly requisite for ceremonial motives or which have been evolved from their equipment used in temples. The *achmani* used by priests in sparkling holy water and making drink offerings are beautiful symbolic objects largely drawn upon in figurative art. The dhupdani or censor is once and again immensely beautiful while the *Sinhasan* or idol throne of lotus leaf pattern has evolved much that is praiseworthy in India. The lamp (*arti*), specially the hanging lamps, and the bells (*ghanta*) found in every Indian temple have notably poignant art notions and some of the most beautiful instance of Indian art are found in these, especially in the chain used to hang up the bell. Kashmir generated two well marked forms of copper and brass, one from the valley and other from Lhasa. The former bears the stamp of Persian ascendancy while the latter is noticeably Tibetan and Central Asian in nature. Brass is mostly used in the propagation of sculptured mythological images and household utensils mixed with 6 other metals, gold, silver, iron, tin, lead and mercury making with the zinc and copper of brass a mixture of 8 metals (*Astadhātu*), which is accounted an impeccable alloy and highly valued. The several alloys manufactured are :- Kansa- lead, and brass mixed, Bharat- brass and copper

mixed, *phulkansa-pewter*, copper and silver mixed. Many articles open with embellished wares. Here the colour is provided by black coloured lac. The colored ornamentations show on a gold, silver or enameled background. In many places the copper is simply embossed through the tinned surface thus showing the pattern in bright colors. Tin is soldered on copper which has been formerly graven over with a disseminated floral design. Muslims all over India use cooking and cutting utensils of copper. These have to be tinned before they can be used with indemnity.

The brass and copper wares of India have caught the visualization of the world and are very fascinating for tourists. Indian workmen have submerged the notions of the West and produce, for both home and foreign consumption cultured articles burnished and oxidized copper and gleaming brass.

The all India Handicrafts Board, through its emporia and private manufactures, is encouraging the generation of articles which, while retaining their distinguishable Indian characteristic forms, take measures the accent to modern-western and Indian interior beautification. Classical Indian designs for vogue with streamlined Swedish design pitchers and fruit dishes. Brass candlesticks find a ready market along with lovely light holders of Moorish design and wall plaques of copper coagulated with brass showing traditional Indian dances or elephant departures. The brass calendar with carved figures and adjustable names of days sometimes showing the phases of the moon continues to incline appreciates lovely brass table tops enhanced with the most attractive tracery supported on wooden legs graces many a modern drawing room while shining brass coal scuttles and magazine racks are found in many European and American houses. The tourist trade and Government tutelage have given a terrific fillip to the metalware industry which, today, is as predominant as it has ever been in the history of the country and in one of the great earners of the much needed foreign reprocation. The tools used in the creation of these articles are simple and few in number.

The familiar ones are the hammer and avail, chisel, longs, file, lathe, the scraper used for the lathe and called Noyali in Bengali, a small piece of triangular iron scrape the clay mould, knife, scissors called Katari and wooden hammers.⁵⁰

In Europe “the word zinc is first found in the writings of Paracelsus (16th century) who has stated out that zinc was a metal”. In India, zinc seems to have been turned out from calamine (Sanskrit “*rasoka*” or “*kharpara*”) by heating it in a coated crucible with elements rich in carbon at least as early as the 7th century. We find the narration of methods of the expulsion of “Essence of calamine” in the alchemical work of the 7th century named Rasaratnakarzinc was conceded as a metal for the first time under the denomination of its modern name. Jasada, as pointed out by Dr. Roy in the lexicon attributed to king Madanapala written about the year 1374 A.D. Dhatukriya, Bhabaprakasha and other alchemical works of sixteenth century mention it in the list of metals and the Ayeen Akbari also mentions “ruh-i-tutia (essence of white tutia) or zinc as one of the seven metals.”⁵¹

Indian craftsmen are also genius of creating shapes out of sheet metal. The most perplexed shapes are formed by hammer strokes. Water vessels, lotas, large serving plates, thals, table-tops large dowry boxes from Gujrat, and countless other forms are made by additionally heating and hammering the metal. A number of these forms retain the hammer strokes which emphasize the form and fixtures of these pieces. The objects of everyday use are normally not inscribed, but the decorative pieces and those which are used for rituals or on formal purposes are another form of decorating surface of metal ware is by the combining of two metals to create the basic shape as in Galati, which has religious fraternity. This technique is known as Ganga-Jamuna the brass representing the Ganga and copper the Jamuna. Combining several metals is also done by damascening, in which other metals are coated on the basic material. This can be seen in bidar work, koptgari, zarnishan and tarkashi.

Deep repousse and exterior engraving is another form of decoration to which is added enamel-ling, where colours are fused with the incised surface, as in Siahkalam or niello work and meenakari. Perforated designs are manufactured to allow the circulation of air and to make the object lighter. The range of techniques and methods of handling materials are endless in the Indian tradition of craftsmanship. Koftgari or damascening, is a primordial art in which one metal is coagulated onto another either in the form of wires or as small shaped metal pieces. Koftgari was centrally done with silver and gold wires, on iron or steel meant for swords, daggers, and even guns. Today this art exists only in Kerala where complexed designs in silver wire are studded on iron metal sheets. Bidri is also based on the damascening of silver on oxidised black vessels made of copper and zinc. The art gets its name from the place of its origin Mysore. It is also smeared Lucknow and Murshidabad in West Bengal. The alloy of copper and zinc is used for casting the actual form on which these patterns are carved. Into the engraved sections thin plates or wire of gold or silver pieces are first carved with the pattern and then studded. Several of techniques are used for inlaying. In some cases silver pieces are first engraved with the pattern and then studded. This process is known as Zarbuland or Zarnishan. The wire models are called tarkashi. In individual cases the background of the figurative design is inlayed in silver while the motifs keep in relief and in the original metal with only the veins of leaves and streams and central section of flowers worked with tarkashi, Huqqas, betelboxes, goblets, flowers vases, trays and spittoons are among the popular items made in Bidar. Enamelling of two kinds is practised in Jaipur, Delhi. Here metal is engraved so as to provide depressions in which several colours of lac are heated and fixed to create a surface of diversified colours. In certain cases, that is filled with glazes and the pot is fired when this technique is applied the colours became lasting. The different styles of motifs used in enamelled metal ware are Chikon, marori, bidar and siah kalam.⁵²

The glamorous contrast in colour and texture of metals has been the basis for the manifestation of embellishment on metals. Ornamentation may be separated into hammered, etched, perforated, penetrated and repousse. Repousse or embossing work is done by raising the design in relief. Chasing is the art of engraving of a design on the surface of the metal with a blunt chisel. Embellishment is done by punching, engraving, etching, etc. Engraving is possibly the earliest attempt in ornamentation done by cutting or scratching lines. When the tracery gives a roughened or finely crumbled surface to the metal, it is called frost work.⁵³

According to Forbes⁵⁴ iron subsisted in India in the earliest days of the Aryans in the country. Recent discoveries have confirmed that P.G. Ware culture is one of the earliest iron using cultures in the pre-historic India. This metal was 'a silver white metallic component, meretricious, supple and flexible. It oxidizes easily in moist air and is enticed by a magnet.'⁵⁵ It was obligingly more viable to man in both war and peace. It could at once achieve ample hardness or sharpness and meet nearly all the necessities of society concerning weapons, machines, ingredient tools and transport, etc, in times to come. But in the beginning of its elevation, people were untrained of iron technology. The iron fabricated in the beginning was softer than copper, bronze and thus, had limited uses.⁵⁶ In the panchanan Neogi's monograph mentioned 'Iron in Ancient India' enormous instances has been put forward to show that iron was known to the Aryan Hindus from the earliest Vedic times, and as time went on, the Hindus perfected their metallurgical proficiency in working iron to such an extent that they processed the famous Delhi Pillar in the fifth century A.D. the gigantic orissan beams, the Dhar pillar, the Mount Abu Pillar and other remarkable iron monuments in later centuries. During the Moghul rule India was still a rich iron producing country as could effortlessly be persued from the manifold wrought iron guns and canon of abundant cognition still subsisting throughout India. India again admittedly produced the steel from which the glorious Damascus blades were made in the middle ages. In fact the history of formulation of

iron in ancient India is almost unparalleled in the annals of the world's metallurgy of iron. After the eighteenth and nineteenth centuries, however, European iron of a auspicious attribute began usually to dispossess the indigenous product until as a present it wholly subjugates the Indian Market. But it should be keep in mind that before that time India was always a rich iron producing country from very ancient times.⁵⁷

The N.B.P. Ware period witnessed a revolutionary change in metal technology. During this period iron conquered the household displacing copper from its position of influence as a material for making tools and instruments, and the traces of slags throughout the country during this period suggests a countrywide generation. The achievement of wisdom and techniques of smelting iron, which had hitherto before not been known, gave a exceptional boost to the proficiency and serviceability of iron. As a result, use of copper became constricted to a few articles. The discoveries of sources of iron ores founded by gradual observation and the more comprehensive use of iron for producing a large diversity of objects had a very great effect on socio-economic life of the people. Men could now practices more efficient control over Nature and harness her potentials in order to make his life more comfortable. For example, it became possible for him to clear forest, lay roads and short-cuts and bring distant and speedy way for dispersal. Thus the emergence of this new metal helped in forging a common technologic-cultural bond between peoples of several regions, Iron tools had started occurring from P.G.W. and Pre N.B.P. periods, but there exist no clues from which it may be feasible to construct a picture about the methods employed by them. No hearths or furnaces have been vestige and no other indications as to whether the smiths were acquaint with smelting and melting methods and applied them for manufacturing their artifacts have been acquired. But analysis of the metal used to make these objects suggests strongly that the smiths of P.G.W. and Pre N.B.P. periods were not enlightened with the teachings of melting and smelting. They made their tools and performance by using hot and

cold and hammering methods. It must be at a later stage that through trial and error and methods through long periods of knowledge or by some foreign impact they learnt smelting the ores of iron. Techniques, however, remain no mystery by the time we reach N.B.P. Archaeological instances clearly express that the N.B.P. smith was not only capable of producing a larger diversity of tools than his predecessors but also he had earned the wisdom of smelting iron ores. The articles also suggest that the smith become more efficient mature and capable in his work.⁵⁸

