CHAPTER TWO

MUSEUM: THE STOREHOUSE OF MILITARY HERITAGE

Section - I

India's Military heritage (ancient & medieval)

Organisation of Army:

Major Sensarma writes, "Organization is a system by which an orderly structure and working order is set to achieve an objective. Any fighting force is organized or built up as a cohesive, balanced, compact and intersupporting body. A chain of command is established to bind the elements of fighting forces into a synchronized machine." So, a proper regular organization is the life and soul of an army. The term regular means, a class of fighting persons dedicated to the service of the nation, i.e., the stout and warlike breed and disposition of the people.

Ancient Indian political thinkers conceived the army as a person with four limbs, Caturāṅga, or as in English, four arms. These arms are chariots, elephants, horsemen and foot-soldiers. Collectively these four arms are known as Caturāṅgabala or Caturāṅga-camū and this four-fold division of the army is a common feature throughout ancient literature on military studies. It is a point to note that ancient game of the chess also goes by the name of Caturāṅga. The chess
is a game of war played on a board having 8 x 8 squares. Both the parties in a game have a king, a minister, two elephants, two chariots, two horses and eight foot-soldiers. The methods of winning the game are the checkmate and the barring of the opposite party’s king. Dikshitar writes, “..... we meet with the term Caturanga, a four-fold force only in epic literature and not in the earlier Vedic literature. And it may be pointed out that the Vedic works are full of references to the game of chess. Therefore it is natural that the principles of chess supplied ideas to the progressive development of the modes and constituents of the army.” Chakravarti refers, “In the Vedic period the army appears to have consisted of two divisions, viz., foot-soldiers (patti) and car-warriors (rathin). During the post-vedic period, however, the horse and the elephant were incorporated in the fighting corps.” In Jātaka stories and in Hindu epic Mahābhārata we get many references of four-fold divisions of army. In Mahābhārata again occasionally army is referred to as six-fold, where to the said four arms, two more divisions are added and they are treasure (kośa) and machines (yantra). Again in chapter 121 of Sāntiparva eight-fold divisions of the army is mentioned. These divisions are the workmen, officers, spies and military guides in addition to the usual four divisions. Chakravarti too refers workmen, officers, spies, military guides, treasure and machines as limbs of army. But these limbs can’t be accepted as divisions of armed forces. If these are accepted as divisions of armed forces...
forces then we have to take into account priests, musicians and many others as limbs of army. Dikshitar also referred to "mantra or the force of counsel and kosa or the power of the treasury being added to the original four division" and for this he quoted from 'Kāmandakanitisāra' (Kāmandakanitisāra, Trivandrum Sanskrit Seires, 19.24). From the same book Dikshitar further quotes, "In another place an eight-fold division is mentioned. Besides the Caturmāga there is Visti or commissariat, and transport, navy or admirality, Cara or spies, and Deśika or elders and advisers." Here again, navy or admirality as a division of armed forces may be accepted but not others because they are all noncombatants. Many such noncombatants are mentioned in Kurukshetra war. "They included priests, trumpeteers and band parties, load carriers, traders, vendors, food-suppliers, doctors with medical outfit, veterinary doctors for the horses and elephants with their technical establishments, field workshop along with its personnel, cooks, water-carriers, bards, panegyrists, paid artists, dancing girls and prostitutes." Chakravarti further quotes from Kautilya, "the army was supposed to consist of six 'limbs' (sadarīga), these being the hereditary troops (maula), mercenaries (bhṛta), guild levies (sreni), soldiers supplied by feudatory chiefs or allies (suḥydbalam), troops captured or won over from the enemy (dvisadbalam) and forest tribes (aṭavībalam)." This classification is totally wrong because they all belong to the infantry division and presumably based on the area or
source of recruitment.

However on a close examination of the various constituents of the army we find a judicious distribution of work and responsibility causing no internal friction, and this is the greatest merit of the Indian army.

Available records in India do not furnish any reliable data regarding the strength of armed forces maintained by early Hindu states in India but still we find a system, a somehow methodical organisation of the ancient Hindus and so they deserve commendation.

In the Vedic period we get two-fold division of armed forces, i.e., foot-soldiers and charioteers but do not have any numerical strength or pattern of their organisation.

When we come to the epic period, in Mahābhārata we get a standard structure of the armed forces. Here the army is divided into Patti, Senāmakha, Gulma, Gaṇa, Vāhini, Pṛtanā, Camū, Anikīni and Aksauhīni. These divisions are roughly equivalent to our modern Section, Platoon, Company, Battalion, Brigade and so on.

Patti, the smallest unit of the army consists of one chariot, one elephant, three horses and three foot-soldiers as mentioned by Dikshitar. Dr. Oppert however, describes that a Patti consists of one chariot, one elephant, three horses and five men. Major Sensarma is of same opinion as Dr. Oppert. All of them agree that the Senāmakha, Gulma, Vāhini, Pṛtanā, Camū and Anikīni are respectively thrice as big as the corps preceding them and Aksauhīni, which represents
a complete army, is ten times bigger in numerical strength than Anikini.

According to Dikshitar an Aṣauhinī consists of 21870 chariots, 21870 elephants, 65610 horses and 109350 foot-soldiers and other two authors have also stated the same number; but it is curious how Dikshitar calculated the strength of foot-soldiers as 109350 taking three footmen in a Patti.

Dr. Oppert further quotes, "The Nītiprakāsikā after describing the original Patti, goes on to say that a chariot has a retinue of 10 elephants, 100 horses and 1000 men; an elephant one of 100 horses and 1000 men; a horse one of 1000 soldiers, and that a foot-soldier had ten followers."

"According to the second estimate one chariot alone demands an extraordinary number of supporters. And indeed the Nītiprakāsikā lays down that the various army corps should have the following constitutions:
Patti - 1 chariot, 10 elephants, 1000 horses and 100000 foot-soldiers.
Senāmukha - 3 chariots, 30 elephants, 3000 horses, 300000 foot-soldiers.
Gulma - 9 chariots, 90 elephants, 9000 horses and 900000 foot-soldiers.
Gaṇa - 27 chariots, 270 elephants, 27000 horses and 2700000 foot-soldiers.
Vāhini - 81 chariots, 810 elephants, 81000 horses and 8100000 foot-soldiers."
Pytana - 243 chariots, 2430 elephants, 24300 horses and 24300000 foot-soldiers.

Camu - 729 chariots, 7290 elephants, 729000 horses and 72900000 foot-soldiers.

Anikini - 2187 chariots, 21870 elephants, 2187000 horses and 218700000 foot-soldiers.

Akṣauhini - 21870 chariots, 218700 elephants, 21870000 horses and 2187000000 foot-soldiers.

This number seems to be incredible. However, for better understanding, the relevant ślokas from Viṣṇupadāṇi are quoted below (Viṣṇupadāṇi, VII, 6-11, 27-30)

"Nāgā Daśā Rathasyāsya Śatam Aśvāsahāsāhugāh
Sahasram Tu Narāḥ Praktāḥ Partivārā Nṛpaṁjayā ......... 6
Ekaśāikasya Nāgaśya Śatam Aśvāḥ Prayāyināḥ
Padatayāḥ Sahasram Tu Pratyāṅgeśvanyāyāṁināḥ ......... 7
Ekāśāikasya Caśāvasya Sahasram Tu Padatayāḥ
Daśā Caitāṇ Pratītin Yūntvā Kārttṛnena Gaṇanā Tvīyam .... 8
Eko Ratho Daśa Gaṇaḥ Sahasram Caṭra Vājināḥ
Lakṣaṅgaṅkhyā Narāḥ Patavem Agrepi Yojanā ......... 9
Pratyāṅgaṅstraṅgamah Mahāvair Kramat Akhyā Tathottaram
Anikinnī Dāsagunāṁ Ahurakaṁsaviṁ Budhaḥ ......... 10
Senāmukhe Tu Cūnitaḥ Trayasvaṁ Caiva Rathā Gaṇaḥ
Triśat Triśākapadaṭh Trisahasram Hi Vājināḥ; etc.... 11
Aksauhinyāṁ TvekaviṁCaśaḥsanăṁ Janadhipa
Tathā Caśtaśatam Caiva Saptatiṁ Rathagāṁ Vidyāh ......... 27
In the following lines Dr. Oppert refers to the proportion of different arms to each other as mentioned in Sūkraniti.

"A king should always maintain four times as many foot-soldiers as horses, for every five horses one bull, for every eight horses one camel, for every four camels one elephant, for every two elephants one chariot and for every chariot two big guns." The relevant śloka from Sūkraniti are quoted below:

"Caturguṇam hi pādiṇam aśvato dharayet sadā, Pencamuṁśánāstu vṛṣabhan astāṁśāṁsu kramelakān; Caturthāṁśen gajan uṣṭrāt, gajādhaṁśe rathānṭathā Rathāt tu dvīguṇaṁ rājā bhrannālikam eva ca."

(Śukraniti, Bk. VII. śkls. 20, 21)

Again in the Udyogaparva of the Mahābhārata it is mentioned that Seṇā as an unit consists of 500 chariots, 500 elephants, 1500 horses and 2500 foot-soldiers. Ten such Seṇās form a Pṛtanā and one Vāhini consists of ten Pṛtanās. In another place the numerical strength of a Patti is stated as 250 men. Three such Pattis form a Seṇāmukha and thrice the number of a Seṇāmukha constitute a Gulma. Three Gulmas form
a Gana. Naturally, it cannot be denied that there exists some confusion in the different descriptions given in the Mahabharata regarding various units of the army and probably the terms Sena, Gulma, Vahini etc., are loosely used to denote the same or similar units.

The following table as given by Major Sensarma shows the composition and total strength of each unit and at the same time the comparable/equivalent formation of the modern Army with approximate man power:

<table>
<thead>
<tr>
<th>Unit</th>
<th>Ratha</th>
<th>Gaja</th>
<th>Ashwa</th>
<th>Padatik</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patti</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>19 (Sec.10)</td>
</tr>
<tr>
<td>Senamukha</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>15</td>
<td>30 (Pltn.30)</td>
</tr>
<tr>
<td>Gulma</td>
<td>9</td>
<td>9</td>
<td>27</td>
<td>45</td>
<td>90 (Coy.120) appx.</td>
</tr>
<tr>
<td>Gana</td>
<td>27</td>
<td>27</td>
<td>81</td>
<td>135</td>
<td>270 (Bn.1000)</td>
</tr>
<tr>
<td>Vahini</td>
<td>81</td>
<td>81</td>
<td>243</td>
<td>405</td>
<td>810 (Brig.4000)</td>
</tr>
<tr>
<td>Pritana</td>
<td>243</td>
<td>243</td>
<td>729</td>
<td>1215</td>
<td>2430 (Dvn.20000)</td>
</tr>
<tr>
<td>Camu</td>
<td>729</td>
<td>729</td>
<td>2187</td>
<td>3645</td>
<td>7290 (Crops.60000)</td>
</tr>
<tr>
<td>Anikini</td>
<td>2187</td>
<td>2187</td>
<td>6561</td>
<td>10935</td>
<td>21870 (Army.180000)</td>
</tr>
<tr>
<td>Akshauhini</td>
<td>21370</td>
<td>21370</td>
<td>65610</td>
<td>109350</td>
<td>213700 (Group of Army)</td>
</tr>
</tbody>
</table>

During the time of Alexander's invasion some Indian States possessed the armed forces as shown below:
King/State/Race | Infantry | Cavalry | Elephant | Chariots
--- | --- | --- | --- | ---
Massage | 30000 | | | |
The Assakenoi | 30000 | 20000 | 30 | |
King Porus | 30000 | 4000 | 200 | 300 |
Agrammes, king of Gangaridae and Prasii | 200000 | 20000 | 2000 | 2000 |
The Malloi and the Oxydrakai | 90000 | 10000 | - | 900 |
The Abastanoi | 60000 | 6000 | - | 500 |
The Agalassoi | 10000 | 3000 | - | - |
The Ambari and Sigambari | 80000 | 60000 | - | - |

In 7th century A.D., king Harsabardhana possessed an army consisting of 50,000 infantry, 20,000 cavalry and 5,000 elephants. At the latter period of his reign (606-647 A.D.) the strength of his cavalry increased to 1,00,000 and that of elephants to 60,000.

