UNIT 7 TECHNOLOGICAL FOUNDATIONS AND SOCIO-ECONOMIC PARAMETERS

Structure

7.1 INTRODUCTION

In the previous Unit we have introduced you to the cultural and geographical settings of the Bronze Age Civilizations in Egypt, Mesopotamia, India and China. In this Unit our focus is on the use of metal, primarily copper and bronze, and its implications. Along with the use of metals we will also discuss the process of urbanization and the importance of trade in the Bronze Age Civilizations.

7.2 THE USE OF COPPER AND BRONZE

Before we proceed we need to understand what the use of metal entailed. Copper was the first metal to be used in most parts of the world, followed by bronze, an alloy of copper with a low percentage of either arsenic, lead, or tin. The advantage of these metals is not necessarily that they are more resilient than stone, but that they can be melted and cast into a wide range of shapes and sizes of tools and weapons, with their working edges or points in the desired form. Bevelled-edge chisels in a range of sizes, toothed saws, adzes with sharp edges, and heavy-duty axes were tools possible or more effective in metal rather than stone. They made good tools for carpentry, for carving stones and ivory, for cutting shells or leather, and so on. In addition, copper is malleable, and can be beaten into thin sheets or vessels of the desired shape. This makes for very thin objects, not possible when copper is cast, and thus is an economical use of the metal.

Metallurgy was specialist work. Not everyone could recognize ores on the ground, or know their properties under heat, leave alone build and control the working of a kiln, using the best charcoal. It is possible that early metallurgy was a skill and lore passed down the generations among some small groups of people. These people would need to be mobile because the ores of copper, lead and tin are scarce and dispersed on the crust of the earth, and also because in their own tribes the scope for utilizing copper would have been limited. Metallurgy came into its own when specialists produced objects for royal ancestor rituals as in China, or tools for urban workshops of the Mesopotamian

temple and palace establishments, or for mortuary cults as in Egypt. Not only were such institutions a source of sustained demand, but the infrastructure, such as fuel, raw material and the day-to-day needs of metallurgists, could be provided. Hence the implications of metallurgy were fully realized only with the coming of states and/or cities, and not in the context of neolithic, cultivating or animal-herding, tribal society.

In western Asia copper was first used by tribal agriculturists around 7000 BC. Native copper (copper found in its metallic state) was beaten into ornaments in this first stage of technological development. Farming villages in northern Mesopotamia learnt to use native copper around 5000 BC. In the Ubaid culture in the south of Mesopotamia, casting (pouring molten metal into a mould) of artefacts was known. The smelting of copper ores (in which metallic copper exists in chemical combination with other minerals) requires brick kilns or even simple clay-line depressions in the ground, in which wood charcoal and the powdered ore are placed for some hours in temperatures around 700° C. (This applies to oxidic ores such as azurite and malachite, with beautiful colours, and rich in copper. Such ores are usually found in the upper profile of a copper deposit. Sulphidic ores that are reached at greater depths, however, require reduction. The ore is powdered and roasted so that sulphur is lost. In the smelting kiln, thereafter, the ore is smelted). For casting copper—it melts at 1084° C— a higher temperature is required, though for a short time, and the molten metal is quickly poured into a mould to set in the required shape. The ancient Egyptians are known to have used blow pipes and bellows to increase the oxygen supply in the kiln, and thereby raise the temperature. Alloying 9 to 17 per cent tin with copper effectively lowers the melting point of the metal. Bronze with, say, 10 per cent tin melts at 1000°C (and lead bronze at an even lower temperature). Another advantage is that tin bronze is a harder material than pure copper.

Complex casting, with the use of closed (two-part) mould and lost wax techniques, came into use in Early Dynastic Mesopotamia for temple statuary, for shaft-hole axes used as weapons, etc. Beaten copper helmets were worn by warriors. In Mesopotamia, arsenic alloying was more common in the earlier stages, but tin bronze came into more frequent use around 2500 BC. The range of tools and weapons of copper and bronze excavated at third-millennium sites in Sumer testify to mastery over metallurgy, but no early production centre has been excavated so far. Copper was acquired from the peninsula of Oman, and from several places in upland Anatolia and Iran.