Nepal is dynamic treasure house of mineral resources. But the strenuous mountainous geo-setting of the country has been a great obstacle to thoroughly surveying and exploring the minerals. Its Terai Region accepted, the country is all mountainous with some separated valleys and river brains. Exalted mountains and terraced slopes of hills are, no doubt great fascination for tourists, but they are a great problem from the communication point of view. Explorations of mineral resources have to be carried out in the face of all sorts of such odd troubles. We have lagged behind in achieving remarkably in solving our national problems due to various restrictions intrinsic several sectors. However, it can be hoped that we shall be susceptible to carry out systematic investigations of minerals and achieve their full exploitation.

Although the extortion and sanctification of metal essentials a intricate procedure in modern days, our ancestors with their traditional system did their best in exploiting mineral wealth found in pockets in several parts of the country and refining the metals to produce several kinds of metallic tools uniquely those imperative for agricultural purpose. The production of agricultural tools such as Kuto, Chande, Sclythe (Hansia), hoe (Kodali), Kodalo, Axe (bancharo), Khurpa, Knife (Chakku), Scissors (Kaichi), Chulesi, Khukri (big

knife), Karda, Tarebar (Sword) Khunda and so on is a brilliant instance of their boundless knowledge regarding the removal, sanctification and utilization of metals.

The export of Nepalese technology in erecting pagoda-style houses and temples to People's Republic of China can be cited as an instance in this context. The Tibetan immigrants empowering paper-making technology, who settled in the northern frontiers of Nepal, can be another instance of this type. These examples tend to show that the distributing of efficiency and technology was possible even in those days although the procedure was dead slow. The technology engaged in the removal, sanctification and utilization of metals must have been begotten by local people themselves in order to fulfill their necessities. When a correlative judgement of the ancient and modern techniques of iron expulsion is made, fundamental similarities are found. This constrains us to conceive that a slow, transfer of technology was feasible even in those days. This calls for a thorough examination as it comprises a separate countenance of study.

Traditional metallurgy of iron and copper in Nepal is, in fact, centuries old. The eminent Chinese traveller Houen Tsang who passed through Nepal on his way to India has narrated that Nepal exported copper to Tibet from Nepal both iron and copper used to be exported to Tibet. King Prithivi narayan Shah, the founder of modern Nepal, has enjoyed on his people in his eternal message by saying that if a mineral or ore deposit is found in any place, the local people should be exonerated in some other parts of the country, and the mining should be motivated. A large allowance used to be given to the farmers in those days in land revenue if they reported that a mineral was discovered in land they tilled. Systematic investigation of minerals and ores was started in Nepal in the year 1929 A.D. with the dedication of Khani Goswara (Mining Office). This office has gone various administrative

alternatives, but all that it could do was some survey work, sample accumulation and analytical works relating to minerals and ore depositions.

The superb workmanship in metal works lead us to suppose that our ancestors had a bent of mind towards designing, fabricating and producing the requisite tools or devices utilizing metals, wood, stone and other instinctive raw materials. Nepal seems to be a land of great sages and saints. Some of them might have chanced to dissolve the metallic ores and produced several oxides of metals in the ever burning holy fire of their hermitages in the historic past. People in good old days used to essence iron from iron ores locally attainable. The national weapon of the Nepalese Khukri (a big knife) of international fame is made mainly in Bhojpur at Nepal. The workmanship and grade of Bhojpuri Khukri are superb. Iron and steel comprise the backbone of national upliftment. A country's material development depends on the application of iron and steel. National endeavor should, therefore, be directed to the exploitation of such metals.⁵⁹

Adaptation of Traditional Technologies

Fergusson, more than sixty years ago, in his History of Indian Architecture pointed out clearly the mistaken manner of the Indian Public Works Department. But E.B. Havell for nearly forty years has tried to teach that the livingness of Indian art (not the Indian-ness) is the only thing that really matters. The subject is now said to be an argumentative one into which a sensible person must not enter, lest he should intertwine the routine of departmental work. But adventurousness in this case is the better part of courage, for this is a disputation in which the whole future of art in India is related and one that only can be avoided by avoiding the heart of the matter – all which is vital and indispensable in art.⁶⁰

The metallic art of Sub-Himalayan Darjeeling region which is closely associated to the life and work of people of this region is boundlessly more significant and humanly

interesting. If India is not to be wholly drowned in the mire of modern commercialism her art must continue, as it has done from the dawn of history, to spiritualise Indian daily life and work. It must not be only an archaeological study, a dilettante gratification for educated Indians and other general peoples, departmental hobby or an advertisement for empire occasion.⁶¹ Almost all physical necessities of the people of Sub-Himalayan Darjeeling and their social life were met, till a couple of decades ago, by the skills in the hands of simple but quite industrious Nepalese and other communities' craftsmen. Even more than this, this artisans, in the years by gone, put forward some such a things serving as a symbols of a individual quality as well as notion of their artistic appreciation that helped the people of Sub-Himalayan Darjeeling to achieve much gold and glory. Time has brought the conventional efficiency and technology of this region at the crucial cross roads. Increasing manifestation of the Sub-Himalayan Darjeeling to the international forums, growing familiarity with them and exertion of this region to drive economic discrimination out of the country within as shortest the period as feasible, have all resulted in the increasing acceptance of modern technologies which in fact is threatening the conventional technology to abrogation. The economic performance of this technology to the development of public social life and a close familiarity, of all men belongs to several religions living at every nook and corner of Sub-Himalayan Darjeeling region, with it, were either insufficiently convinced or not realized at all. One can very well envision the significance of traditional technology that the artisans have now begun to give a special intentness towards the conservation and modification of traditional skills. This metallic art technology had greatly subscribed to keep our society alive even in the dreary days of the past. It has, at the same time, tried to gauge our caliber of using modern technology for the conservation of and modification of conventional one.

Traditional Metallic art and its technology is the brilliancy of Sub-Himalayan Darjeeling region. The very nature of such technology is labour severe and it utilizes the significant resources although found in pockets in several parts of this region, without bringing any noxious effect to the society. It also provides job opportunities to a great majority of people in their own region. Unlike the capital passionate technology, it has sound influence on the society in which it has emerged. As a matter of fact, many such traditional technologies are found to be confounded with the local culture and art in such a way that is stubborn to draw a line demarcation between them. This is one identical feature of traditional metallic art and technology that is rarely found in modern technology. It is a significant fact that the peoples of Sub-Himalayan Darjeeling region are struggling hard to solve their pressing economic complications by the application of science and technology. Even if the remote areas of this region empower a wealth of rich technological wisdom, this wealth of information materializes to be imperfect to meet the challenge of the changing times. This has forced these areas to look for cultivated modern technologies. But unfortunately the imported modern technologies alone have not solved all their problems of poverty and unemployment of this Sub-Himalayan Darjeeling area. Moreover, the import of cosmopolitan technology has thrown away many traditional professionals out of their jobs and it has enforced the interest of a small minority. In many cases, such import of profit-oriented technologies has disregarded the implementation of indigenous raw materials and has disturbed the ecological balance. But indeed of the traditional technology and as well as a method honours the presence of traditional metallic art of artisans of Sub-Himalayan Darjeeling.

These unfortunate conditions have compelled the Sub-Himalayan Darjeeling region to look for some sort of technologies that are compatible to solve their economic problems. These necessity have led them to think of different alternatives such as (1) appropriate

technology (2) intermediate technology (3) capital profound technology (4) rural technology and so on. Technology, no matter whether it is traditional or modern, should be susceptible to serve the basic needs of the people. Technologies in favourable forms should be able to provide job convenience to a great majority, should exert the natural resources to the maximum without disturbing ecological balance should be within the reach of many. ⁶²

It is no overstating to say that traditional technology in an elevated form can solve most of the problems of a developing country. If we are willing to modernize and revitalize them, they can be desired to play a role of much pleased appropriate technologies. Viewed from this angle, traditional technologies can be of foremost consequence in rural improvement programme. This calls for an in-depth study of these rural technologies which will consummately pave a way to novelty and adulteration of the technologies needed for this Sub-Himalayan Darjeeling region. The Sub-Himalayan Darjeeling reflects a wealth of conventional technologies of economic significance. The study of the traditional metallic art of Sub-Himalayan Darjeeling have expressed that this region has inherited the technical know-how in different fields such as agricultural function, housing, metal works, water management, mechanical devices etc. from the hoary past. If a little necessity is given to these age-old technologies, rapid financial development can be prospective in upcoming future. Thus they can be geared to solve the problem of society. ⁶³ The traditional technologies are expected to serve as a cross-section of the traditional technologies of the Sub-Himalayan Darjeeling region. Traditional technologies should not be radically different from the existing technologies of the other region in the region besides for minor differences. There was time in history where the diffusion and transfer of technologies were very efficient notwithstanding modern means of transportation were not attainable in those days. This must be the reason for the manifest similarities found in traditional technologies in the whole Nepal and as well as adjacent areas. Within the last few decades different changes have

usually started to materialize in Sub-Himalayan Darjeeling region as it unfolded its door to the outside world in the early sixties. With other changes old technologies are being slowly but surely changed by newer ones in every field. As traditional technologies of any country are the total outcome of long struggle towards better of all the people and culture of that region and the period it is very significant that scientific studies of such technologies be carried out without loss of time and before they deliquescent from the scene or change the traditional feature. The traditional metallic art and craft technologies of Sub-Himalayan Darjeeling region have also additional significance because however absolute and, primordial they may appear today, they were very much matured at the time when they evolved and could be deliberated as the milestones of creative improvement of the artisans with the passage of time. The varied traditional metallic art technologies of Sub-Himalayan Darjeeling from the delicate bronze and metal works and buildings of several temples and towns, to agriculture and water supply for drinking and irrigation could be areas of fascinating studies.