As reported by Al 'Uthi, king Jaipāl, the Rājā of Bāthindā moved against Sūltān Māhmud in 1001 A.D., with an armed force consisting of 30,000 foot-soldiers, 12,000 horses and 300 elephants.

According to Fīrishtā, king Gandā (995-1025 A.D.) of Gandēllā territory possessed the army with total strength of 45,000 foot-soldiers, 36,000 horses and 640 elephants.

In the second battle of Taurān (1192 A.D.) Rāi Pithorā (Prthvirāja) had had under his command and control a large army,
of which the cavalry alone numbered 30,00,000, besides the countless mass of foot-soldiers.  

Again in 1443 A.D., it is noted that according to Firishta the Vijayanagar army consisted of 62,000 archers, 80,000 horsemen and 20,00,000 foot-soldiers.  

From the following table as given by Irvine we get the estimated number of Moghul army in different periods and the sources of his information:  

<table>
<thead>
<tr>
<th>Period</th>
<th>Cavalry</th>
<th>Infantry &amp; matchlock men</th>
<th>Artillery</th>
<th>Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akbar</td>
<td>12000</td>
<td>12000</td>
<td>1000</td>
<td>Blockman, 1, 246</td>
</tr>
<tr>
<td>Akbar</td>
<td>357757</td>
<td>3677557</td>
<td>-</td>
<td>Ain-i-Akbar.</td>
</tr>
<tr>
<td>Shâjahân</td>
<td>200000</td>
<td>40000</td>
<td>-</td>
<td>Bâdshâhnamâh, ii, 715, Ain, i, 244</td>
</tr>
<tr>
<td>Aurangzeb</td>
<td>240000</td>
<td>15000</td>
<td>-</td>
<td>Bernier.</td>
</tr>
<tr>
<td>Aurangzeb</td>
<td>300000</td>
<td>600000</td>
<td>-</td>
<td>Catrou.</td>
</tr>
</tbody>
</table>

It is peculiar to note that boats or ships are being used in fighting since the epoch of epic in Kautilya's Arthasastra too a special officer to look after the navy is mentioned and history also tells us that during Moghul and Mârâthâ rule navy has flourished greatly, still the numerical strength of Indian Navy in different periods is not available.  

In conclusion, the organisation pattern of armed forces in India can be summarised as follows:  

* These include all militia levies and zamindar's retainers throughout the provinces, besides the army proper.
(a) In the pre-Vedic period no record is available regarding any organised division of armed forces. Probably at that time people used to fight on foot.

(b) In the Vedic period we got two-fold division of army i.e., chariots and infantry.

(c) During epic age we find clear four-fold division, i.e., chariot, elephant, horses and foot-soldiers.

(d) Kautilya refers to about navy and commissariat as two more divisions besides chariot, elephants, horses, and infantry.

(e) Chariots have been rejected as an armed force by the states of the post-Kushan period and there is no evidence of its use or deployment by the Guptas. During the Gupta period, however we notice the introduction of mounted archers and a gradual increase in the ratio of cavalry in relation to other branches of armed forces but at the same time it must be noted that the cavalry never formed the core of Hindu army.

(f) During Moghul period and onwards we notice great changes in organisation and technique in the system of war in India. Matchlocks and big guns were introduced and artillery became an arm of military organisation.

So, there exists a system, a method or a plan of organisation in Indian army through ages and as human organism cannot work without a sound muscle so the state-organism cannot function without a soundly organised army.
Divisions of Army

Chariots - Originally man was a foot-soldier. When political state was formed from the state of nature, long marches were necessary for a foot-soldier, encumbered with arms and armour to meet his enemies for a close quarter encounter. This was a great disadvantage for a foot-soldier of being tired at the starting of the conflict. It became necessary to carry the soldiers without fatigue at the battlefield so that they could fight with fresh vigour and energy. Probably this was the main reason for using chariots in ancient warfare. Another reason for using chariots in war may be that a chariot-warrior could carry greater number of weapons with him than a foot-soldier could carry. At the same time he was partly protected by the chariot screen. Major Senarma referred to a chariot as 'the queen of the Kurukshetra.'

In India chariots are being used from very remote days. There are numerous references to war-chariots in the Rg Veda. Dikshitar has translated two hymns addressed to the war-chariot from Rg Veda and Atharva Veda respectively which are quoted below:

"Lord of the wood, be firm and strong in body: be bearing as a brave victorious hero. Show forth thy strength, compact with straps of leather and let thy ride win all spoils of battle." (Rg Veda VI.47.25)

"O forest tree stout-limbed verily mayst thou art fastened together with kine; be thou stout; let him who mounts thee conquer things conquerable."
"Forth from heaven, from earth (is its) force
brought up; forth from forest trees (is its) power brought
hither; to the force of the waters, brought forth hither by
the kine, to Indra's thunderbolt, the chariot, do thou
sacrifice with oblation."

"Indra's forces, the Marut's front, Mitra's embryo,
Varuna's naval do thou, enjoying this oblation, giving of
ours, O divine chariot, accept the oblations." (Atharva Veda:
VI.125)

Dikshitar further refers "The large number of
references to chariots in the Aitareya Brähmana would seem
to indicate that chariot was an important instrument of war
in these days. This inference is supported by the Taittirīya
Brähmana which mentions a class of people called rathakāras,
or chariot-makers; and this may be taken as proof that war-
chariots were in great demand."30

Chariots as an important and valuable arm of warfare
can be seen in the Hindu epics. Chakravarti writes, "The
car-warrior is the main strength of the epic army, the stay
and hope of contending hosts. So completely does he dominate
in the battle-scenes, so controlling is the role that he fills,
that the period represented by the epics may well be designated
as the veritable chariot age of the Indian history."31

Major Sensarma quoted from Date, "The oldest Indian
war-car is seen in the paintings of the reign of Thothmes III
(1495 B.C.). It is said to have been a present given by Indian
charioteers to that sovereign."32
Both Vedic and epic evidences however, prove that chariots were more or less a monopoly of warriors belonging to the noble classes. The rank and file fought on foot. . . . . . the epic car-warrior in India was followed by one or two 'wheel-guards' (cakra-rakṣau), attended by a retinue of foot-men. These 'wheel-guards' were often younger members of the noble classes, who were thus winning the name of the hero by useful service under some renowned knight. 33

In the Vedic period the chariot was usually a small-sized, two-wheeled vehicle. It was drawn by two horses, occasionally by three or even four. The body of the car appears to have been exceedingly light, consisting of wooden framework, fixed on an axle-tree (akṣa) and fastened by cowhide thongs. The framework consisted of a floor (garta) to stand on, and a guard of some sort round it. It was provided with a seat (vandhura) where the warrior could sit when wanted. The pole (isā, praūga) of the car was probably attached to the middle of the axle; and at the end of the pole was the yoke (yuga). 34

Normally there was, it seems, one pole on either side of which the horses were harnessed, a yoke (yuga) being laid across their neck; the pole was passed through the hole in the yoke (called kha or tārman), the yoke and the pole being then tied together. 35

The horses were tied by the neck (grivā) where the yoke was placed, and also at the shoulder, presumably by traces fastened to a bar of wood at right angle to the pole,
or fastened to the ends of the pole, if that is to be regarded as it probably should be, as of triangular shape, wide at the foot and coming to a point at the tip. The traces seem to be denoted by 'raśmi' and 'raśanā'. These words also denote the reins, which was fastened to the bit in the horse's mouth. The driver controlled the horses by the reins, and urged them on with a whip (kaśā). The girths of the horses were called 'kaṅṣyā'.

"The wheels, like the body of the chariot, were of wood. It is probably that originally solid wheels were used, but gradually these were replaced by those with spokes (ara). Besides the spokes, a wheel consisted of rim (Pavi), a felly (pradhi), and a nave (nabhya). The rim and the felly together constituted the tire (nemi)."

Chakravarti while describing the dimensions of a Vedic chariot quoted from the following passage in the Śulba Sūtra of Āpastamba (VI.75): "The masters of the cartwright profession say that the iva (the pole of the chariot, which lies in the middle lengthwise - this has been compared with the centre line, the prsthya or the back-bone of a vedi) measures 138 āṅgulis, perpendicular (tiryak) to which (iva) are aksa (hind part of the cart) equal to 164 āṅgulis and yuga (the fore part) equal to 86 āṅgulis; such is the chariot (constructed according to the rules of the guild). These are the measures of the car."

"Passing over to the epics, we notice two types of chariots being employed in contemporary warfare. The first of
these was a vehicle of small size, two-wheeled and two-horses, very much like its Vedic fore-runner. The second variety, however, was of comparatively larger and thicker build, occasionally resting on four wheels and generally drawn by four horses. Mr. C.V. Vaidya's assertion that the epic war-chariot was 'always a four-wheeled construction' (Epic India: Bombay 1907, p 257) is not justified by evidence. Epic testimony on the contrary, tends to show that inspite of the development of four-wheelers, the two-wheelers still continued to hold their ground. Thus in the Dronaparva (63,15), Kṛṣṇa's chariot is expressly said to have had 'two-wheels like the sun and the moon'. Elsewhere (ib.188,54), it is stated that a wheel came off a car, and then 'the horses dragged the car with one wheel only'. It is clear that the epic war-chariot was not always a four-wheeled construction. The bas-reliefs at Sānci prove beyond doubt that two-wheeled, small sized chariots were still in vogue as late as the first century B.C.39

In both the Hindu epics, the Rāmāyana and the Māhābhārata, we find occasional references to four-wheeled and also eight-wheeled chariots. There too, we find references to chariots drawn by four horses. In the opening scene of the battle in the Udyogaparva (ch. 153) we see that all the chariots were drawn by four horses and were equipped with various types of weapons and necessary war materials.