Egypt acquired copper from the peninsula of Sinai (where turquoise, a blue stone containing copper and aluminium phosphate, was also available), and later also from the Eastern Desert, from Cyprus, etc. Unalloyed copper was in frequent use, and also some arsenic bronze. The regular use of tin bronze is evidenced after about 2000 BC.

In Egypt, the use of native copper and some smelting began after 3500 BC, the major artefact types being daggers and axes. In the Archaic period too, much copper production went towards weaponry, mainly spearheads and daggers. Saw marks have been detected on a stone bowl. Thereafter, we have evidence for a prolific range of copper tools for carpentry, stone work, leather industries, etc. Splayed and convex-shaped knives were used for cutting leather; adzes, chisels of varying shapes and sizes, saws, nails, and piercers for advanced

carpentry for the construction of boats; the carving of stone palettes and vases also required metal tools of appropriate size and accurate working edges.

In South Asia excavated material of the period preceding the cities of Mohenjo-daro and Harappa has produced very little metal. A few crucible fragments, and some pieces of rods and bangles, are the main finds. We see a marked increase in the variety of metal tool forms and techniques with the onset of the urban Harappan period. Hard and fine-grained ivory, one of the new materials in use, could not have been carved without fine and sharp metal chisels and drills. The perforation of long and slender carnelian beads also was done with the use of bronze drills. Blocks of steatite, for making seals and ornaments, would have been cut with saws. Faience carvings would have been finished off with a knife. Seal carvers' tool kits would have included small awls, drills, and burins (all pointed tools). Shell cutting was done with metal saws. There were, in addition, metal fishing hooks and razors for everyday use. Large vessels were beaten out of copper. Weighing-scale pans were made of metal, for accuracy. Metal weaponry included arrows, daggers, and sword blades; as elsewhere, there was weaponry both in bronze/copper and in stone.

Metallurgical techniques in use in the Harappan world included cold hammering, shallow casting, two-piece stone moulds, and occasionally (for the Dancing Girl, for instance), lost wax casting. There is also evidence for soldering, rivetting (piercing two pieces of metal and holding them together with another metal piece), etc. In the Harappan period, pure copper, lead alloys, and tin alloys were in use.

In China there is scarce evidence of a chalcolithic or copper-stone stage, but we can tell from the fine, thin grey ceramics that the technology of the reducing kiln had been mastered in the early Shang period and probably earlier. Pottery kilns were not simple bonfires, but two-tier clay structures with flues or air circulation devices, the fuel burning in the lower chamber and an upward draught being created. No potter's bonfire could give steady temperatures above 900°C as these kilns could.

The advent of metallurgy itself may have been far speedier in China than in western Asia. In the Erhlitou phase copper was alloyed with either tin or lead, and multiple-piece moulds were used for casting. A large proportion of metal output, as evidenced archaeologically, was vessels for the ancestor rites. Such bronze vessels often imitated the shapes of pottery. The Shang procured their copper from regions beyond their political boundaries: mines in mountains near the Yangtze and North Shensi, and tin from South Shensi province. There were several sources of copper and tin within a 100-km radius of An Yang. In the Chinese tradition as known from records of later periods, it was held that the founder of the Hsia dynasty commissioned the mining and casting of round four-legged bronze vessels, with 'all the myriad creatures' depicted on them. These were in time handed down to the Shang rulers, and then to the Western Chou. This tradition indicates that bronze casting, closely associated with royal sacrifice, symbolized power and legitimacy. The horse-drawn chariot was constructed of wood with presumably bronze tools, and had a bronze draught pole, tubular bushings for mounting the wheels, and harness.

The bronze ritual vessels of the Shang have been written about voluminously. There are dozens of complex shapes, for cooking, storing, serving food, for

washing and for water. At feasts, each aristocratic person was served his food in a set of dishes. Ornate figurative schemes on the vessels were possible because they were cast with the use of multiple-piece clay moulds that were carefully fitted together. The decorative schemes were appropriate to the ancestral feast in that they portrayed mythological elements such as the dragon, the symbol of water, the phoenix which embodied the wind, and so on. One of these vessels is inscribed, *"King Wen Ding is making a sacrifice to his Mother."*

Such vessels have been excavated in huge numbers. Once used, they were buried away, never to be melted and re-fashioned into utilitarian objects. True, tools made of bronze were in use in Shang China. Yet these have not been found in large numbers because they were the kind of objects that would have been melted down. Instead, it is stone or clay moulds for arrows, socketed axes, knives, leaf-shaped spearheads; also jingles used with chariots; and a few heavy rectangular axes (probably weapons) that have been found. This said, the seemingly wasteful use of bronze is only partly explained by the ample supplies