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Traditional Metal Art and Craft Works of Sub – Himalayan Darjeeling

The traditional metal art works in bronze, brass, and copper of Sub-Himalayan Darjeeling has always been a fascination for the people those who demonstrative about art. The numerous art works of several forms and dimensions have genuinely proved the merit and modestly recorded the superb skill and workmanship of the master hands that produced them acquainted with the basic principles of metallurgy and perfectly skilled in casting various images of God, statuaries, agricultural tools and also various arsenal of religious purpose, the traditional craftsmen of Sub-Himalayan Darjeeling have forged out art pieces of various shapes and sizes. The artists of Sub-Himalayan Darjeeling have shown to the world their superb original workmanship which has acquired admiration from all the section of the society. Their master works have always been assiduously religious and supremely symbolic.

The production of statuettes is done in two ways, the work process depending upon the nature of article to be emanated. In other works it is done by casting and by hammering on plain sheets of brass and copper. The first methods are called “*kataniya*” or “*katankigu*”. The later methods will be dealt with individually.⁶⁵ Brass and copper vessels are used in India as well as special reference in Sub-Himalayan Darjeeling for domestic purposes instead of porcelain, glass and silver ware. Brass formation of copper and zinc, but a kind of bell metal having copper and tin for its element parts, called *phul* in upper Indian and *Kansa* in Bengal is also largely engaged in the manufacture of plates, cups, and drinking vessels. Ordinary domestic utensils are not adorned, as, in similarity with the Hindu idea of purity, these are requisite to be brushed with earth or sand before being washed each time they are used. Hindus usually use brass vessels for ordinary intention; Muhammadans prefer tinned copper. Brass, copper or bell-metal vessels may be classed as sacrificial utensils, cooking utensils, plates, cups and drinking vessels, and miscellaneous articles.⁶⁶ Sacrificial vessels dissent in several parts of the Country, not only in shape, but in the metals in which they are made. On the Bengal especially Sub-himalayan Darjeeling region side they are usually made of copper, white in other parts of this region brass is exceedingly employer. Bell metal is not deliberated pure enough for such purposes. Vessels used for purposes of worship form chiefly of a water-vessel, shaped like the long petal of a plantain flower and is called *Kosa*. A small spoon of accurately the same shape is kept along with it: it is called *Kusi*. A basin with a high rim, called *Tamrakunda*, in which the idol is bathed; large plates to keep flowers and other offerings, called *pushpa-patra* or *Tat*. A stand to place the idol when being worshipped, called *Gorur Pristha*, a brass basket with a handle to keep flowers, called *Saji*, small cups to hold Sandalwood paste and other minor offerings; a single or many mouthed lamp which is waved before the idol, these and many other small knick-nacks form the worshipping utensils which are made of metal. The images of deities themselves are also made of brass and other

metals, and unusual sincerity is often displayed in their manufactures. A collection of such Gods, especially of the old traditional patterns if available must be very interesting to people of Sub-Himalayan Darjeeling⁶⁷. Another instance of traditional metal craft is altering of sacrifice. Usually it is made of by copper and as well as brass also. Of miscellaneous objects made in brass or copper may be mentioned the *Hukka*⁶⁸ or the smoking bowl, the scent holders and the pandan or a container to keep betel leaves and the spices chewed with it. These articles are very often ornamented, as they do not require to be permanently scrubbed, like those which come in touch with cooked food.⁶⁹

According to Mr. Rivett-Carnac – “The workers in brass have no tracing or pattern. They may be seen any day in Benares with as brass vessels steadied between their feet, a small hammer in one hand and an iron graver in the other, working out without a moment’s hesitation the figures and symbolisms, or the foliated designs, applicable to the vessels in hand. Not a line drawn on the surface of the brass is there to guide them; still the workman’s hand never hesitates and the uninterrupted tap, tap, of the hammer is deafening as it resounds from all sides. The symbols of their old faith they requisite unchanged from the hand of the graver, and thus, ever to the rhyme of the tap, tap, of the hammer, are charmingly traced on the shining shimmering brass or copper the same lines, carving and weaving beneath an attentive gaze into a pictorial representation of what may be called the Hindu Nibelungen Lied.⁷⁰ We can also allusion the Mr. Kipling’s observations about the metal craft he makes the following remarks:-

Brass is the Hindu material par dignity, and though it is preferred plain for household motives, as being more easily cleaned, as Hindu usage ordains, it is sometimes richly chased or decorated.⁷¹ Domestic vessels, idols, lumps, mythological animals, figures of birds etc. are made of brass, copper, or mixed metal in this area. They are mostly rough articles without any finish or exactness, circles out, lines never true, and marks of the file and burnish

discernible. Brass utensils consisting of Lota's, bowls, drinking vessels, bells, lamps of several kinds, figures of deities, and sacrificial equipment are largely made by artisans in Sub-Himalayan Darjeeling. Of these the designs of some of the lamps are immensely exotic and artistic. The pagoda like temples are hung with little bells, to the clappers of which are attached broad leaves shaped pieces of brass; these are set in motion by the wind, and a continual tinkling is kept up. Except these two classes of bells are exceedingly manufactured, one made in brass is in use in Hindu temples; the other of mixed metal is used by Buddhists. The tone of both kinds is usually clear and musical.⁷² Drinking and cooking utensils of brass, copper and mixed metal are made all over the Sub-Himalayan Darjeeling area and adjacent area. The material used is either brass or bell metal (a compound of brass and copper). The latter is melted and cast into moulds. Brass vessels are made from sheet brass, which is cut and beaten into the required shape.⁷³ Another instance of metal and mixed metal work is in Burma, images of Gautama, large and small, bells for pagodas, open and closed cattle bells, and flat crescent-shaped gongs used for religious objectives are the principal manufacturers in brass and mixed metals.⁷⁴ In many parts of India Iron and tin are largely used for several sorts of household utensils. Of these, the most important are the frying pans, water buckets, tongs, basins, bowls; spoons are now also imported from other part of the country. None of these articles possess any artistic merit however an unusual small industry was carried on in carved steel work in former times, but the art has all but died out at the present day. In that purpose Dr. Bidie States that –Some of the old work was most extended and worked out with great integrity and patience. The style of ornamentation is noticeably Dravidian, comprising chiefly of monsters ingeniously poured and grouped and of arabesques.⁷⁵ It is exceptionally stubborn to procure old specimens of metal work, for when brass and copper wares get old they are interchanged for new ones. The old ones are taken up

by braziers and copper smiths, melted, and made into new vessels. Even if an old article is acquired, it is stubborn to find out its authentic age besides by guess work.⁷⁶

In the Sub-Himalayan Darjeeling region, varied topographic and agro-climatic conditions ranging from sub-tropical to cool temperatures permit the cultivation of a wide variety of crops and fruits. However, agriculture in general is handicapped due to steep and hilly terrain, hazards of climate, uneconomic scattered holdings comprising of shallow and stony soils. The tools and their implements used are of a primordial nature throughout Indian Himalayan Ranges. Traditional farm tools and implements for self element have been exhibited or modified through experience over generations to meet emerging socio-economic and farming challenges. The type of soils and topographic conditions largely influence the type, size and shape of particular tillage tools or implements. The following is a list of local tools/implements found in various regions of temperate Sub-Himalayan Darjeeling track. Like every other region tillage is also the basic operation of farming of Sub-Himalayan Darjeeling. It is done to create subsidiary conditions for seed placement and plant growth. This is done mainly with a plough. A full history of the evolution of plough is not available. Farmers have been using plough since time immemorial. The primordial model might have been a crooked twig or a branch of a tree. The basic elements of the plough are a shoe, a share, a body, a handle and a beam. The joint between the shoe and body is purposely avoided with a view to make the plough more rigid and robust, so that the implement can work on importantly soils with stones and other hindrance which are envisaged during the course of ploughing. Another tools used in agriculture purpose which is Harrow. It has wooden plank to which wood/iron pegs, handle and bamboo shaft are fitted. It is used for breaking soil crust after rain and also for uprooting weeds. But now-a-days it's use is now almost un-noticed. The Sub-Himalayan Darjeeling region the most common type of traditional harvesting implement are "*Kaalam Churi*"⁷⁷, "*Jhurni*"⁷⁸, *sikle*, *pharwa* or *kodali*