Further details about the construction of war-chariots
are given by Chakravarti in the following lines: "The epic war-car, like its Vedic fore-runner, appears to have been provided with a sort of 'guard' or fence-rim (varūtha) to prevent the warrior from falling down while in action. One verse in the Udyogaparva (ch.153) suggested that the fence-rim was made of tiger-skins and other stiff leather. .... it was provided with a pole (ratha-isa) which was fastened to the box of the car (kāṣṭha) and the double yoke (yuga) that crosses it, and rests in turn on the necks of the steeds. It was, moreover, embellished with standards and flags with the distinctive devices of each knight. Another noteworthy part of the car's furniture was the 'chattrā' (umbrella). Whether it served merely the purpose of a sun-screen or approached anything in the nature of a real protector can not, however, be ascertained. .... still another apparatus of the war-car was the anukāra (drag) which has been explained by the commentator as a piece of additional wood fastened beneath the car for the purpose of quickly repairing damages done in battle." Major Sensarma describes that "The chariots of Arjuna and Karna were soundless and they were covered with hides and skin for the purpose of protection." "The number of charioteers, however, depended on the number of horses. When two horses are sufficient, one Sārathī or charioteer is sufficient also. In the case of four horses, (two fastened to the pole, two by straps outside, not tandem: dhur and pārsni), we have one charioteer in the middle, who
guides pole-horses, and on each side of him the two drivers of the outer steeds, pārśpisārathi."

"The Vedic car-warrior usually stood on the left hand of the charioteer, on whose skill he so largely depended. In the epics, however, the charioteer is generally represented as standing in front of the chariot, and never in a line with the knight. It is probably that the floor of the chariot was a little elongated so as to consist of two parts, viz. the Upastha (the chariot lap), where the knight usually took his stand, and the Niḍa (the chariot nest), the little shelf in front where the charioteers stood. The use of such terms as vandhura and ativandhura suggests that the charioteer was provided with a seat (Vanaparva, 240.31; Dronaparva, 35.31). Whether the knight was similarly provided with a seat is not quite clear, although it is not impossible that he had one called 'Talapa' (Dronaparva, 191.38)."

"In addition to chariots drawn by horses there were others drawn by asses and bulls. The Rāmāyana tells us that Indrajit's chariot was drawn by mules. The Mahābhārata refers to a war car drawn by sixteen white bulls. The employment of asses and bulls may also be attributed to the lack of suitable horses."

Coming down to the age of Alexander we notice a great change in the Indian military system. Here though the chariots were still in use but not as an important arm. Unlike epic heroes, here we find that the king Porus came to the
battle-field not on a chariot but riding on an elephant. Megasthenes remarked: "In fact, no one invested with kingly power ever keeps on foot a military force without a very great number of elephants and foot and cavalry." Here the omission of war-chariots is noteworthy.

From the writings of the classical authors we come to know that the preliminary encounter, which king Porus had sent under the command of his son to oppose Alexander by the river side, the chariots 'proved to be of scarcely any service, for the storm or rain had made the ground slippery and unfit for horses to ride over, while the chariots kept sticking in the muddy sloughs formed by the rain, and proved almost immovable from their great weight'. Ignoring this difficulty the charioteers drove the car at highest speed into the battle field probably with the idea to use the momentum of the weight and speed of the horse and chariot as an offensive weapon. At first, Alexander's foot-soldiers were no doubt trampled down; but Porus's car-men 'were hurled from their seats, when the chariots in rushing into action, jolted over broken and slippery ground. The horses again took fright and precipitated the carriages not only into the sloughs and pools of water but even into the river itself.'

McCrindle observes that each chariot of king Porus "was drawn by four horses and carried six men, of whom two were shield-bearers, two archers posted on each of the sides of the chariot, and the other two charioteers as well as the
men-at-arms, for when the fighting was at close quarters, dropped the reins and hurled dart after dart against the enemy."\(^{47}\)

King Porus's disastrous experience was an eye-opener to the then military experts but still chariot as an arm of war was not immediately rejected. Kautilya's Arthasastra mentions about a special officer called Rathādhyakṣa (superintendent of chariots) and detailed rules regarding his duties. Here again we get references of six varieties of chariots of which three are used in war, viz., the Sāhārāmika (battle chariots), the Parapurābhīyānīka (chariots used in assaulting the enemy's strongholds) and the Vaigayika (training chariots). According to the Arthasastra the best chariot should be ten purūṣas in height and twelve purūṣas in width.\(^{48}\) (The actual measurement of Purūṣa is not clear, because we get two terms, — Purūṣa and Paurūṣa. Bk.I, Chp.20 refers 108 angulas = 1 paurūṣa, but the term Purūṣa is not mentioned.) Chakravarti quoted: "The best chariot should accommodate ten persons and in extreme cases twelve. After this there should be six more varieties of chariots with gradually decreasing weight and size till we come down to one which might contain four persons ordinarily, and six in exceptional cases."\(^{49}\)

Gradually, the use of chariots in war declined but scholars differ in determining the last days of chariots used in war in India. According to Major Sensarma, 'the chariots were used as late as Kharavela's Deccan Campaign (170 B.C. approx.)'\(^{50}\) Sarkar says, "that charioteers ceased to be a
branch of fighting forces soon after the beginning of the Christian era. 51 Chakravarti refers, "They (chariots) are not only mentioned in the Junägadh Inscription of Rüdradaman (151 or 152 A.D.) but occasionally, too, in the records of a much latter period." 52 In Hien Tsang's description of the then Indian army we find the mention of foot, horse, chariot and elephant soldiers but 'the nonemployment of chariots in the various campaigns of Harçavardhan as mentioned by Bäncaîa would suggest that the chariot lost its significance as offensive arm.' 53 The chariot is also not mentioned in the inscriptions describing Samudra Gupta (c350 A.D.) or Harçavardhana's (c625 A.D.) campaigns. "The Samnad copper-plate grant of Dantidurqa or Dantivarmana II (also called Khaägavolaka), dated A.D.753-4, Saka 675, tells us that this monarch 'overcome the countless army of Karâataka', with a force of chariots and horses which were not to be conquered." 54 Again, "in the Kuram Pallava grant about 650 A.D., which describes the battle of Peruvala Nallur, only elephants, horses and footmen are mentioned and not chariots. Further in the history of the Chola kings of South India, during the succeeding centuries mention is only made of the other three divisions of the army. The chariots, as instruments of war, are not mentioned — a clear indication that they must have become obsolete by that time." 55

Chakravarti is of opinion that, "The final disappearance of chariots from India's military system probably
came about in the eight century A.D. The doom of war-
chariots had already been signalled many centuries earlier
in the field on the Hydaspes. Ancient military thinkers
recognised that chariots needed a dry and plain soil for
their use, that they could not be employed in hilly tracts
or morasses, nor in the rainy season. Such restricted
employment must have reacted fatally upon their utility as
instrument of war. With growing complexities in the texture
of Indian political and military life, a premeditated selection
of soil and season became more difficult, and consequently war-
chariots fell more and more into disuse.56

As quoted by Sensarma, Majumder feels that, "The
cause of its disappearance from the military arena seems to
be its cumbrous nature, its unsuitability for employment in
every field and the growing usefulness of cavalry and mobile
horsemen realised from past experience."57

However, it may be concluded that chariots played
an important role in warfare from the earliest time down to
the end of the epics' epoch and probably the final dis-
appearance from India's army came about in the eighth century
A.D.

Elephantry:

The elephantry corps was the next important force
of war in ancient India. Elephants are commonly described
as wild, terrible beasts. Sensarma describes an elephant as
'a huge monstrous uncouth, four-footed pachyderm with long
proboscis and long curved ivory tusks,' and the Latin title of the elephant is 'angui-manus' means snake-handed animal.

Since early days in India the elephant is being used in peace as a vehicle and in war as a combatant. We get the earliest reference of the elephant in the Rg Veda probably under the designation of 'mrga varana'. Roth is of opinion that this compound name is a proof of the newness of the animal to the Vedic Indians. However, in any of the Vedas there is no reference to the use of elephants in war. Scholars like Chakravarti and Sensarma also hold the same opinion but Dikshitar mentions that 'There is a reference in the Rg Veda to two elephants bending their heads and rushing together against the enemy, which is a fairly early reference to the animal being used in war.' By the time of Yajurveda the art of training elephants was common and there we find the term 'hastipa' to denote an elephant-trainer.

In the post-Vedic period during the epoch of epics the elephants are represented as an important part of armed forces in military operations.

Elephants described in Kurukshetra war were well protected with various types of armour (kabacas) and normally an elephant used to carry six men along with a driver called 'ankusadhara' for carrying an 'ankus' or hook to guide the animal. Generally they were used to make the central column of the advancing army. Major Sensarma refers that "at Kurukshetra war the role of elephant was to haul the enemy,
to chase the fleeing enemy and to establish victory. Further, it provided with a lofty but quickly movable seat to the king or the Senāpati. From that high position the king or the Senāpati could have very good observation and at the same time he could be seen by all his soldiers and men, who used to draw considerable inspiration from the personal presence of the king or the Senāpati."

In the post epic era, the importance of elephants in military activities in India went on mounting higher and higher and thus challenged the superiority of the chariots. During the time of Macedonian invasion elephantry became the most important arm. King Porus was confident about his elephantry in his historic battle against Alexander. He hoped that the elephants would terrify Alexander’s army and thereby the Macedonian cavalry would become unmanageable. Plutarch writes about king Porus’s elephant in his battle with Alexander in the following lines: “His elephant waxing furious though not yet wounded, kept changing the ranks of the enemy until the driver, perceiving the king’s condition, turned the beast round and fled ...... The Indian driver thinking the king wished to alight, made the elephant kneel down in the usual manner ....... Alexander, supposing that he was dead, ordered his body to be stripped ...... when the elephant turned upon them in defence of his master and lifting him up placed him once more on its back.”

The history of the battle of the Hydaspes proves the
superiority of the elephantry over other divisions of the army. Alexander himself said in course of his instructions to his followers: "It is the elephant only which makes it impossible for the horses to land on the other bank." 63

In the latter period it is noted that Kautšilya has written several chapters on elephantry. He mentions about a special officer for the care of elephants and narrates in detail about his duties and other particulars attached to this office. This surely proves the importance of elephantry as an arm in this period. He has provided a list of works to be done by elephantry which are enumerated below: (1) to lead own army, (2) to help in making roads etc., (3) to disperse enemy soldiers, (4) to measure depth of rivers by actual going down and swimming into the streams, (5) to move up and down the hilly places facing the enemies, (6) to go through the uneven lands covered with shrubs, (7) to put fire in enemy camp and to extinguish fire in own camp, (8) to consolidate own troops, (9) to defend own troops, (10) to protect his master at the time of danger, (11) to save own troops from the clutches of the enemy, (12) to frighten enemy soldiers, (13) to demolish the walls, forts and camps of the enemy, (14) to disrupt the organised formations of the enemy, (15) to trample the enemy and (16) to establish victory. 64

Again Kautšilya is of opinion that some battle formations may be made only with the elephants and that formation is called 'śuddha' or unmixed. However in a mixed
formation elephants must be placed on the extremities of the front wings. Elephants may also be deployed against all kinds of enemies and in all kinds of battles.65

According to the nature of works done, the elephants are classified under four heads — Dāmya (that can be controlled by training), Sānakhya (those fit for war), Oupabahya (those which carry passengers) and Byāla (obstinate and criminal by nature) and the measurement of the best type of elephant is: length—nine cubit, height—seven cubit and the circumference at the belly—ten cubit at the age of forty years. He also mentions seven ways of training elephants for war: (1) Upasthāna — rising and jumping over fences and other eminences, (2) Saṁvartana — lying, sitting and jumping over pits, (3) Sāmyāna — marching in straight, curved circular and cow's urine (gomutfrakar) like arrays, (4) Badhābadha — trampling with trunk, tusk and body the horses, foot-soldiers and chariots of the enemies and not to do any harm to own troops and chariots, (5) Hastiyuddhva — pitting elephants against one another, (6) Nāgarāyana — demolishing forts and buildings and (7) Sāmārāmika — deployment in open warfare.