Illustration 1: Shang Wine Container (Bronze)
Source : J. Rawson

of tin and copper in China. More relevant to the scale of utilization was the needs of ritual vessels. In the tomb of a Shang queen were buried 217 of these sacrificial vessels, incorporating 21 different forms. There were 130 bronze weapons also, so that the total weight of the bronze in this single tomb was 1,625 kg. (In addition there were 590 jade objects and 7000 cowries.) The inscribed vessel mentioned above was 133 cm high and weighed 875 kg. (It may intrigue you, however, that jade is harder than ordinary steel, and therefore did not await the invention of bronze tools in order to come into use in China. Its use goes back to the neolithic cultures. In fact it was cut with stone (say, slate) knives and abrasives like quartz sand.)

In summary, we can state that the Bronze Age represents a true leap in technology as far as metal work, and therefore other crafts using metal tools, are concerned. Most important is a point realized best by Gordon Childe: these were produced for the urban elite rather than the populace. The frequent use of moulds points to mass production, at least where metal weaponry is concerned. The social context of such technological development was the emerging division of labour and specialization, and also demand from ruling elites and their productive establishments.

7.3 URBANISM

We have placed the flowering of bronze metallurgy in the context of the Bronze Age city. Let us explore urbanism now.

In general, the settings of our civilizations are the broad expanses of the valleys of great river systems, but due to the needs of irrigation from river floods (the Nile), or short canals/ditches (the Euphrates), or ground water (lift irrigation in South Asia and China), actually it was a series of enclaves in each valley that were populated. Urbanism is possible only when the land has a capacity to support a large number of people per unit area: for it entails the clustering of people in dense settlements, rather than an even dispersal across the landscape. Also necessary are technologies that make feasible the transport of bulky food grain to the non-farming populations of urban nodes. In Egypt the Nile was the main artery of communication for the narrow valley. The energy of winds and the river current were freely available. In Mesopotamia too, a great deal of transportation was handled along the Euphrates, and city temples employed large numbers of boatmen. The Indus, too, is a navigable river, but here as in Mesopotamia, we also have evidence for the use of wheeled vehicles. And there were pack animals too: the donkey in Egypt and Mesopotamia, oxen in India.

Yet there was nothing inevitable about the growth of cities. City life and clustering makes sense only when there are several persons engaged in diverse non-food producing occupations such as metallurgy, seal carving, administration, serving the temples, trade, etc. (Only such activities benefit from spatial clustering—agriculture does not.) In the Bronze Age, producers of non-subsistence goods were largely dependants of the rulers or temples. A non-labouring ruling elite ensured not only law and order, but the administrative structure on which the division of labour could be organized. The ruling elite demanded the labour of the populace, if not token tribute as well. An overarching administrative and regulatory structure such as this ran on systems of recording (writing) and calendar keeping. It was in this kind of society that the specialist seal cutter,

for instance, was assured of his supplies of stone and bronze tools, and his day-to-day needs such as pottery or grain.

Thus we find that the city was not just a more dense and larger settlement than the villages that supported it with food and fuel. It was also as a social entity, very different from the village community or the tribe. People were linked together not by the ties of kinship as in tribal society, not by custom, tradition and beliefs as co-residents of a village community, (To some extent, community ties would certainly have existed, but it would not be these that characterized urban society)but by interdependence and functional complementarity. The more specialization there was, the more the individual depended on suprahousehold organization mechanisms and less on face-to-face community ties. Instead of being a total of so many tribes and clans, the city was a population held together by regulation and co-ordination. This is why there is a logical connection between the coming of cities and the existence of states or societies ruled by elites. In short, rulers have a central role in this social transformation. This is why, too, writing often comes into being when cities and states emerge.

Of all our regions, Sumer was the most urbanized. Mesopotamian art and literature were essentially urban in their ethos. The great centres of public life, the temple and the palace, with their imposing architecture and immensely complex record keeping, were urban institutions. One of the most skilled of its crafts (perhaps a figurative art), was the carving of cylinder seals, intrinsically connected with life in cities. These seals were rolled on to freshly-written clay tablets or on to the clay sealings of packages or containers. Urban dealings were often impersonal and amongst individuals who were not related or personally known to one another, so that such impressions on messages, records, and commodity containers were essential.