(spade), *Kulhari* (Axe), *Khurpi*, etc. These are used for the harvesting of several vegetables, pulses and also in small tea garden. Another miscellaneous tool like hammer jumper, wedge and shovel and hand saw are also used from time to time in the several farm operations. Indeed of their widespread use even today, these internal implement or tools which are made of iron metal in general are not agronomic ally sound and as a result lower the efficiency and increase tiredness of the operator. There is an urgent need to enhance upon the traditional implements so as to redress this serious limitation. The standardization of their design in accordance with the necessities of Sub-Himalayan Darjeeling farming is long overdue.⁷⁹

The manufactures of traditional metal works (like khurki, sword) of Sub-Himalayan Darjeeling region is now constricted almost entirely to supplying the demand created by the aristocrat people and various to India, who use them for decorative purposes by displaying them on the walls of their entrance halls, dining rooms.⁸⁰ In the sub-Himalayan Darjeeling region the craftsmen also produce ritualistic, decorative and several households utensils. Furthermore the contemporary approach varies with separate choice. The various metal craft which made by copper – brass, iron are *Dhung* (which is generally known by Trumpet), *Rolmo*, *Selnyen*, *Thorma*, *Mendel*, *Bhumpa*, *Manrak*, *Dhuntrak*, various lamp, *Chodea*, *Tak*, *Chimji*, *Thikchu*, *Changda*, Copper household utensils, another various ritualistic craft like *Puspapatra*, *Panchpradip*, *trisul*, *Thal*, *Kalas*, *Dio*, *Mana*, *Pati*(large vessel), *Jug*, *Gyling* and *Ridang* (wind musical instrument, use in Tibetan Buddhism for ritualistic purpose), *Maney* (religious wheel used in various buddhist monasteries for ritual purpose), Meditation bowl (which is also used in Tibetan Buddhism) etc. Besides artisans also propagation *sangli* (iron chain), *Naal* (horse shoe), *Kutay* (a type of small spade), *Phali* (special type of nail used in yoke), and manymore household utility. This kind of articles propagation by the artisans with their traditional concept.

Traditional metallic jewellery of Sub- Himalayan Darjeeling

Discussion about traditional metallic art and craft of Sub-Himalayan Darjeeling will remain incomplete unless we talk about traditional ornament and jewellery generally Indian women being as fond of jewellery as their sisters in other parts of the globe, the maker of gold, silver, copper and brass ornaments has been an important member of the village commune from time immemorial. The dress of native women, which leaves a larger part of the body bare than in colder climates, admits of an elaborate personal adornment by means of ornaments. Want of pecuniary means does not stand in the way of satisfying this vanity, for ornaments are made of all sorts of materials, from the cheapest bangles made of lac, glass, or brass to the most valuable gold necklaces, thickly studded pearls and diamonds; and thus the wearer has before her a large assortment from which to choose, according to the means at her command. Although the love of personal adornment has been in some cases carried to an absurd length, - so that it is often painful to one unaccustomed to such sights to behold a peasant women labouring in the field loaded with a heavy weight of bangles and anklets, made of solid brass, without any pretension to being artistic or ornamental, - still some of the cheap trinkets are so well made as to deserve to be classed within the domain of traditional art. The Indian workman displays his good taste, which seems to be inherent in his nature, wherever he has a chance of doing so. He cannot cut or chase ornamental designs on hard metal articles without raising the price to a point beyond the means of the class for whom they are intended; but he is free to exercise his ingenuity on the softer lac, and indeed, bangles made of this material in many places display great taste in the combination of colour and tinsels. As want of decoration and finish in the brass ornaments is due to the stern necessity of making them cheap, there is another reason why Indian gold and silver ornaments often lack that neatness of execution which is characteristic feature in other parts of Indian articles of a similar description. To lay by some money as a provision for a bad day is perhaps a more cogent object with the head of a family in possessing gold or silver

ornaments than personal adornment. Hence massive solid articles of soft pure gold are preferred to family ornaments made of hard alloyed gold but of superior workmanship.⁸¹ The ornament lover people of Sub-Himalayan Darjeeling purchases gold or silver jewellery, but he orders the goldsmith to make these for him from gold or silver which he supplies himself, the wages of the maker being paid at the time – honoured fixed rate on the weight of the metal used. Such a system does not encourage superior workmanship. But still the jewellery or the ornaments of Sub-Himalayan Darjeeling is not devoid of art or of intricacy of finish.

We have in India specially Sub-Himalayan Darjeeling the most primitive methods of personal adornment in the wild aboriginal races as well as its highest development among the more civilized people. Bones of animals, plumage of birds, shells, and seeds of gaudy colours still afford an endless supply of personal ornaments to the savage tribes of the Sub-Himalayan Darjeeling forest region.⁸² Here we can also mention that old books and old statues show that costly ornaments were in use in Indian from pre-historic times. Rig-veda the oldest book in the world, mentions ornaments worn by the gods, the demons described in the same book had plenty of gold and jewels, and kings and sages prayed to the Gods for valuables of that kind.⁸³ On the basis we can easily said that the gold is a valuable and as well as precious metal which used by the people from ancient time to present. Metal ornaments are very largely worn by women all over the country. The Sub-Himalayan Darjeeling area also followed this tradition. Almost all the gold that is annually imported into the country and a large portion of the silver are used up for the manufacture of such ornaments. In India, both gold and silversmith's work is done by the same class of people, known by the caste name of swarnakar i.e. worker in gold. Such work was until recently the monopoly of this caste, but of late many blacksmiths, cultivators, and other castes have adopted it as their trade.⁸⁴

The jewellery or various ornaments prevents a phenomenal absence of uniformity or monotony of workmanship or craftsmanship. It also provides a good medium for the examination of the development of culture of the people of Sub-Himalayan Darjeeling region through the ages. The crude jewellery of the aborigines made of twigs and branches, flowers and leaves is probably an exact copy of the ornaments worn by primitive man.⁸⁵ Later these forms were copied in gold, silver, copper and brass wire by more advanced craftsmen who, not satisfied with the limited range offered to them, turned to their surroundings for inspiration and evolved new forms through the imitation of flowers and animals.⁸⁶ Indian ornaments have existed in almost an unchanging form through the centuries. The jewellers' and goldsmiths' art of India is of the highest antiquity and forms of Indian jewellery have come down in an unbroken tradition from the Ramayana and the Mahabharata. The Rigveda also makes constant mention of jewellery. The Maruts decorate their persons with various ornaments. In the Nirukta, or Etymological Glossary forming one of the vedangas and in the Grammar of Panini composed about the 4th century B.C. the names of various ornaments are given. These are identical with those still used throughout the country. The old vocabulary of Amara Sinha, one of the nine gems of the court of Vikramaditya, quoted by Rajendralal Mitra, gives a long list of names for crowns, crests and tiaras for the head; of rings, flowers and bosses for the ears; of necklaces of from one to a hundred rows of gems; of all shapes and patterns of armlets and bracelets; of anklets and other ornaments for the legs. All the names mentioned are the ones still used for the same ornaments in India⁸⁷ as well as a part of Sub-Himalayan Darjeeling region also.

The Indian jeweller and craftsman thinks mainly of producing the sumptuous, imposing effect of a dazzling variety of rich and brilliant colours. In nothing do the people of India display their naturally gorgeous and costly taste so much as in their jewellery which is not

only fabricated of the richest rarest materials but is also worked with all the elaborateness, delicacy of art and splendour of design within reach.⁸⁸

Ornaments must, by tradition, be given to every girl at the time of her marriage and if many pieces are beyond the means of parents, there is one particular pieces, which must be given at the time of marriage, to be worn continuously until the girl becomes a widow or dies.⁸⁹ The jewellery and various ornaments used by the people of Sub-Himalayan Darjeeling which reflected to the general simplicity of their lives. It is amazing as to how strikingly a unity in diversity in most the culture as well as religious of the people of this region is displayed through their traditional cultural ethics. Nature form has been used as a common denominator in the folk as well as the religious cults but having different impact. The wide spectrum of Sub-Himalayan Darjeeling culture contains various colours of different intensity. Different kinds of people races, languages, religions and traditions made Sub-Himalayan culture vital and colourful. The nature form rotates in every art and craft traditions with every colour of the spectrum. How the nature impressed the people of Sub-Himalayan Darjeeling region through the ages is sought to be explained by the artisans or craftsmen along with all the myths and stories associated with it. Besides a folk divinity it also perforated in the traditional belief and the culture of the Sub-Himalayan people. It is the inner vitality of Sub-Himalayan Darjeeling culture which has been the result of intimate connection between nature and human inspiration. That is why traditional art and craft are rooted in the natural environment. Traditional art and crafts are the best example of the oneness of nature and also human factor as reflected on their creativity of this region. Nature is only one of the aspects of the multidimensional theme which embodies the various hues and colours of the Sub-Himalayan Darjeeling cultural tradition. But in modern times jewellery is valued not only for ornamental purposes but also as a solid investment. In a country where modern banking facilities did not exist until very recent times, ornaments