The elephants are caparisoned with various armour, ornaments, bells and special flags known as 'Vaijayantis'.66

Hṛṣācarita and Mānasollāsa also give detailed descriptions of the methods to train elephants in military manoeuvres followed during the period 7th to 9th century A.D.67
Sen Sarna referred, "Sultan Mahmud also carried off from India (11th century A.D.) a large number of trained elephants and used them in his war against the Turks in Transoxiana." "Taimur's armoured Turkish cavalry, which caused panic and terror wherever it went, also had been seized with terror of the ferocity and power of the Indian war-elephants (14th century A.D.)." "In the battle of Haldighat (1576 A.D.), the deadlock created by the contending armies of the Moghul Emperor and the Rajput Rana Pratap Singh could be cleared by elephants only. The Moghul army could establish victory by killing the driver of Pratap's rank-breaking elephant Ram Prasad." 68

Again in 1784 A.D. in the battle at Shakar Khera between Mubāriz Khān, the governor of Golkundā Subāh and Nizām-ul-Mulk, "Mubāriz maintained the Indian tradition of using elephants against the enemy. Initially he got success also, but the elephantry ultimately could not stand the attack of Nizām's artillery." 69

There are references to elephantry being used in still latter periods. As for example, mention may be made that, "Sarfaraz Khān used elephant against Alivari at the battle of Sheriā (1740 A.D.). ..... In 1756 A.D., Shaukat Jung, the Nawāb of Purneā, fought at Manihārī from elephant." 70

Thus we notice that the Greeks in the 4th century B.C. and the invaders of Medieval ages were equally amazed by the astonishing feats of Indian elephants; but only during the British regime Indian Army lost its elephantry as an arm of war.
The third arm of the army is the cavalry. It is practically unknown to us when cavalry in the true sense of the term was first used in Indian warfare. Vedic Indians knew about horse-riding but there is no record of the use of cavalry in battles of that period, though we have references to horses and war-chariots drawn by horses in the days of the Rg Veda. In the post-Vedic period we get cavalry as a force in Indian army.

In the epoch of the Hindu epics cavalry is recognised as a separate arm but at that time it is not properly organised and is of no real value. In Kurukshetra war we find Dronāchāryya on horse's back to supervise the battle formation of 'Cakrāśakaṭa Vyūha' but after the supervision he rode his chariot to fight. The tactical use of the cavalry was to protect the flanks by taking position at the front wings, to break through the obstacles, to chase the retreating enemy and to make speedy communication with the different parts of the army unobserved. In brief, the cavalry was indispensible in a situation where quick decision and movement were required.

During the period of Alexander's invasion we come to know about efficient and skilful Indian cavalry. In the battle of the Hydaspes, the Indian cavalry in service of king Porus had done wonderful fight but Macedonian horse-men being more skilled and disciplined finally drove them back.
Though Indian cavalry could not withstand the cavalry attack of Alexander still we must accept that Indian cavalry was surely an improvement upon their epic fore-runners.

Gradual development of the cavalry as an efficient arm is attested by the various functions assigned to them by Kauṭilya in Arthaśāstra.

Military duties of horses are as follows: (1) to advance to contact the enemy (abhisaraṇa), (2) circling round the enemies while charging them (parisaraṇa), (3) to advance like a needle piercing the enemy at its centre (atisaraṇa), (4) to come out of enemy’s formation like a needle (apasaraṇa), (5) to uproot the enemy by employing many horses at a time and then to consolidate them (unnathyaśabdhān), (6) encircle the enemy by approaching from two sides (balaya), (7) to encircle the enemy by a crooked movement (gomutrākār), (8) to encircle the enemy after piercing its formation from one side (mandala), (9) to employ the horses in all types of horse movements (prakīrti), (10) to pierce the enemy after pushing it to some distance (byābṛttapristha), (11) to protect the rear of its own army while returning from the enemy’s area (amabhāsa) and (12) to chase a defeated enemy. Kauṭilya is also of opinion that a battle-formation can be made with horses alone.

In the later centuries, during the Gupta and post-Gupta periods Indian cavalry could not do any good result but we find a steady improvement in Indian cavalry. Sensarma
writes, "It appears that horse archery developed in India in the Gupta period (320-350 A.D.). In this period more and more reliance came to be placed on heavy-armed horse-men."  

It is noteworthy that on certain types of their (Gupta) coins, the Gupta emperors are depicted as full dressed cavalries. Whether the Guptas issued these coins merely in slavish imitation of the Indo-Bactrian and Indo-Parthian rulers, or were imbued with the idea of making the cavalry the most honourable form of service, is more than we can say.  

History tells us that in 991 A.D., the army of Sabuktigin that invaded India were mounted archers and spearmen. Again in 12th century A.D., due to the valour of the Rajput horsemen the first invasion of Shihābuddin Ghori was totally foiled. Further, we find in the 17th century A.D., Shivaji’s army consisted mostly of horsemen.  

However, it must be noted that in India cavalry never occupied the front rank in ancient Indian army organisation. As in the 4th century B.C., so in the 12th century A.D., the superiority of foreign horsemen always decided the fate of India.  

The lack of good horses within India compelled the powerful kings to have their supply of good horses from foreign countries like Vanāyu, Āratta, Kāmboja, Bharadvāja, Śindh and Persia as mentioned in Bēna’s Harṣacarita. Want of good horses of indigenous breed is the prime cause that hinders the development of a powerful cavalry force in India.
Chakravarti writes that, "........ the art of mounted archery did not strike deep roots in the Indian soil. Introduced by the Parthians and continuing for a time as a sickly exotic it withered away shortly after the Gupta period."75

Again, the lack of mounted archery is another fatal drag in the military history of ancient India. From numerous figural representations of cavalry in Indian relief carvings the Indian preference for mounted dartmen or lancer to mounted archery may easily be evinced.

The conclusion is drawn with the words of Sensarma, that, "with the advent of tanks, however, the horses lost their importance and gradually they have been replaced by the war-tanks and other mechanized transport."76

Infantry:

The next important arm of an army is the infantry or the foot-soldiers. They are the original fighting men in India since Vedic age. 'In the Atharva Veda (vii, 62.1) Agni is referred to as conquering the most powerful opponents, as a combatant on a chariot overcomes men fighting on foot.'77 This statement proves that the foot-soldiers are poor helpless mass in the Vedic period when pitted against charioteers.

Chakravarti holds 'the same view that the relative inferiority of the foot-men has been more graphically depicted in the epics. In the war-scenes of the Mahābhārata, for instance, they are described as a conglomerate mass, with
hardly any individuality or initiative. Their role is either protective or supportive in nature. They are deployed to protect the flanks and rear of a particular hero on chariot or elephant. They are the worst sufferer but contribute little to the battles.

Sensarma observes that "Bhisma, however, realised the importance of foot-soldiers. He told that the army which had high proportion of well trained foot-soldiers was the stronger army. In his opinion the foot-soldiers could be deployed in all terrain at all seasons. He told Yudishtira that with handful number of well trained, well disciplined foot-soldiers wonders could be achieved." Sensarma further says, "It should not be overlooked that the high explosives
or incendiaries always take greater toll of foot-soldiers; and even to-day the foot-soldiers however skilled or trained they be, suffer the greatest casualties."  

Kautilya too attaches less importance to the foot-soldiers. He says that the foot-soldiers' proper works are to carry weapons to all places and at all times and to practise military training.  

The Nītīprakāśikā, a medieval work does also provide us with a similar enumeration of the jobs to be performed by the infantry. Here we find that the proper task of the foot-soldiers is to protect the granaries, arsenals, treasuries and to make entrenchment for the army.  

Thus it may be said that in ancient India, probably there was no clear-cut line of demarcation between the infantry as foot-soldiers and the camp-followers. Smith rightly observed that during the reign of emperor Akbar poters, dak-runners, gladiators, wrestlers, palki-bearers and water-carriers, were all classed as infantry. Bernier too observes that the total strength of the Moghul infantry during the rule of Aurangzeb includes servants, sutlers, tradesmen and all individuals belonging to the markets, who followed the troops on march.  

From the above discussions it may be concluded that in ancient and medieval India, infantry was a mere residual force but the fact is otherwise. Most of the ancient authors suggested and emphasised about the nature of ground where
infantry could be deployed with greatest advantages. In Mahābhārata, Bhiṣma stated that the regions full of inaccessible spots overgrown with trees and cane bushes are the most suitable for the foot-soldiers. Similarly, Kautilya is of opinion that the best ground for an infantry to fight is that where big stones and boulders exist or the place thickly planted with trees dry or alive.

Moreover, in the defence of forts and strongholds, where chariots, elephants and horses fail, it is the infantry who can be specially entrusted upon, because the foot-soldiers are most suitable to offer resistance and fight with the enemies at that time standing unobserved on the walls, in the towers, behind the parapets and shooting missiles and other deadly weapons.

"Now it has been fully recognised that whatever may be the technological development and sophistication of the weapons the effectiveness of the infantry will remain unquestionable; and the last phase of battle or war still have to be fought by the foot-soldiers with their Close-Quarter-Battle (CQD) weapons."

Admiralty:

The admiralty as a division of armed forces is the creation of Candragupta Maurya but evidences are there to prove that the people of India knew the use of ships and boats since Vedic Age, though at that time their deployment in warfare was only on a scale that might appear insignificant to-day.
More about this has been treated in a separate chapter on 'Indian Navy'.

Weapons.

Weapons as gathered from different text:

The history of weapons is the history of gradual development of human civilization. Weapons are pre-requisite for war and conquest and so a basis of history and the main factor responsible for process of material culture and political changes. They are the symbol of authority, token of command, a tangible sign of force, strength and domination and lastly the best companion of the heroes.

The importance of weapons to a soldier or in war needs no further elaboration, but even before the emergence of organised troops man invented weapons for his personal defence against the attack of wild animals as also of unknown tribes. The weapons invented by the primitive men were crude and much less lethal, but with the progress of human civilization increasingly lethal weapons capable of operating in longer distances have continuously been invented. Thus it may probably be said that the weapons also serve as indicators of technological progress of man and every new scientific discovery has helped in production of more effective, i.e., more dangerous weapons.