Illustration 2: Mespotoamian Cylinder Seals

During an early phase temples were constructed on a tripartite plan, a long

central hall ending in the podium for the deity's statue flanked by an aisle on each side. Perhaps because of enlargement in the scope of its activities, the Mesopotamian temple later came to be built on the plan of a house, with a central courtyard open to the sky. And perhaps because a priesthood now interceded between worshippers and their gods, one did not now come face to face with the cult statue on entering the temple. There was, instead, indirect access through courtyards, antechambers, and a bent approach axis. Throughout, the temple retained its distinguishing architectural feature, buttressed and recessed outer walls. With few good woods and stones locally available, architects had to make the best use of mud bricks. Regularly spaced niches and projections gave brick temple facades a play of light and shadow, a device no secular structure ever had. Many city temples were actually quite small, prompting the inference that their multifarious activities were carried out elsewhere: for multifarious they were, judging by clay tablet archives attesting to the organization of subsistence production, bread making, weaving, archive keeping, and various craft workshops. Palaces, on the other hand, were truly imposing structures: huge, with protective perimeter walls, storerooms, and indirect and closely guarded access to the ruler's throne room.

We have said that there was nothing inevitable about the development of cities. There was nothing particularly gradual about it either, and this is clear from the settlement history of Mesopotamia. A huge city like Uruk came about, in the beginning of the Early Dynastic period, (The first Mesopotamian written tablets come from Uruk, at the same time as are evident cylinder seals and monumental temple architecture) more by the desertion of numerous small villages for Uruk, than by the local growth of its own population over the centuries. One reason for such population shifts could have been tensions between communities (mentioned in Unit 6) resulting in militarism and population nucleation behind protective city walls, under the rule of newly-emerged kings. For sure, people are more secure in walled and large settlements than in small villages dispersed over the landscape. This, then, is the background to the Mesopotamian "city state".

In the Mesopotamian literary tradition, Gilgamesh was a heroic king who built the city wall of Uruk. The Epic of Gilgamesh, which narrates his exploits and dwells on the inevitability of the death of even a great king like him, makes frequent references to the city wall, to "Uruk the enclosure", and to the brickwork of Uruk. In the opening portion the text states, *"Climb Uruk's wall and walk back and forth! Survey its foundations, examine the brickwork! Were its bricks not fired in an oven? Did the Seven Sages not lay its foundations?"*

The cities of Egypt, in total contrast to those of Mesopotamia, are largely inaccessible to the archaeologist's pick. The exceptionally narrow valley of the Nile has been continuously occupied and built on for thousands of years, so that many ancient cities (e.g. Abydos, the cult centre of the Old Kingdom) lie buried under modern towns. Rising subsoil water (as at Memphis, the first capital), the tendency for ancient towns to spread laterally along the valley, modern cultivation, and the location of a great number of cemeteries near habitations are other factors that have made urban archaeology difficult in Egypt. What little we know is that houses were rectangular, streets narrow, and the towns often divided into four quarters, each with its temple. More

important, however, is the evidence for the establishment of pyramid towns and later, temple towns. Pyramid construction required the recruitment of huge numbers of men, huge quantities of supplies for them, and supplies of tools, raw materials, and crafted items—and hence state-level organization. For each dead king or god installed in a temple, a cult endowment had to be set up, and some of these centres developed as the nuclei of urban centres.

As far as urban archaeology is concerned, Mohenjo-daro occupies pride of place. (Harappan cities as a rule were not occupied in later periods, so that extensive excavation was possible.) The walls of Mohenjo-daro still stand many feet high, because they were exceptionally well constructed. In spite of the absence of written testimony to rulers and dynasties, there were, at Dholavira, Kalibangan, and other Harappan towns, citadels where public buildings and elite residences were built, almost always on elevated ground. On the Mohenjo-daro citadel were located the Great Bath, the storage structure, a large residence with a fenestrated courtyard, and a hall so large that its roof was supported by brick pillars. On the Kalibangan citadel there were ritual structures and elite residential architecture. It is significant that many of the Harappan citadels had perimeter walls, indicating that the rulers required protection from the ruled who lived "downtown" (Students may take note of the opinion of some field archaeologists that some Harappan citadel walls were not for defence but to support constructions on slopes and elevated places)