satisfied both one's sense of vanity and thrift. Their portability made them invaluable during times of crisis when they could be carried on one's person and until recently the Hindu women did not inherit money either from her father or her husband. The only property she could claim as her own was the 'stridhan' or dowry she received at the time of her marriage and the presents she received either from her husband or his people. These usually took the form of ornaments and every woman tried, in her husband's lifetime, to acquire as much jewellery as she could as insurance against hard times. Eventually most of these find their way into the melting pot either to help family finances or satisfy the craving for acquisition of new shapes and meet the demand of changing fashion. It is therefore, possible to find the earliest forms only in the traditional metals which have no intrinsic value and serve only to satisfy the wearer's vanity.⁹⁰ Now-a-days recent trends affected by globalization are "Dhanterus". In this auspicious occasion people buy some valuable metals (like silver, gold or platinum) for their bright future. This practice of precious metal shopping is going on the current series. The traditional art and craft of sub – Himalayan Darjeeling are generally sold through some channels. These are (a) sale at the house, (b) peddler, (c) local market, (d) various melas, fairs, (e) created marketing chain in particular region, (f) supply on the basis of demand. (g) Sale shop, (h) various govt. emporiums. Through this kind of marketing process the artisans often try to sell their traditional art and craft objects to the people who want to buy it. In this way the art and craft lover or the people whom need their necessary household utility purchase and fulfill their requirements. In spite of the local handicrafts items sold through the various government emporiums like Biswa Bangla, Manjusha, and other private shops like Art Emporium, Tibetan self help refugee centre, Darjeeling, Arts Crafts and curios, Jolly arts, Kalimpong art gallery, Asian Art Palace, Nepal curio House etc. played the vital role for selling the traditional art and craft objects. Many foreigners come to see the beauty of our Darjeeling they must fall in love the

traditional art and craft articles also. Therefore, they purchase these objects and create a global market through their requirements. It is notable that this kind of business has transferred from one generation to another generation and which led to the improvement in establishing guilds to act within in preserving very nature of the traditional art and craft till the date.



Pic- 21, Metallic decoration on door of Dali Monastery, Darjeeling



Pic- 22, Floral and faunal design door Knob, brass metal

Source: collected by researcher, from Dali Monastery



Pic- 23, Dragon motif on door, brass metal



Pic- 24, Fire Alter for ritual purpose made by copper,
Source: collected by researcher, From Dali monastery



Pic- 25, White parsol and sea shell motif on metallic door panel



Pic- 26, Metallic design on sangfur

Source: collected by researcher, from Dali Monastery



Pic- 27, Brass and copper mixed prayer wheel



Pic- 28, Metal Decorative Trumpet, silver and brass metal used

Source: collected by researcher, From Dali Monastery, Darjeeling



Pic- 29, Selnyen



Pic- 30, Rolmo

Source: collected by researcher, Dali Monastery



Pic- 31,Chodea, made by silver



Pic- 32, offering pot, made by copper
Source: collected by researcher, from Dali Monastery