In India, people had to pass through the usual stages of individual, tribal, territorial and national feuds and fights, and with every step of progress newer weapons were
developed. Thus we come across a huge list of weapons of various descriptions and capabilities during the period starting from ancient days to modern times. For the convenience of study the weapons have been discussed according to the periods such as: Pre-historic, Ancient, Medieval and Modern.

Indian subcontinent is very rich in archaeological sites and like any other country of the world India also passed through the Stone Age. This Stone Age in India can be divided into three stages — early, middle and late — according to the nature of stone implements unearthed by archaeologists with close co-operation of the anthropologists.

Mostly, all early Stone Age implements are made out of quartzite, though implements made of volcanic rocks, and various kinds of crypto-crystalline silica are also found. 90

The main types of implements of this period are as follows:

(i) **Hand-axes**: These implements are either pear shaped or triangular or heart-shaped or oval or elongated or lance shaped. They are mainly used for digging purposes.

(ii) **Cleavers**: They are used for cutting purposes and of different shaped such as (a) having straight wide edge with pointed butt end, (b) having square or 'U' shaped butt end, (c) having broad or narrow butt and sides spread out, and (d) having parallelogramatic section.

(iii) **Choppers**: These are massive, unifacial stone tool having hemispherical base and one pointed end.
(iv) Scrapers: They are like choppers but smaller in size with an unworked side to be used as butt.

In the middle Stone Age, the materials used for preparing implements are mainly the different types of crypto-
cry ataline silica having a smooth and more regular concoidal fracture than the quartzites of early Stone Age.91

The different types of implements of this period are as follows:

(i) Scrapers: The different types of scrapers found are side-scraper, round-scraper, convex-scraper, concave-
scraper and end-scraper. They were used to scrap animal-skins, bamboo-shafts or barks of trees.

(ii) Borer-cum-scrapers: These are used for boring as well as for scraping while their upper portion used for holding.

(iii) Awl: This implement possessed a stout, projecting pointed structure with careful retouches so that it could be used for boring.

(iv) Points: These are again of various types such as, (a) points possessing mid-rib, (b) points with one tang, (c) oval shaped points, and (d) bifacial points, and (e) triangular points. Of these points again those which are thin and smaller in size are used as arrow-heads while the larger ones serve the purpose of spear or javelin heads.

(v) Burin: It is a short chisel like thing having a sharp cutting end.
The Microliths are the main implements of the late Stone Age. These are implements of tiny stone pieces made by retouch or secondary working and are hafted in wooden or bone handles. Their main types are: single straight edged, double straight edged, straight but one end pointed, crescent shaped, triangular shaped, obliquely blunt, trapezoid shaped and hollow based.92

The implements so far mentioned are mostly coarse and uneven as because they are prepared by flaking and chipping techniques but when we pass through the New Stone Age, these implements we see are all grinded and polished.

The main types of implements of this period are celts, chisels, hammerstone, ring-stone, spear-head type hand-axes, tanged scrapers etc.93

Next we come to the age of Indus Valley culture. To be precise this Harappan Culture flourished between the time period of 3rd millennium B.C., and the first half of the second millennium B.C. "...... the military element does not loom large amongst the extent remains but it must be remembered that at present we know almost nothing of the earliest phase of the civilization" as remarked by Mortimer Wheeler.94

A careful study of the different weapons unearthed from the Indus cities is really a matter of great interest to all and they are enumerated below:

Swords: Though Marshall believes that there are no swords in the Harappan culture95 but Mackey for the first
time finds swords in 1930-31. These swords are double edged and relatively heavy to their size. The figure 3 in plate No. CXIII of Mackay’s book ‘Further Excavations at Mohenjo-daro’ represents a long, narrow copper sword measuring 15.75 inches in length and maximum thickness of about 0.4 inches. Moreover it possesses two rivet holes at the junction of the tang and the blade. Similarly, figure 9 in Plate CXIX of the same book shows another sword like weapon whose length is 18.5 inches and the thickness at the junction of the blade and the tang is 0.48 inches. A median rib runs down the blade on its both sides.96

Arrow-heads: Regarding arrow-heads of this cultural site Mackay observes, "Their number in this area is perhaps accounted for the poverty of many of the houses of the Late Period. One would not expect bows and arrows to have been used by the wealthier residents of Mohenjo-daro nor are arrow-heads often found in the larger houses."97 This observation is not convincing. We find the use of bow and arrow since the prehistoric days in India. These arrow-heads are mostly made of copper with long fine barbs but no tang. Their average length, breadth and thickness are 1.19, 0.64 and 0.07 inches respectively. Not a single bow is found in this area. Probably the bows were made of such perishable materials like bamboo, wood etc., which have not survived the ravages of long time.

Knives: The knives found in the Indus cities have
been described by Mackay are as follows: knives with broad leaf-shaped blades, knives with leaf-shaped blades having curved apex, straight narrow knives, triangular knives whose blades gradually taper towards the edge, broad curved edged knives, narrow curved edged knives, double-curved edged knives and hollow-backed knife that possesses a stout concave back, wherefrom it gradually tapers down towards the convex edge.98

Daggers: The daggers of this period as described by Mackay are as follows: (a) The 'knife-cum-dagger' is an elongated weapon with double edged blade serving both the purpose of cutting like a knife and thrusting like a dagger. (b) The 'narrow double edged daggers' with their concave sides are probably used for thrusting. (c) The 'shouldered daggers' were of common use of this age and these are mostly made of copper. (d) The 'daggers with mid-rib' possess bronze blades with prominent medial ribs.99

Spear-heads: Spear-heads of both copper and bronze and of varied measurement have been unearthed at the Indus city area. Figure 9 in Plate CXVII of Mackay's above mentioned book shows a very short spear head which looks like a knife blade. In the same Plate figure No. 11 is a 9.1 inches long copper spear head. Its blade is thin and well preserved and the tang is edged for inserting into a wooden shaft.100

Axes: The pre-historic axes are either long narrow or short broad shaped. The first variety is also used as adzes. Its butt end is straight or slightly circular where as
the working end is crescent shaped and in cross-section it is double convex. The sides are more or less parallel and the stoutest part is the central region. The edges of the other variety are very much splayed.\textsuperscript{101}

Mace-head: Pant reports of mace-heads made of sandstone, cherty limestone, alabaster and green coloured stone. They are normally lentoid shaped but circular and pear shaped mace-heads are not uncommon. The mace-heads got perforations of hour-glass form, bored from both ends and probably fastened to a handle with leather strap.\textsuperscript{102}

Wheeler mentions about various shape and size of clay pellets found in Indus cities. Their find spots suggest them to be weapons of offences but their mode of use is not clear to us. They might be thrown by hand or with the help of a sling. These clay pellets are either round or ovoid having the length of two and a half inches and the diameter of about one inch. Compressed and baked lump clay materials of about 6 to 12 ounces weight are also found.\textsuperscript{103}

The Copper Hoard: The 'Copper Hoard' weapons were first discovered in 1822 A.D. Vincent Smith, in 1905 A.D., first made a thorough survey of these weapons. Latter on Hirānanda Sāstri, Campbell and S.C. Roy also discovered some more weapons of this type from Hardoi, Bihar, Bulandshahar and Hyderabad. The archaeologists are confused about their period of occurrence. Some are of opinion that the Vedic Aryans have produced these weapons but Prof. Piggot associated
these weapons with Harappān refugees. He opined that, "It would be tempting to associate this movement with something more than trade, and to see in it the colonization of Ganges basin by refugees and displaced persons from Punjāb and the Indus Valley during the time of break up of the Harappān empire and the coming of the raiders from the West. The deposition of hoards itself suggests a time of insecurity and economic instability, and may mean that invasion gathered momentum and pressed on beyond the old frontiers of the Harappān kingdom and down into the Ganges Valley."  

However, these weapons have not been found in regular excavations and on the basis of circumstantial evidence these are assigned to post-Harappān period, i.e., 2nd millennium B.C.

The main types of weapons of this period are as follows:

**Flat Celt:** These weapons are plain and smooth having no hole or tang but upper edge evenly curved. Their average length is 7 inches, width 5 inches, thickness 1/4 of an inch and weight about 4 lbs.

**Bar Celts:** These are parallel sided bars. Their length varies from 1 foot 6 inches to 2 feet and the width ranges from 4 to 6 inches. Their upper side is convex but bottom is flat. According to B.B.Lal these copper bar-celts developed from their proto-types in stone in course of time when metal began to replace stone.
Shoulder Celts: These are like flat celts but very much curved and their outside edges are almost crescent shaped. They look like a clear shoulder where the blades meet the sides.

Harpoons: These are long barbed arrow-shaped objects having strong midrib and tapering blades. The middle portion contains finely curved barbs and at the point of junction of the barbed portion and the tang there is an opening to pass a cord for tying it with the shaft. Lal's observation on some harpoons from Sarthauli shows that the barbs were possibly cut out from the blade by chiselling and trimmed up with a file, though of course, they might have been cast as barbs and sharpened by filing.\textsuperscript{106}

Antennae Swords: These are long, tapering rapiers with a prominent mid-rib. The hilt is bifurcated like the antennae of an insect and so it is known as Antennae Sword. These swords have been discovered from the Gangetic basin and Hyderabad. The main peculiarity is that the hilt and the blade are of one cast. The National Museum, New Delhi has got a few specimens of this sword from Gujrat. Lal pointed out that these copper swords should not be confused with similar other implements discovered in North-Western India. So he writes, "while the socketed axe, adze-axe, trunion celt and Fort Munro sword etc., with their demonstrable West Asiatic affinities, are likely to have been associated with the upheaval and movement of people, that followed the break up
of the Harappan culture, the Copper Hoards on the contrary, seem to point to a culture which was mainly confined to the Gangetic basin with a possible southward extension across Vindhyas and Kaimur ranges.  

**Spear-heads**: Gordon mentions that the broad bladed specimens found at Fatehgarh, the 'Elliot Sword' and the blades found at Miorai, Etawah are all spear-heads though their size ranges between 20 to 28 inches in length. He describes, "These weapons have a projection curving outward from the tang and the same contrivance is found on three out of five spear-heads at Sarthauli. The 'Elliot Sword' has all the appearance of a sword but the three examples from Sarthauli with similarly finished tangs are barb headed and must be intended for spears."

**Dirk**: Pant mentioned about a hoard of thirteen swords and dirks found at Fatehgarh. Again at Kanpur in the district of Bulandshahar he found a copper dirk, 18 inches long with a mid-rib along with two other axes. He did not describe the weapon. Probably, it is a kind of dagger shaped weapon.

**Socketed Celt**: Pant writes, "In 1921 a socketed celt, the only one of its kind so far known, has been unearthed from the site of Rājā Karna Kā Kilā, near Kurukshetra, Maryānā. This is of copper or low-grade bronze."

**Axes**: From Ranchi, Bihār some copper axes have been unearthed. Most of these axes are simple and flat. Pant
refers about a hoard at Gungeria having 424 axes together with bar-celts. Gordon writes, "Even axes with practically parallel sides having unsplayed edges, ranging from almost straight to semi-circular, and others with sides tapering towards the butt and widely splayed edges appear in both areas."