Because of the scope for extensive excavation, many craft work loci have been found. We know that shell cutting, bead making, seal carving, metallurgy, pottery production and other crafts were, somewhat unexpectedly, located at settlements large and small, almost as if we must revise our definition of urban centres. But if we accept that Bronze-Age craft production and distribution of craft items were elite-organized, we can understand that some industries (especially weight-reducing ones) were located near the source of raw material and/or fuel, some where there was maximum consumption. Households in Mohenjo-daro depended on water from hundreds of wells dug in the city itself; well rooms were often situated near the doorways of multiple-room houses built around one or more courtyards. Most interesting is the fact that the objects and residues left behind in the houses show that activities—shell cutting, bead making, seal carving, etc.— varied from house to house, even in the same neighbourhood.

There is also the testimony that Harappan urban centres provide, in the form of the street drainage system, of civic infrastructures. Street drainage functions only as a planned whole; individual houses cannot organize it piecemeal; this system thus appears to have been the outcome of elite regulation and co-ordination.

As in Mesopotamia, here too, we find little continuity of settlement at individual sites between the formative and the urban periods. In other words, few Harappan cities have earlier habitation levels, and we had seen that important earlier settlements such as Rahman Dheri and Mehrgarh had no Harappan occupation.

The Shang cities were different yet. They were often rectangular, and surrounded by beaten earth walls; as in Mesopotamia, text references reveal that the walls were constructed by deploying mass labour. Housing was either in pits or in wooden structures built on top of beaten earth platforms. Some platforms at Chengchou were surrounded by rows and rows of post holes, which seems to

indicate elite residences. As for below-ground houses, these kept people warm in the intensely cold winters of northern China; also, they were easy to dig out from the soft loess and redeposited-loess soils of the north. Moreover, a minimum of wood was required for their construction: "pillars" of earth could be left standing in the centre of a pit, or where desired, to support a wood or thatch roof. Craft production areas were marked by dozens of conical pits with copper residues, crucible fragments, and pieces of casting moulds; by thousands of clay mould fragments in a small area; and by pits with sawed pieces of bone together with bone arrowheads and hairpins.

In the most extensively excavated area of Anyang, the late Shang capital, there were areas with pit houses of the populace with bone and stone tools, in their vicinity were pits used for storage of grain, metal weapons, stone sickles (and even inscribed oracle bones—a veritable archive!), and workshops. The rich queen's grave that we had mentioned, was found in the elite residential area comprising dozens of rammed earth platforms for wooden posts and wattle-and-daub walls. Some of these platforms were very long, say 85 m along one side, and besides actual housing, could have supported ancestral temples.

The connection between newly founded urban centres and political processes comes out not in settlement history, but in traditions of a later period which show that many Shang cities were deliberately built and peopled by kin groups six generations deep. The king would grant a kinsman or high ranking official the right to set out to a new area and build there, with the labour of his own clan or lineage, a town. Lands around the new settlement were cleared for agriculture. With this went a new name granted by the king for the town and its area, and ritual paraphernalia for its ancestor temples. Such a settlement functioned as a kin group and ritual unit, and also a politico-military unit owing loyalty to the king. Perhaps such new foundations were too small to be termed 'urban' in the strict sense. In the case of cities like Anyang, however, it needs to be said that the degree of technical proficiency evident in the ritual bronzes speaks not for hereditary smiths working from their family worskhops, nor for the labour of gangs of unskilled prisoners-of-war, but for what has been called "attached specialists", a highly-skilled workforce producing under the direction of the elite. Two metallurgical production loci here were extensive, and in one case there was a structure housing a foundry, with runnels in the floor.

The connection between Bronze-Age urbanization and the political development of states and emergence of ruling elites, is hopefully now clear. Also, urbanization is connected with the development of new crafts and craft skills, i.e. with specialization, and also with institutions that co-ordinated multiple production activities and infrastructure. This is why, since Gordon Childe, scholars have used the term "Urban Revolution" for this transformation.

7.4 THE ROLE OF TRADE

Did external trade contribute to the structure and particular characteristics of Bronze Age states and early civilizations?