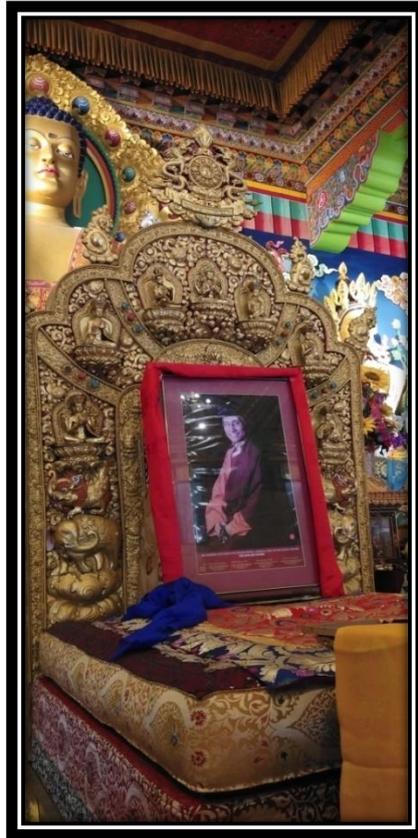


Pic- 33, Mendel



Pic- 34, Manrak

Source: Collected by researcher, from Mirik and Dali Monastery



Pic-35, Golden decorative throne

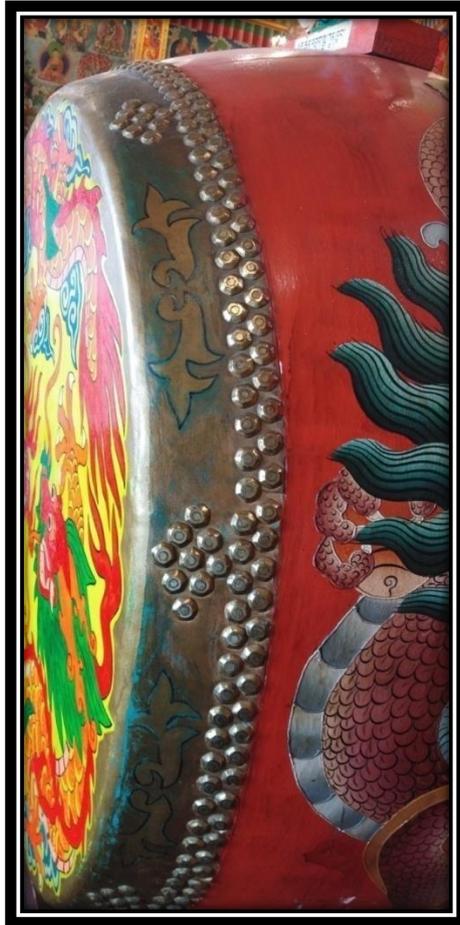


Pic- 36, Brass Bell, Infront of door, Korean Concept

Source: collected by researcher, from Dali Monastery



Pic- 37, Dhuntrak, made by copper



Pic- 38, Brass decorated drum

Source: collected by researcher, from Dali Monastery



Pic- 39, offering lamp (Chomi), made by gold and copper



Pic- 40, Copper Dragon motif panel

Source: collected by researcher, from Dali Monastery



Pic- 41, Metallic Buddha,

Source: collected by researcher, from Art Emporium, Darjeeling



Pic- 42, Brass metallic mask

Source: collected by researcher, from Art Emporium, Darjeeling



Pic- 43, Metallic Vajradhara with his Shakti in Yab-Yum



Pic- 44, various metal Deities

Source: collected by researcher, from Art Emporium, Darjeeling



Pic- 45



Pic- 46, Khukri with metal decorated cover

Source: collected by researcher, from Art Emporium, Darjeeling

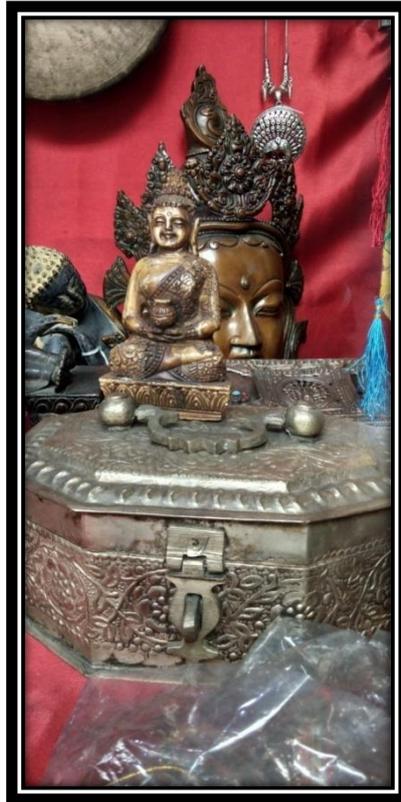


Pic-47, Shopkeeper selling their various metallic objects



Pic- 48, Votive pot, made by copper

Source: collected by researcher, from Art Emporium, Darjeeling



Pic- 49, Metal jewellery box with floral decoration



Pic- 50, Metal flower vase for ritual purpose with floral decoration

Source: collected by researcher, from Jolly Art, Darjeeling



Pic- 51, Votive metallic object with traditional decoration

Source: collected by researcher, from Jolly Art, Darjeeling



Pic- 52, Metal Deity Ganesha,



Pic- 53, Metal Ravana,

Source: collected by researcher, from Biswa Bangla, Darjeeling



Pic- 54, Goddess Kali, Brass metal



Pic- 55, Metal Bull Mask

Source: collected by researcher, from Biswa Bangla, Darjeeling



Pic- 56, Silver bowl with floral and faunal motif, for home decoration

Source: collected by researcher, from Biswa Bangla, Darjeeling



Pic- 57, various copper objects

Source: collected by researcher, from Arts Crafts & Curious, Darjeeling



Pic- 58



Pic- 59, various votive objects for ritual purpose

Source: collected by researcher, from Arts Crafts & Curious, Darjeeling



Pic- 60



Pic-61, Traditional Khukri with design

Source: collected by researcher, from Asian Art Palace, Darjeeling

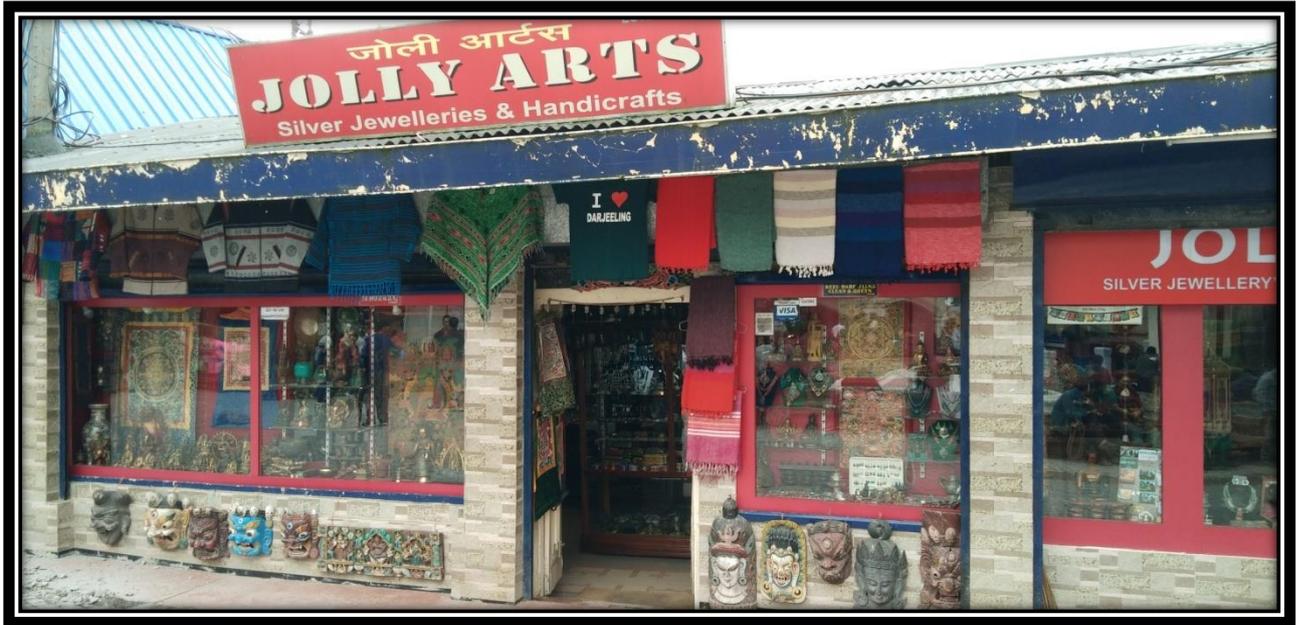


Pic- 62, Asian Art Palace, Darjeeling



Pic- 63, Kalimpong Art Gallery, Darjeeling

Source: collected by researcher, from Darjeeling

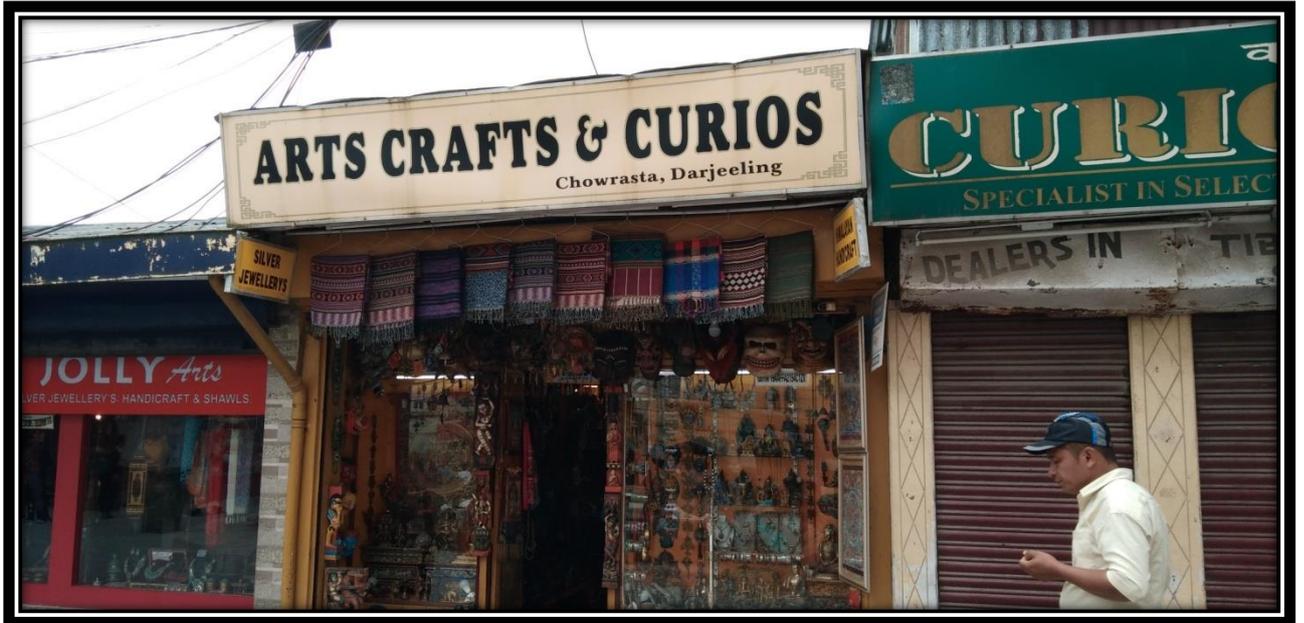


Pic- 64, Jolly Arts, Darjeeling



Pic- 65, Art Emporium, Darjeeling

Source: collected by researcher, from Darjeeling



Pic- 66, Arts Crafts & Curios, Darjeeling

Source: collected by researcher, from Darjeeling



Pic- 67, various iron tools for weaving,

Sources: collected by researcher, Tibetan Self Help Refugee Centre, Darjeeling



Pic- 68, Chimji



Pic- 69, Tak



Pic- 69, Thichu

Sources: collected by researcher, Tibetan Refugee Self Help Centre, Darjeeling



Pic-70, Nirani: traditional agricultural iron metal tool
Sources: collected by researcher, From Sub- Himalayan region



Pic-71



Pic- 72, Brass metallic Dragon motif and Selyen

Sources: collected by researcher, Tibetan Refugee Self Help Centre, Darjeeling



Pic- 73, Kupi;Traditional lamp



Pic- 74, Hajack traditional lamp

Sources: collected by researcher



Pic-75, Traditional Puspapatra made by brass, use only ritual purpose

Sources: collected by researcher



Pic- 76, Kosa-Kusi , made by copper

Sources: collected by researcher



Pic- 77, Pancha Pradip made by brass use traditional ritual purpose

Sources: collected by researcher



Pic- 78, Hill Craft Centre in Mirik, By govt. of West Bengal

Sources: collected by researcher



Pic- 79, Traditional copper household Utensil Milching

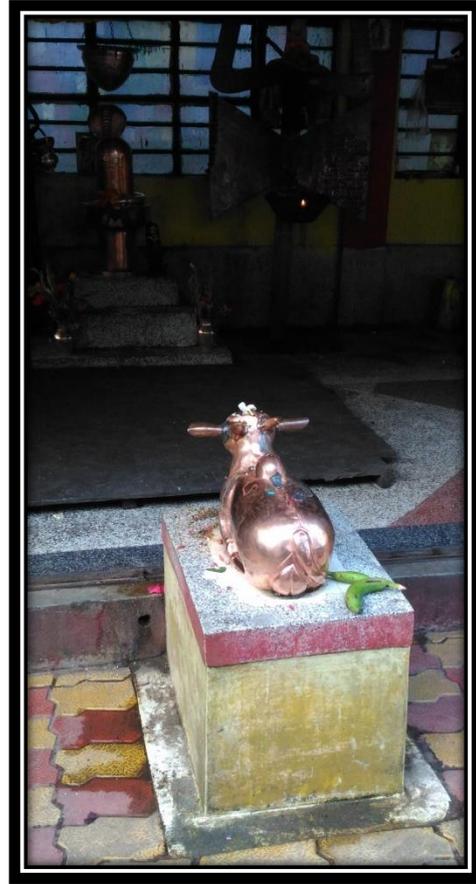


Pic-80, Traditional aluminum household utensils of Sub –Himalayan Darjeeling region



Pic- 81, some decorative traditional silver and copper objects of Sub-Himalayan Darjeeling region