Multi-purpose weapon: Pant mentioned about the 'anthropomorphic' figures of copper found at Baisculi, Fatehgarh and Seorajpur which have been suggested by Lal as used for religious or utilitarian purpose. "The curved 'arms' are sharp which was deliberate and not mere accident as suggested by Lal, and could be used for cutting purpose. The comparatively long and blunt 'legs' might have served as a grip. Since these are very heavy, some as heavy as ten pounds or even more, and they might have proved deadly when hurled at close quarters. The intentionally blunted head, hammered into a flanged ridge was most suitable for breaking the skull of the animals and enemies."

The weapons belonging to 'Copper Hoards' are very much uncommon and when compared with the stone age implements or late Harappān culture their comparison is superficial and rarely convincing. So these weapons are grouped separately as a mark of advancement in the military skill of our country.

During the Vedic days the art and science of war received thorough attention of the Vedic Aryans. The military science was recognised as a specialized branch of knowledge
and it developed to a great height. The Rishis and sages like Vasistha, Viswamitra, Jamadagnya, Parasurama were the specialist in this discipline of knowledge. Many of these Rishis wrote treatises on military studies. Though all these scripts have not yet been retrieved, some have come to our knowledge; mention must be made of Dhanurveda, which was considered as Upaveda (secondary Veda) during latter Vedic culture. Dhanuspradipa, Dhanuschandradyayan, Kodandamandya and Sukranitisara were other texts on science of war compiled at a very late period. Later Vedic texts mention various subjects of learning of which Kshatravidya is one.114

The Hindu epics — the Ramayana and the Mahabharata — also contain massive materials on military science.

Besides these, many of the Sanhitas — Vishnu Sanhitā, Hareet Sanhitā, Atri Sahhitā etc. — also deal with military studies. They mainly concentrate on the duties of the king, the diplomacy, the espionage and counter espionage, but contain very little about the weapons; whereas Puranas like Agnipurāṇa, Bāyu Purāṇa and Brahmanda Purāṇa, a late work datable to 15th/16th century A.D., describe various weapons.

However, no archaeological relics or coins belonging to Vedic and Epic periods have so far been found. So we are to concentrate on the descriptions contained in the above mentioned books or in their commentaries to get some idea about the weapons of the ancient period. It must be admitted
here, that though the materials gathered in this present venture is quite massive and probably comprehensive, they are by no means complete. Still, with the present state of information efforts can be made to reconstruct the weapons or prepare their models with a fair degree of precision; and the museum galleries, rich with models thus reconstructed, can definitely be educative and helpful to the common people as well as to the research workers in disseminating knowledge about the Indian weaponry of the period.

The Dhanurveda classifies the weapons into four categories — (i) Mukta — the weapons which can be thrown or released towards the enemy; (b) Amukta — the weapons which can not be thrown or released but to be operated by hand in close quarter battles; (c) Mukta-Amukta— these weapons can be used by both ways, i.e., by releasing or hurling towards the enemy and also can be used in close quarter battles without releasing; and (d) Yantramukta — weapons which can be released or hurled only with the aid of some machines.¹¹⁵

But according to Mitiprakāśikā the weapons are of the following three types — Mukta, Amukta and Mantramukta i.e., weapons which can be thrown or released by chanting some hymns or spells.¹¹⁶

According to the nature of operation the following weapons of the ancient period have been placed under Mukta group:

Śakti — It is like a spear with a metallic blade and handle, may be of wood, bamboo, iron or even ivory. It is two
cubit long with the blade like the leaf of *Nerium oleander* (Karavi) plant and the handle resembles the udder of a cow. It requires the use of both hands and can be operated in six different positions. In *Mahābhārata* it is described as a terrible weapon of different shape, all sharp and adorned with gold, beryl or sometimes with balls. The commentator to Kautilya's *Arthasastra* defined it as the weapon provided with edges like a ploughshare.

**Bhindipāla** — It is a heavy club shaped weapon with a broad and bent tail-end, measuring one cubit in length. It is used for cutting, hitting, striking and breaking the body of the enemy. While using this weapon, the left foot of a right handed soldier should be placed in front, so that the balance of the body of the user is not disturbed by the weight of the weapon. It was used by the Asuras against Arjuna. In *Mahābhārata* it is often mentioned but its nature is not defined. Kautilya regarded it as a kind of spear or javelin.

**Drughana** — It is a club four feet in length. Dr. Oppert translated it as a hatchet, but from the description it appears to be a wooden mace or a staff headed with a heavily spiked ball of iron. It is used for hitting, striking and inflicting injury.

**Tamara** — Dr. Oppert pronounced it as 'tomahawk'. It consists of a wooden body and a metallic head forming like a bunch of flowers. Its length is three cubit, coloured red and is not crooked. It is operated in three ways.
śaṃsāstri, the Kautilya's commentator describes it as a rod with an arrow like edge and according to its quality its length may be 4, 4½ or 5 hastas (1 hasta = 18 inches).

Laguḍa — It is a heavy staff having a small foot, a broad head and wide shoulder. It is shaped like a tooth and the foot part is surrounded with some metal. It is two cubit long and can be manipulated in four different ways. It can be handled by both hands or by right hand only.

Pāśa — Dr. Oppert called it a 'lasso'. It is a noose of two or three ropes used as a weapon killing the enemy by a single stroke. It is composed of very small scales, made of metal. It is triangular in shape, embellished with leaden balls and thrown by three peculiar movements. Agni Purāṇa mentions a noose ten cubit long and prepared of cotton thread, munjā grass or sinews of animals. It is regarded as a novel weapon and held to the left, then taken to the right and then thrown at the enemy by whirling over the head. It can also be thrown from a horse on trot.

Gakra — It is a circular disc with a small quadrangular hole in the centre, provided with four, six or eight spokes. Its colour is just like indigo water and circumference amounts to two spans or ten cubits. It can be used in five or seven different ways. Its various uses are whirling, breaking, severing, rending and cutting. It is identical with the quoit still used by the soldiers of Sikh regiment. Kautilya describes it as a movable machine.
Dantakaṇṭa — Dr. Oppert describes it as a tooth thorn. It is a metallic weapon broad at the front but the tail is thin. Its colour is like charcoal. Its body is straight, about an arm high with a strong handle and looks frightful. It has two kinds of movement.  

Musundi — It is octagon-headed club with broad knots and broad body. It is three arms long, provided with a strong broad handle for the fist and has the fearful colour of a cobra. Jerking and whirling are its two peculiar movements and is mainly used to cleave or break enemies' limbs into pieces.

The weapons under Amukta group as referred to Vaisampāyana Nītiprakāśikā are described below:

Vajra — A mythological origin has been attributed to this weapon in the Tīrtha-yātrā portion of the Mahābhārata. Rīṣhi Dadhici offered his back-bone to Indra to prepare this weapon. Perhaps originally it had six sides and when hurled produce terrible sound. Its length is ten yojanas (100 miles) and breadth is five yojanas. Its fangs extend to a yojana in length. It shines brightly and resembles the fire which shone at the dissolution of the world. In Satapatha Brāhmaṇa it is described as having thousand spikes and hundred edges. It can be used in four different ways and a broad strong handle is fixed to it.

Ili — Dikshitar called it as 'Iśu'. It is a kind of hand-sword or an arrow or a reed like weapon measuring
about two cubits long, five fingers broad and the anterior portion of the blade is curved but has no hilt for the protection of hand. Its colour is black and four movements are associated with it.

Parasu — Nitiprakāśikā describes it as 'a thin stick with a broad mouth. Its face is in front, curved like a half moon, the body is dirty-coloured, but the face is shining. At the foot end is the handle, and it has a head. Its height is the length of an arm. Its qualities are felling and splitting.' "The Semitic origin assigned to this weapon of war can not be taken as correct, for there is nothing in the Rg Vedic religion that has not an Aryan source." The commentator on Kauṭilyya describes it as a short semicircular curved sword about two feet long. According to one's own advantage it can be manipulated in six different ways.

Gosīrṣa — It is said that Lord Indra presented this weapon to Manu who was the first king of this world according to the Hindu religion. It is probably a spear resembling a cow-horn — two pronged Śula, whose prongs are in the shape of cow-horn. It is two feet long, the lower part is made of wood and upper part is of iron. Its blade is three cornered, dark metal coloured and is sharp in the front and broad at the middle. It is handled with four movements.

Asidhamu — It is a dark coloured, three edged, one cubit long, two thumbs broad dagger-like weapon with a small slender handle without any handle-guard. It is used for
fighting at close quarters, and is called the sister of the sword. It is fastened with a waist-belt and worn by the kings. It has got three movements. Perhaps it is the same weapon that Kautilya mentions as Asiyasti.130

Lavitra — It is a crooked shaped, black coloured, one and half cubit long and five thumbs broad weapon. It is sharp at the front and provided with a broad handle. It is lifted with both hands and thrown to cut buffaloes into pieces. Dikshitar describes it as a sickle, an instrument for mowing and reaping.131

Astara — It is a kind of boomerang with a long head at the top, the middle portion curved to the extent of a cubit and a knot is provided at the foot. It is sharp and black coloured. Whirling, drawing and breaking are its three actions and it can be used both by the charioteers and foot-soldiers. In South India it is called as Valaitadi or bent stick. Two ivory and one such wooden boomerangs are now preserved in the Madras Museum. Dr. Oppert is of opinion that these boomerangs are of South Indian origin and not of Australien.132

Kunta — It is a lance made of iron with sharp top and six edges. It is six to ten cubit high and round at the foot end. It can be manipulated in six ways.133

Sthana — Dr. Oppert describes it as an anvil but Dikshitar calls it as a pillar-like instrument and has a height of a man with many knots at the top. It is manipulated by whirling and fells the enemy to the ground.134
Prāsa — It is made of bamboo and is coloured red with a sharp metallic face measuring about seven cubits long. It is decorated with silken tufts and can be handled in four different ways. In Mahābhārata we get its frequent reference but nowhere its exact nature has been made clear. The Arthaśāstra clearly mentions it as a kind of spear or javelin.

Pināka — It is a trident (trisūla) having three prongs of iron but the apex is made of brass and is very sharp. It measures four cubits and has a tuft made of bear’s hairs and the neck region is ornamented with brass armlets. It is shaken and impales the enemy. It is used for striking, thrusting, rending, cutting, breaking and severing. Commonly it is known as ‘Triśūla’ of Lord Śiva.

Gadā — It is a heavy club made of iron having hundred spikes at its broad head and is also covered on the sides with spikes. It is four cubit long and its head possesses the capacity to destroy elephants and rocks. It can be used in twenty different ways. Its various ways of handling with skill are bending, stooping low, springing forward, retreating, ready to fly upon etc., and by doing so it generates fear. By means of gunpowder it can also be thrown out of projectile weapons of various forms.