We know that the use of copper, tin, lead and arsenic was integral to the Bronze Age social and economic transformation, and that these metals were not available in the alluvial valleys of the river systems we have described in Unit 6. We also know that the elites of the newly-formed states lacked full-fledged military

power and administrative organization (to be discussed in Unit 9). They assumed a sacral role, distinguishing themselves from the rest of the populace more by consumption levels (of metal work, exotic stone beads, shell carvings, etc.) and mysterious powers, than by special privileges over land, water sources, mines, or pastures. Thus there were imperatives to organize the imports of high status-cum-utilitarian things like cedar wood (to Egypt and Sumer from the Lebanon); the turquoise of Sinai to Egypt; jade from the Kunlun Mountains of Central Asia in the case of China; lapis lazuli from north-eastern Afghanistan in the case of Mesopotamia, South Asia and Egypt; or finely cut and polished carnelian beads, but also ivory, gold, lapis lazuli and wood from the Harappan region to Sumer; and cowries from the Pacific coast south of the Yangtze mouths in the case of China. These are only a few instances.

This brings us to the point that much of what we call "trade" was actually import-oriented missions organized by the state. It is significant that in both Mesopotamia and Egypt we have references to dragomans or official interpreters of foreign languages. The Pharaohs of Egypt would equip huge expeditions to go out to the eastern desert, to quarry, say, amethyst; the force would build barrack-like housing near the quarries and would be provisioned with food, fuel and clothing by the palace. After a sufficient quantity of the stone was quarried, the expedition would close and return to the valley. This was the pattern regarding the procurement of turquoise and copper from Sinai also. Cedar of the Lebanon is a prized building wood, as the tree grows high and the wood has a pleasing fragrance when burnt; the literary tradition records that some kings of Sumer organized cedar procurement by having bronze axes cast to equip a work force, and sending/leading it out to the distant and high Lebanon or Amanus range, to cut down the trees.

The ancient Egyptians—and not only the Pharaohs—spent much thought, organization and resources on their tombs, and those of some of the elite displayed long biographies. Near Aswan, the tomb of one Harkhuf, a high state official during Dynasty VI, carries a narrative about his three expeditions to Nubia, each lasting several months. Harkhuf interacted with the chiefs of the inhabitants of Nubia, and *"returned with 300 asses laden with incense, ebony, oil, leopard skins, elephant tusks, and boomerangs and all goodly products."* As he sailed down the Nile on the successful completion of a mission, he was met by another high official, *"with ships laden with date wine, cake, bread, and beer"*, presumably as a reward. Harkhuf also displays on the wall of his tomb the text of a letter he received from the Pharaoh's son, urging him to bring for him a dancing pygmy he had taken captive, and written about in a letter from Nubia to the Pharaoh. The prince urges Harkhuf to hurry and bring the pygmy to him, and in return he will grant such a wish of Harkhuf that all the people will know.

Instead of continuing with this description of trading patterns, fascinating as they are, we shall now address questions that arise. Scholars have not solved a number of the puzzles. For instance, we have stated above that there is a marked correlation between the period of state emergence and an expansion of trade, in Egypt, Sumer, and South Asia. We had referred to the movement of Upper Egyptian crafted palettes to Lower Egypt, increasing reliance on copper, and the links of Maadi at the Delta head with Sinai and southern Palestine. In western Asia there was not only the occurrence of Uruk-related pottery, seals,

temples and occasionally writing at sites on the upper Euphrates system and eastward on the plains of Iran; there was also an Elamite (south-western Iran) expansion eastward into the Iranian highlands, immediately following the Uruk period. Elamite written tablets and seals occurred at a few sites on the Iranian plateau and as far east as the Makran plain of Pakistan. In South Asia, land routes from Baluchistan that brought materials like lapis lazuli to the Indus region ceased to function; a Harappan village was established near the lapis mines in eastern Afghanistan; and now lapis, together with other materials mentioned above, went out to Mesopotamia by sea. Did these seemingly dramatic expansions and shifts of trade play a causal role in the emergence of kingship and the state? Did procurement of the relevant materials give emerging war leaders additional prestige and legitimacy? Or can we argue the other way, and suggest that such expansions are a symptom of early state formation and the search for metals and prestige materials?