Sources: collected by researcher, from Mirik



Pic- 82, Shiva Linga and Nandi made by copper metal

Sources: collected by researcher, from Tiger Hill Shiva Temple, Darjeeling



Pic-83, Prayer bowl made by copper, silver, brass

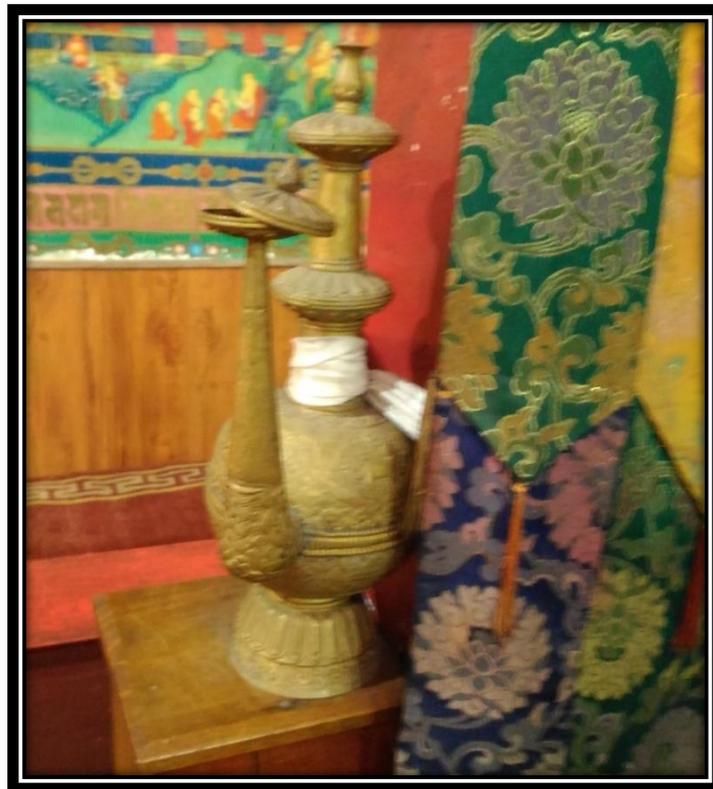


Pic- 84, Traditional Holy water pot with floral Motif, Bhumpa

Source: collected by researcher, from old Ghoom Monastery



Pic- 85, Ritual bell and Thunderbolt with traditional design

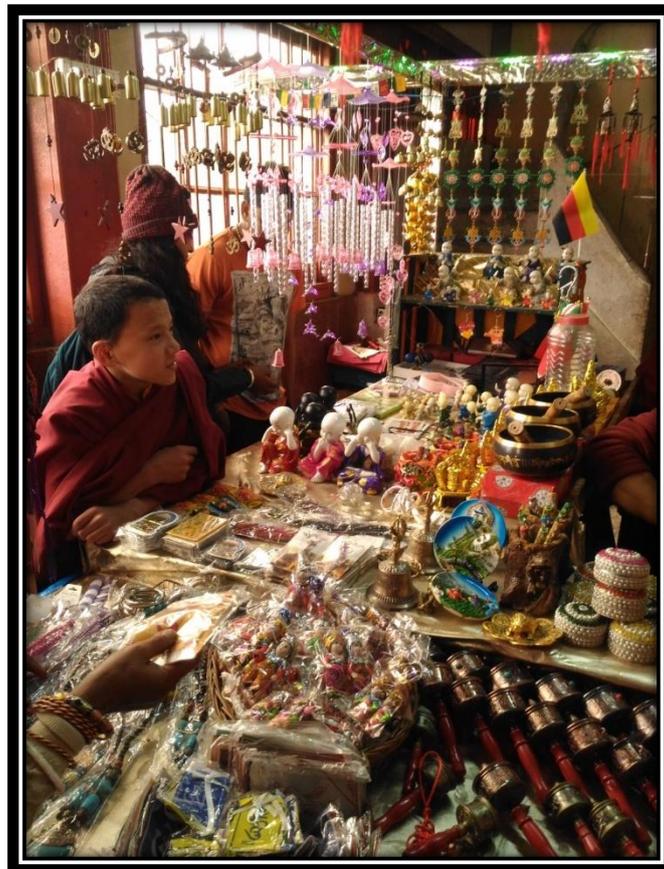


Pic- 86, Brass pot for ritual purpose

Source: collected by researcher, from old Ghoom Monastery



Pic- 87, Copper hand prayer wheel



Pic- 88, various ritual objects for commercial purpose

Source: collected by researcher, from old Ghoom Monastery

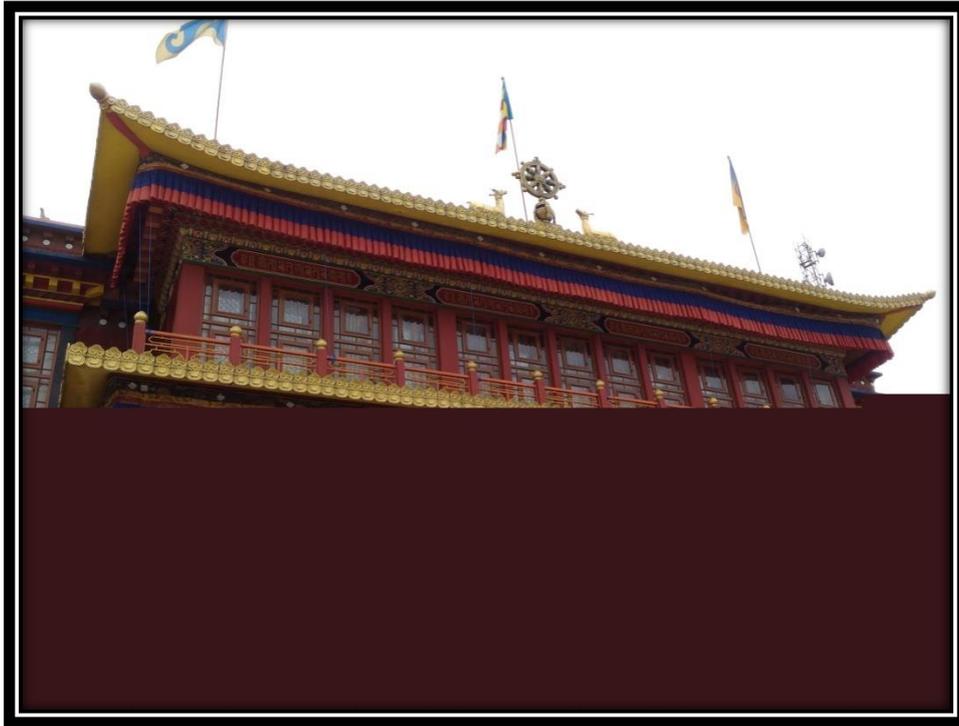


Pic-89, Meditation Bowl with wooden handle



Pic-90, Votive object made by brass

Source: collected by researcher, from old Ghoom Monastery



Pic- 91, Bokar Ngedhon Choekhor Ling Institute, Mirik



Pic- 92, Brass Metallic Lion with Mahakala face resemblance in Front of the entrance gate of Bokar Monastery

Source: collected by researcher, from Mirik Monastery



Pic-93, Brass metallic Bell (Gongs) for ritual purpose

Source: collected by researcher, from Mirik Monastery



Pic-94, Metal decorated door



Pic- 95, Traditional Metal Door Knob with Dragon motif

Source: collected by researcher, from Mirik Monastery



Pic- 96, BEG-TSE, THE God of war, Brass and copper metal motif on door



Pic- 97, Metallic Dragon, Hamsa and Bird motif with floral decoration on door

Source: collected by researcher, from Mirik Monastery



Pic- 98, Gold and Brass mix traditional decorative oblation pot with floral design,

Source: collected by researcher, from old Ghoom Monastery



Pic-99



Pic- 100, Traditional copper Silnyen and Trumpet for ritual purpose

Source: collected by researcher, from old Ghoom Monastery



Pic- 101, Korean Traditional Buddhist Brass Bell

Source: collected by researcher, from Salbari Monastery



Pic- 102



Pic-103, Some brass and copper metal Sculpture

Source: collected by researcher, from Salbari Monastery



Pic- 104, Brass temple bell with wooden handle.