Mudgara — It is just a hammer without any fence and measuring three cubits long with a broad shoulder and weighing eight loads (1 load = 2000 palas of gold or between
140-150 pounds). Its colour resembles honey but the strong round handle is black. It whirls round and fells things to the ground. It is used to break heavy stones or rocks and in the sense of a club to breakdown clods of earth. Śaṅkarāchārya in his short poem 'Mohomudgaram' compares knowledge to a Muddgara which breaks 'moho' or delusion.\textsuperscript{138}

**Sīra** — It is doubly curved bucket-shaped weapon having no head but an iron-plated front to crush the objects with which it comes to contact. It is about a man's height with agreeable colour and by means of much dragging it causes persons and things to fall on the ground. Oppert has translated it as a ploughshare.\textsuperscript{139}

**Musalā** — It is a pestle-like club with both ends well knit together. In Rāma-Rāvana battle, the Rākshasas used Musalas of iron embellished with gold to crush enemies.\textsuperscript{140}

**Paṭṭiśā** — Dīkshitar describes it as a kind of spear with sharp edges made of iron or copper. Dr. Oppert translated it as a battle-axe but it is not correct because in his description he called it as the uterine brother of the sword. He further describes, "The Paṭṭiśā (battle-axe) is of man's height, has two sharp blades and a sharp top. Its handle has a protection for the hand." Kautilya speaks of it as a razor like weapon.\textsuperscript{141}

**Maṇḍūṭika** — It may be called as 'fist-sword'. It is a span long, ornamented weapon with a strong good hilt and is dark coloured. It has a high neck, sharp end and is
broad in the midst. As a very handy weapon all sorts of movement can be done. 142

Parigha — Dr. Oppert describes it as a battering ram. It is made of wood, tubular in shape and as big as a palmyra tree. It is so heavy that a whole troop is required to move it and strike. 143

Mayūkhi — It is the staff like weapon of the height of a man with a hilt. It exhibits various colours and is decorated with bells. It is always provided with a shield. It can be used for striking, warding off a blow, killing, discharging and for attacking. 144

Sataghni — As the name suggests, it is a weapon that kills hundred persons at a time. Dr. Oppert writes that, it "is provided with thorns, is of black iron and hard. It looks like a mudgara, is four cubit long, round and provided with a handle, ...... it resembles in all its movements the Gada, it was therefore like the Gada shot out of other projectile weapons." It is generally identified with modern cannon and so it is a projectile weapon. Kautilya refers to it as a movable machine, generally placed on the walls of a fort. 145

Asi 146 — It is an important weapon of war and is still in use since the days of Indus Valley culture. In Sanskrit literature it is also known as — Nistrīṣā, Viśāmanā, Khadga, Tikṣṇadhāra, Durāsada, Śrīgarbha, Viśaya, Dharmamūla etc., meaning cruel, fearful, powerful, fiery, unassailable,
wealth affording, victory-giver, and the source of maintaining 'dharma' respectively. Its length is generally fifty thumbs and width is eight angulies (four inches) and can be handled in thirty-two different ways. It is generally carried on the left side of the pelvic region hanging from the belt and kept within a scabbard.

Agnipurāṇa mentions that the test of a good quality sword (Asi) is that which is sufficiently long and when used in any way must produce a ringing sound. It is used for rending, cutting, looping and striking the enemy. A good quality sword is to be made of iron having the colour of a cuckoo's neck. Its blade must be like the petal of a lotus. It should be deep inside, bulging in the middle with sharp edges and without any bolt. The quality and the value of a sword are determined by seeing the natural symbol like Linga, Garuḍa, Swan and other auspicious and artistic images on its body. The best sword must be fifty inches in length. Swords of shorter length are of inferior quality. According to Devipurāṇa a sword of fifty inches length is called 'Trisikhā'. 'Pandrara' iron found in the 'Jangala' country, grey coloured iron of Maharasthra, oily iron of 'Komboja', golden colour iron of 'Kalinga', black iron of 'Anupa' and redish-white iron of 'Karnātaka' are best for preparing swords of good quality.

The origin of Indian sword is obscure. In Mahābhārata there is a legendary origin of sword where Bhīsma
narrates that sword was born out of a meteor like lotus which emanated from a sacrifice performed by Brahma to kill the Asuras. Whatever may be the origin, the sword is an important weapon in the Indian armoury. Its evolution can be traced from the Stone Age. The flint daggers, knives and celts of the Upper Paleolithic period (c.3000 B.C.) may probably be considered as the precursor of copper and bronze swords. Among the earlier weapons it is difficult to distinguish between the large knives and the spear-heads and the swords. Due to their close affinity Mackay has admitted that the spear-head of Harappan culture (No.3, Pl.CXIII of Further Excavations at Mohenjodaro, Vol.I, p.459) has been included in the category of sword only because of its long tang and unusual length.

The sword as a weapon is first unearthed by Mackay in the year 1930-31 after the excavation at Mohenjodaro area, the historical site of Indus culture that flourished within a time between 3rd millennium B.C. and the first half of the second millennium B.C. However Marshal believes that there is no sword in the Harappan culture, but the general shape and the sharp edges bring these weapons definitely closer to the category of swords. They are well built and have got sharp double edges but are much heavy for their size. The nature of these swords has already been discussed while discussing the weapons belonging to ‘Copper Hoards’.

Arthaśāstra has mentioned Místriṃśa, Maṇḍalāgra and
Asiyasthi as some varieties of swords. Nistriṃśa is sword of crooked handle, Mandalāgra is erect and provided with a disc at the top and Asiyaṃśhi is very sharp and long. The handles of swords are made of the horn of rhinoceros, buffalo, the tusk of elephants, the wood or the root of bamboo.

The Rajputs in India used swords as their weapon of war. In the City Palace Museum, Jaipur (now named Maharājā Swāī Mān Singh II Museum), the famous 'Khandā' of Mān Singh is preserved. The National Museum, New Delhi possesses a sword of Mahārāṇā Nāmīr Singh.

Again the Mārāṭhās relied more on swords and their swords were of good temper, straight or curved. The sword of Nānā Rāo Peshwā, now at National Museum, New Delhi is slightly curved, single edged at the upper end. During the siege of Phondā Fort in the year 1675, by Shivāji, the sword was the most used weapon. In cavalry charge sword is more reliable than a musket or bandook and in this respect Mārāṭhās are very good swordsmen. The 'Khandā' used by the Mārāṭhās is a peculiar variety of sword. A beautiful specimen of Mārāṭhā Khandā having double edged blade, mount-guilt and long knuckle guard is of particular interest in the National Museum, New Delhi.

To the Sikhs also, the sword has a religious sanctity. They believe that the sword is the most dependable weapon at the time of crisis. 'Talwār' is the most common form of sword used by the Sikhs. It may be straight
or slightly curved. The straight variety is double-edged but the curved one is either single edged all through or single edged at the beginning and double edged towards the lower end. 'Khandā' used by the Sikhs is of very broad blade with a knuckle guard at the hilt. 'Khong' is a small sword without any sheath and hangs round the shoulder. 'Krich' is a very long, straight and thin sword.

Mughal swords too are single edged, double edged or single edged at the upper end but double edged at the lower end and they are either straight or curved. 'Dhup' is a double edged straight sword about four to five feet long while 'Shāmsher' is a curved one commonly known as 'Oriental sword'. Its handle is small and the sharp edge is on the convex side. 'Teghā' is a curved sword with broad hilt and wide blade. There are serrated swords with sharp edge but saw-like back called 'Arapṛṣṭa' or serrated edges on both sides called 'Aradam'. 'Julfkar' is a bifurcated serrated sword. The blades of these swords are prepared from an alloy of iron mixed with some other metal. These blades have so much of elasticity that they can be bent like a bow and they are either plain or with ribs and are hollow throughout the length. Those having three ribs are called 'Tājūshāḥī', with two ribs are called 'Sultānšāḥī', and with one rib, two hollows are named as 'Alemani'. A manuscript of 'Bābarnāmā' (16th century A.D.) kept in the National Museum, New Delhi, shows some varieties of curved and straight
"Tegha", and 'Khanda' swords. Dusman-Khus (enemy-killer), Alam-Sitān (world-conquerer), Yari-Yafdar (faithful-friend), Fateh-Laskar (army-vanquisher) and Komar-Jeb (waist-adorner) are some of the swords of the Mughal period. 'Ālamgīr' is the sword presented by Shāh Jāhān to the emperor Aurangzeb. Pant has discovered two swords of Aurangzeb out of five thousand weapons received in National Museum, New Delhi, after the Hyderabad Police Action in 1948. In the Arms Gallery, National Museum, historical swords of Nādir Shāh bearing the date equivalent to 1739 A.D., Ahmed Shāh Abdālī of 1761 A.D., Tipu Sultān and Netāji Subhās Chandra Bose are displayed and well preserved.

Ābul Fāsal mentions in his famous work 'Āin-I-Akbari' that there were thirty 'Khās' swords, of which daily one was to be sent at the Majesty's bed room and forty other swords called 'Kotal' were kept ready for emergency.

As gathered from Nitiprapākṣikā and different sanskrit and modern text, most of the weapons belonging to the classes 'Mukta-Amukta' and 'Mantra-Mukta' are various kinds of missiles but even with great effort it was not possible to collect their description, nature, and methods of operation, perhaps because during latter period they had gone totally out of use or the persons knew the hymns or mantras kept it secret to others and so, naturally those weapons are lost in due course. Still to-day it is believed that the tribal people
of India know the use of Mantra-Mukta weapons but they do not teach those 'mantras' or the use of those weapons to others. Very recently Dr. Shasmal, a social anthropologist, has written an article 'Ban Visharad Bāule' in a Bengali journal, where he narrates a few 'mantras' used by a class of people known as 'Bāule' to protect themselves against any kind of danger within a forest. Dr. Shasmal did not describe any kind of weapon used by them. However, the author does not find any scientific basis of those 'mantras' and on an interview with Dr. Shasmal it is learnt that he too does not believe in the strength of these 'mantras' or hymns. J.C.Roy in his small book 'Dhamurveda' in Bengali referred to the Mantra-Mukta weapons as 'Dibyastra' used only by the gods according to Hindu concept, whereas 'Māyāstras' are used by the Asuras. The terms 'Dibyastra' and 'Māyāstra' may be translated as Divine weapon and magical weapon. It can be said that 'Māyāstra' and 'Dibyastra' are nothing but magical weapons. But it can be argued that in a magic the material is real but in 'Māyā' or 'Dibya' the material is not real but is only illusion. The weapons mentioned in Nītīprakāśikā under the classes Mukta-Amukta and Mantra-Mukta are largely associated with one of the god or goddesses of Hindu religion. So, it is doubtful whether these are actually weapons of war or philosophic terms for signifying instruments of establishing individual and collective morality in those days.

The weapons under 'Yantra-Mukta' class of ancient
India have their uses also in latter period. So the weapons of this class, as gathered from ancient texts have been discussed here along with weapons of latter period. In Kautilya's Arthaśāstra various types of Yantra-Mukta weapons are referred to. Of these weapons some were used in earlier period too and this is probably due to advancement in military studies and at the same time military architecture.

Kautilya divided these weapons under two broad classes — Sthitayantra, means immovable machines and Čalayantra, the movable machines.

Shāmśāstri and Basāk, the commentators of Kautilya have described the weapons under Sthitayantra and Čalayantra respectively as given below:

(A) **Sthitayantra** —

Sarbavatovadra or Bhumirikayantra — It is cart-like, with wheels and capable of rapid revolution. When rotated it throws stones on all directions.