Concerning the fallout, within an early state, of such engagement in trade and how local economies of the Indus or Nile were affected, a few observations can be made. We find that the Harappan requirements of fine wood from the Himalaya/Shivaliks prompted the establishment of villages at the navigation heads of the Chenab (near Akhnoor, Jammu) and the Sutlej rivers (at Ropar). Roof beams of deodar wood from the Shivaliks have been identified at Mohenjo-daro, for instance. Deodar could also have been used for carts, fine furniture, and ships, and for export to Mesopotamia. Thus it appears that the search for raw materials influenced the location of Harappan settlement. In the temple workshops of Sumer, large numbers of women were employed in spinning and weaving of wool, Mesopotamia's export (to Anatolia, to India) par excellence. Clearly, involvement in external trade heavily influenced the deployment of labour.

There are some interesting references in Sumerian literature/inscriptions to kings organizing the mass casting of weapons for military expeditions, and we can also surmise that the more successful a ruler/chief was in procuring copper and the alloying metals, the more militarily successful he would be.

It also appears that the procurement of metals and semi-precious stones from afar for the elite created a need for ever larger quantities of them, or, as elite positions were contested by others, ever more persons desired the same goods. Perhaps, therefore, the Bronze-Age economies had external expansion built into them. At the edge of Ur, a southern Sumerian city, lies a large graveyard with ordinary burials but a few immensely rich graves of the Early Dynastic period. It is reasonable to assume that these were the burials of men and women of the ruling class. They are buried with exquisitely crafted gold and silver vessels, symbolic weapons with gold handles or sheaths, masses of jewellery of gold, lapis, carnelian, etc., and artistically inlaid furniture. So too, we have seen the enormous quanitites of bronze that were buried with the elite at Anyang. Such funerary usage meant that costly and imported wealth went permanently out of circulation, and new supplies of metal and stone had to be acquired for succeeding generations.

As regards the regions abroad that provided the raw materials, we can ask if contact with the centres of civilization generated in them the need to acquire their own bronze weaponry to defend themselves, or created elites among them,

with whom the foreign rulers decided to deal. If so, these would have been impulses towards social change in the peripheries of civilization. We find Harappan jewellery cached in peripheral sites such as Kunal in Haryana and Burzahom near Srinagar. As all the Harappan material at these sites was found in one locus instead of being distributed amongst the various houses, we infer that these were gifts made by visiting Harappans to the local elders or chiefs. However, we see no subsequent development of these centres into settlements with more complex technological or economic levels.

As regards the world of Egypt, Byblos, on the coast of Lebanon, became a port whence Egypt procured cedar, and used as a station en route to Crete and the Aegean. Egyptian enterprise here dates from Dynasty II. Perhaps visiting Egyptians built a temple here as well. But Byblos did not remain just a source area; we know that Egypt had to bring to Byblos fine linen garments, and expensively carved stone cups. Most important, Egyptian literature and royal correspondence refer to the rulers of Byblos. In contrast, societies south of Byblos in the southern Levant, nearer Egypt, were not reached by Egyptian arts, writing or metallurgy, in spite of a modest level of trade.

At the mouth of the Gulf, the peninsula of Oman, which is immensely rich in copper, was visited by Mesopotamians and Harappans, but does not seem to have seen the development of cities, writing, its own trade network, or social stratification. In fact, the inhabitants of this richest of copper zones appear to have used tin bronze on a very limited scale in the third millennium. Archaeology has unearthed dozens of centres in Syria, Anatolia, Iran, and Central Asia, that were in contact with the river valley civilizations and have produced evidence for wealthy chiefs, fortified centres, and richly appointed graves. But we cannot ascribe the development of these to trade in any simplistic fashion.

7.5 SUMMARY

The Bronze Age definitely marks significant development in the use of technology so far as techniques using metal tools are concerned. Technological development led to the division of labour and specialization. Linked with technological progress was the emergence of city and the elites as a distinct social group. This had direct bearing on the political development of states. Lastly we have discussed in this Unit the role of trade in the emergence of early state formation.

7.6 EXERCISES

1. Discuss various techniques used to extract copper from Ore?
2. Give a brief account of the use of objects of copper and its alloys in activities other than wars.
3. Compare the urban plan of Egyptian and Harappan Cities.
4. Compare the urban plan of Mesopotamia and Shang cities.
5. Discuss the pattern of trade of Egyptian and Harappan civilizations.