Source: collected by researcher, from Zambulind Monastery

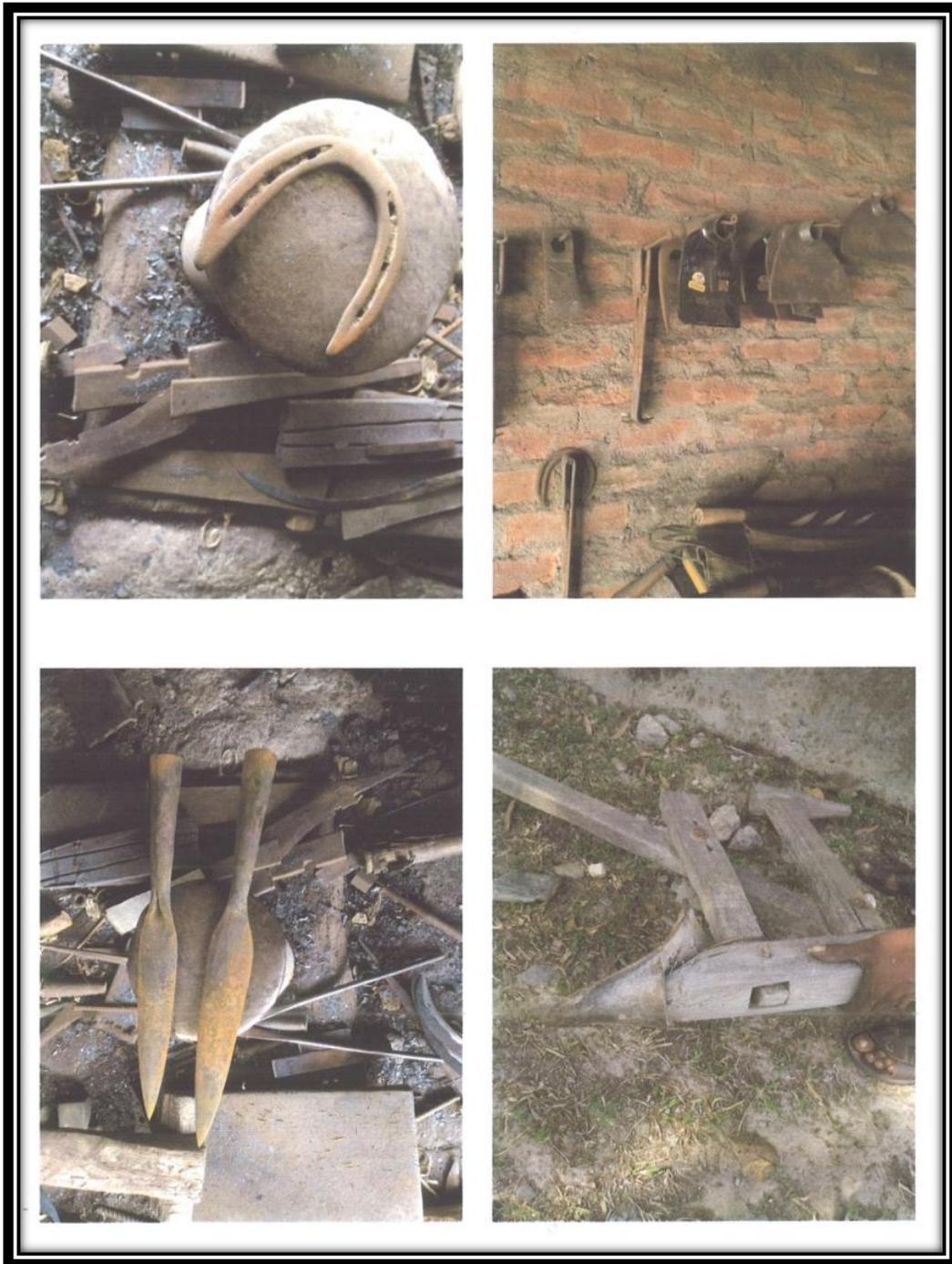


Pic-105



Pic-106, Traditional agricultural equipments, made by iron

Source: collected by researcher



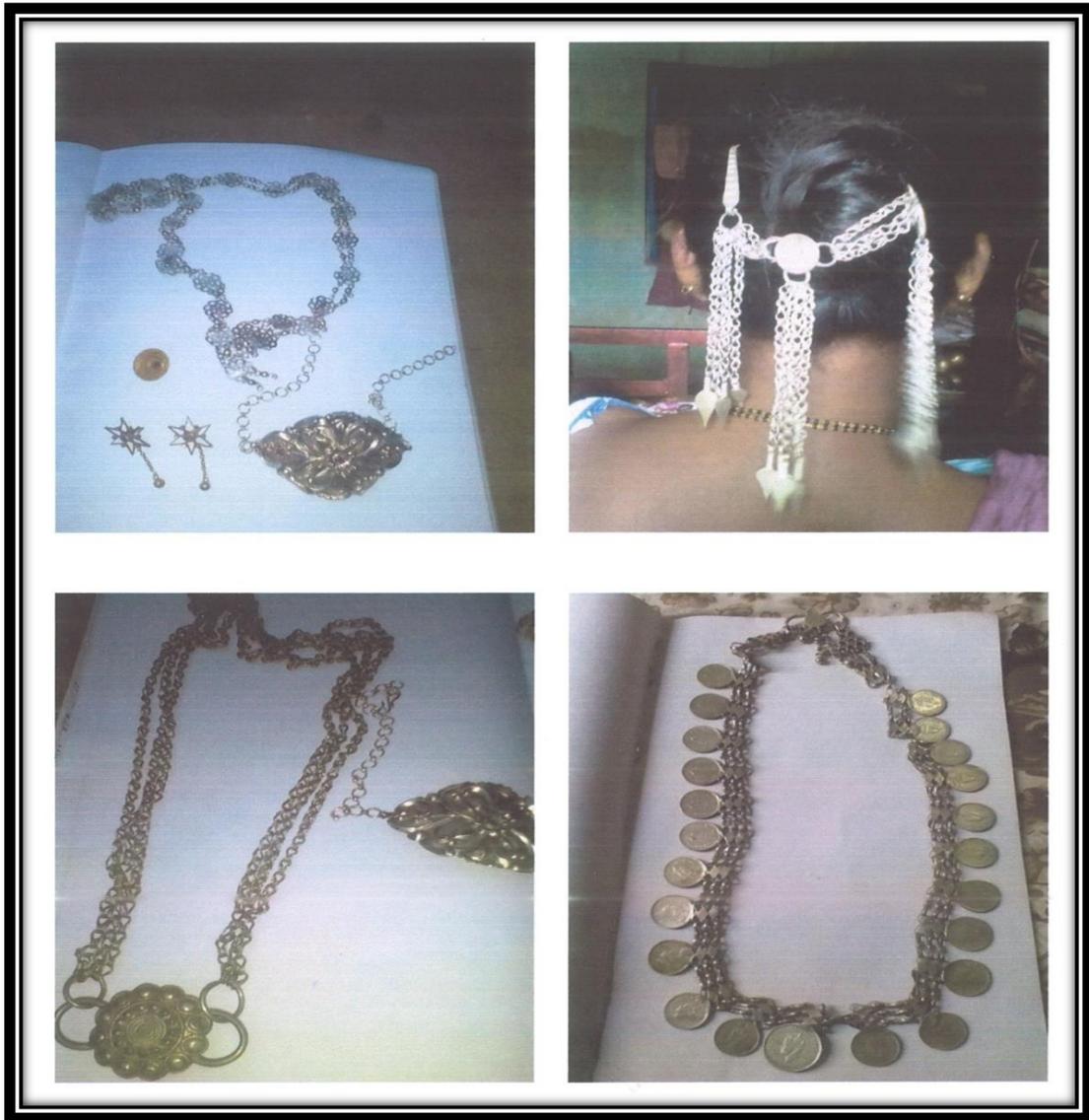
Pic- 107, Naal, Pharu, Plough head and vojali

Source: collected by researcher



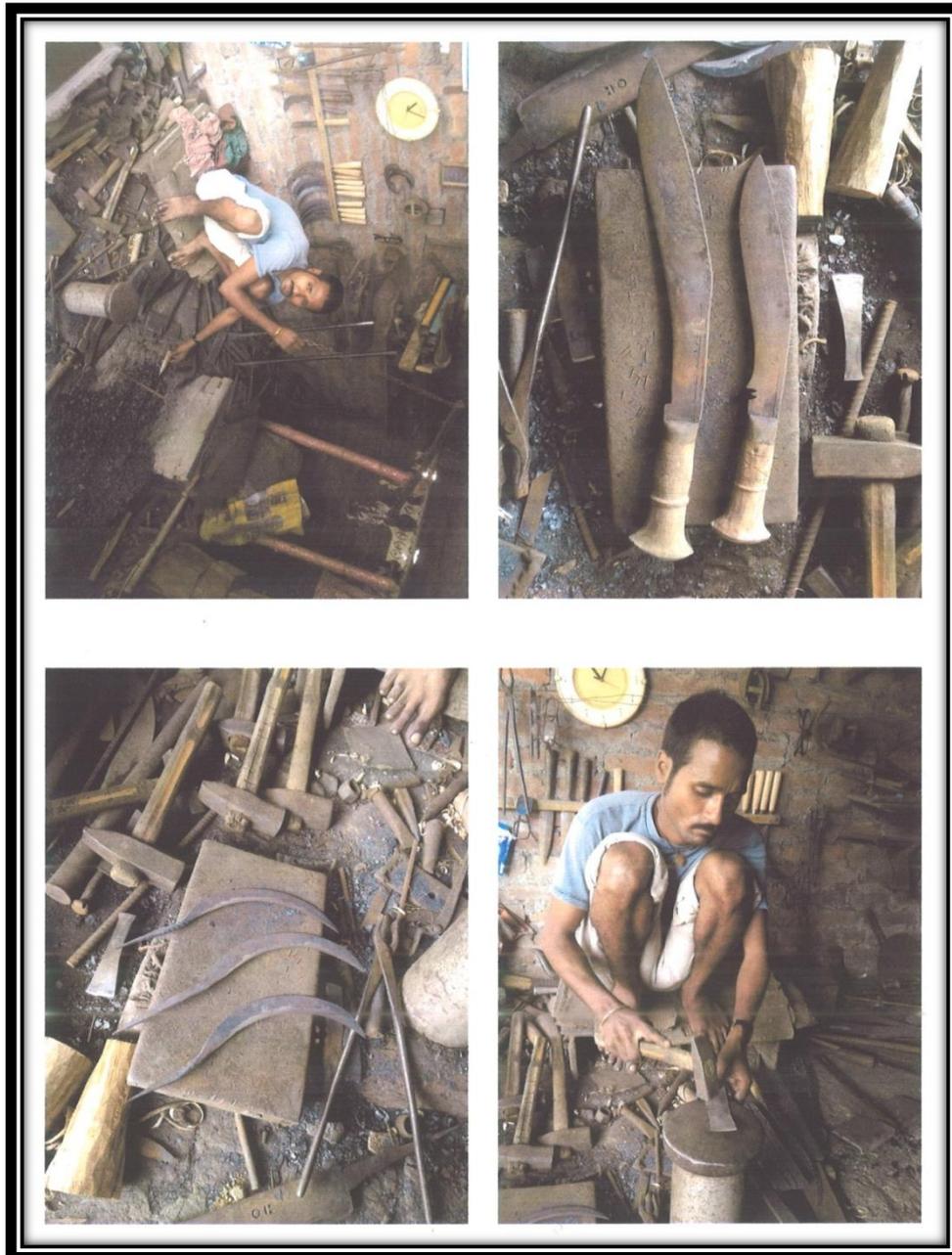
Pic- 108, Traditional Plough of Sub- Himalayan Darjeeling

Source: collected by researcher



Pic-109, Traditional Silver Jewellery

Source: collected by researcher



Pic-110, Artisans making various types of iron tools

Source: collected by researcher

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⁷⁰ Ibid, p.193.

⁷¹ Ibid, p.200.

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⁷³ Ibid.

⁷⁴ Ibid.

⁷⁵ Ibid, p.211.

⁷⁶ Ibid, p. 212.

⁷⁷ Harvesting iron metal instrument generally used in Sub-Himalayan region and other adjacent areas.

⁷⁸ Jharni is also harvesting tools, made by iron, it used in Sub-Himalayan region.

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⁸⁵ Bhushan , op.cit, p.70.

⁸⁶ Ibid.

⁸⁷ Ibid , p. 71.

⁸⁸ Ibid ,p.73.

⁸⁹ Ibid , p.74.

⁹⁰Ibid.