Jāmadagnya — It is also known as Mahāśārayantra. It is a big machine to shoot arrows in all directions.

Bahumukha — It is tower like, situated at the top of a fort and provided with a leather cover facing all directions. From here archers shoot arrows in all directions.

Viśvagḥāṭī — It represents a cross-beam over the ditch at the entrance of a fort. It is placed in such a manner as to be caused to fall down and destroy enemies while approaching the fort.
Yangka — It is a rod or pole mounted on a wheel so as to be thrown against enemies.

Sangháti — It is a pole of considerable length used for setting fire at different parts of a fort.

Parjanyaṅkā — It is a water machine to put out fire or a machine fifty hastas long kept outside a fort wall so as to be thrown against enemies when approaching. This is not so big or so conspicuously placed as Visvaghati.

Ardhabāhu or Bahāyantra — Here two pillars are so placed as to be caused to fall facing each other and thereby kill enemies. It is a machine of half the size of 'Urdhabāhu'.

Urdhabāhu — It is also a large pillar, placed on high and thrown against enemies.

(B) Cālayantra:

Pāncālika — It is a big wooden board provided with numerous sharp points on its surface and kept in water outside the fort wall to arrest onward march of enemies.

Devadanda — It is a long pole with pointed iron nails attached to it and placed on the fort wall.

Musalayasti — It is a pointed rod made of Mimosa catechu (khadira) wood.

Sukarikā — It is a leather cover or a bag filled with cotton or wool placed like a wall to protect the towers or roads against stones thrown by enemies. It is also described as a mat of bamboo bark covered with leather.
Hastivāraka — It is a rod with two or three points to prevent elephants from resting on.

Tālabrinta — It is a fan-like rotating disc.

Mudgara — It is also called Gada. It is a long and heavy club-shaped or rod-like weapon.

Spriktalā — It is a rod with sharp points on its surface.

Kuddāla — It is spade-like.

Sphātimā — It is a leather bag with a rod to produce high sound.

Utpātimā — It is also called Audaghatima. It is an instrument to pull down towers, etc.

Satagnī — It is like a big pillar with indefinite number of sharp points on its surface mounted on a wheel-cart and placed on the top of a fort wall.

Trisula — It is a trident.

Cakra — It is a disc-like weapon.

Isu — It is the arrow and the most important, much used weapon of this group. The Dhanus (bow) and Isu (arrow) are the first composite weapons invented by man. In Vedic period its mastery was considered so important that an elaborate and exhaustive treatise 'Dhamurveda' was devoted to the science of war. In Rg Veda we often get references of bow and arrow. In Yajurveda archery has been given an important place. In Viṣṇupurāṇa Dhamurveda is considered as one of the eighteen branches of knowledge and has been
described as the Upaveda (secondary Veda or branch) of Yajurveda. Its knowledge is considered as essential for proficiency in fighting.151

'Nitiprakāśikā' classified this weapon under Mukta group.152 Chakravarti and Dikshitar did not contradict this but Pandit Ishwar Chandra Śāstri, commentator on 'Sadāśīva Dhanurveda' describes arrow as the weapon and bow as the means to shoot an arrow.153 So a bow can be regarded as a machine for throwing arrows and hence here it is put under the Yantra-Mukta group.

Sāranga, Kodanda, Kāramuka are the different names of the bows. Sāranga is made of horn of buffalo, Sharabha (a kind of Kashmiri animal) and deer. Kodanda and Kāramuka are made of 'Chāpa' and 'Tāl' wood respectively.

The term 'Astra' in Śukranitiśāra is translated by Dr. Oppert as bow154 but to interpret it as an arrow seems to be more correct because the term 'astra' means a missile, something that is discharged.

The best material for the bow is the horn. Dhanurveda prescribes three principal materials for manufacture of bows. They are metals (iron, black-iron, white-iron, oily-iron, gold, silver and copper), horn (buffallo, sarabha and deer), wood (sandal, śāl, cane, anjana, kukubha and bamboo).155

Agnipurāṇa mentions that bow's string should be made of the fibre of bamboo or of any other tree. Atharvaveda recommends silk thread as the best and next are the sinews of
cow, buffalo and the deer. If these are not available then twisted cotton thread and bamboo fibres are the best substitutes.

According to Kautilya bows are made of Tala (Palmyra), Chāpa (a kind of bamboo?), Dāru (wood) and Śringa (horn) and bow-strings are made of Murva (Sanviera roxburghiana), Arka (Calotropis gigantea), Sana (Hibiscus cannabinus), Gevedhu (Coix barbata), Venu (bamboo bark) and Snayu (sinew).

Kodandamāndana mentions eighteen types of bows according to weight, heavy or light, of both stave and string. Too heavy bow is not at all good for an archer. So a bow of lesser strength than the bowman is always preferred. Niti-prakāşīkā prefers a bow to be four cubits in length with three bents but Sadāśiva-Dhanurveda speaks of a bow of 5½ hastas (1 hasta = 24 anguli) is the best and is known as Dibya Dhanu.

In Dhanurveda we get the references of ten different types of arrowhead such as Bhalla, Karnik, Kāktunda, Aramukha, Khurapra, Gopuchha, Ardhachandra, Divibhalla, Suchimukha and Batsadanta.

The arrow-heads made of bone and ivory of Taxila are of four types — (1) with polished circular point having well defined tang, (ii) roughly shaped but sharpened at both ends, (iii) with tri-lateral point and (iv) with hollow socket. All these probably were in use between the period from 6th century B.C. to 1st century A.D. when the Dhanurveda was compiled and Arthaśāstra was written.
According to the physical nature the arrows from Taxila are divided into different groups. They are —
(a) flat with triangular cross-section, (b) flat with rombic cross-section, (c) flat with lozenge cross-section, (d) barbed, (e) flat with square cross-section, (f) conical, (g) three barbed, (h) four barbed.  

Kautilya refers to five kinds of arrows such as Venu, Šara, Šalākā, Dāndāsana and Nārāca. Of these the first three are made of wood, while the remaining two are wholly made of iron. These are used for cutting, rending or piercing.  

'Nawak' is a small arrow used with cross-bow. Such arrows can be seen in the National Museum, New Delhi. 'Tukkāh' is another kind of arrow without a head but with a knot at the end. Such an arrow has been shot by Azam Saha at his general Zulfiqar Khān on 18th June, 1707. Irvine has referred to 'Paikar-Kash' an arrow-puller, used to pull out arrow-heads from the body. The Arms Gallery, National Museum, New Delhi has got two such specimens.  

In the 18th century, Pāthāns of Farrukhābād used the following types of arrows — 'Lais' is the ordinary arrow, Calander, Kahartarash and Gherā are broad headed arrow, Nuktab is the headless arrow, 'Tuth' is the bill typed arrow and 'Ankaridār' is curved at its head.  

Among the Mughals we find two varieties of bows. The first one is either single curved or double curved but in the second variety two separate pieces are hinged together.
with a metallic grip. These bows are four to five feet long and the materials used are wood, bamboo, steel, horn or ivory. One bow of Shāh Jāhān is preserved in the Dogra Art Gallery at Jammu. Egerton describes, "The concave side of the bow (the convex when strung) was lined with several strings of thick catgut to give its elasticity and force. The belly is made of buffalo or wild goat's horn, jet black and fine polished, glued to this is a thin-slip of hard, tough wood. The ends were fashioned to represent snake's head. The horn is left plain, while the wooden back is decorated with arabesques of birds, flowers or fruits intermingled with gilding."  

In the Mughal period the arrow is called as *Tir*, the archer as *Tirandāz*, the stave as *Kaman*, the string as *Zih*, *Rodā* or *Chhillān*, the grip of the bow as *Moothā*, the curved sides of the stave as *Zihgir* or *Shast*.  

During this period though the use of fire-arms became much popular, still the use of bow persisted throughout the period of their reign and it was better prepared and better handled. Bāhādur Shāh of Gujrat declared war in 1537 by shooting an arrow in the air and soon after compromise, the emperor Humāyun presented his own quiver to Bāhādur Shāh’s minister. *Taksha-Kaman* and *Kuman-i-gurohā* mentioned in Āin-i-Ākbari have been defined as small bow and pellet bow respectively by Blochmann. Again 'Kamatha' is the long bow generally used by the Bhills and Navak is a pipe through which
an arrow is shot. In the National Museum, New Delhi, we shall find many arrows of the 17th and the 18th century.

The Rajputs in India also knew from early days about all the types of bows such as single curved, double curved and triple curved. Bows made of bamboo, cane and metal are equally popular to them and those bows are nicely carved with geometrical designs, images of gods and goddesses. Their unstretched condition is of particular interest. It is curved in such a way that both the ends almost touch with notches on the inside; but when both the ends of the stave are heated it automatically converts itself into a normal bow. This bow is made of cane, painted with lacquer and beautiful scenes in dazzling colours are drawn on it.

In the Alwar Museum a cross-bow of the Rajputs is preserved. This bow works by tension. A hollow piece of horn lay over a straight iron socket is loosely fixed to the bow. The stave of the bow is attached to a hook of the iron shaft. The string is pulled with the help of a sort of trigger. Inside the hollow space small arrows of about nine inches long are placed. The arrow points are round, square, pentagonal or octagonal. Arrows are discharged one after another by the trigger operation and work like bullets. Some arrows of cross-bow can also be seen in the National Museum, New Delhi.

Pellet bow or Gulel is also another important weapon of the Rajputs. By Gulel balls of desired size can be discharged with force and accuracy.
Bows used by the Sikhs are made of bamboo, cane or metal with decorations and engraved with names or sayings of their Gurus. They use this weapon mainly for guerilla warfare.

Mārāṭhās too use this composite weapon made of bamboo or steel. They also use cross-bow.

From the above mentioned descriptions it is clear that the Yantras were of various kinds and were used for various purposes. If we are to believe the commentator's interpretations then the 'Saṟvatoḥbhādṛa' and the 'Jāmadagnya' were much similar to the ballista and the catapult as used in ancient and medieval Europe. We have no knowledge of how these big and heavy 'Yantras' (not all of course) used for throwing heavy bolts, stones and arrows were constructed, how they worked and also what supplied their motive power, but from descriptions it is learnt that these mechanised weapons (Yantras) produced heavy noise when in action. So they may be considered as the artillery of the then Indian forces.

In Kāṭiliya's Arthaśāstra, besides the mechanised weapons (yantras) mentioned before we also get references of the following kinds of weapons with edges like a ploughshare (halamukhānī): Śakti, Prāsa, Kunta, Ṣātaka, Bhindipāla, Śūla, Tomara, Barāhakarna, Kaṇaya, Karpaṇa and Trāsika.

Further, razor like weapons such as Paraśu, Kuṭhāra, Paṭṭisa, Khaṇittra, Kuddala, Cakra and Kāndachchedana are mentioned in Kāṭiliya's Arthaśāstra.
Of these weapons Śakti, Prāsa, Kunte, Bhīṇḍīpāla (Bhīṇḍīvāla), Tomara, Paraśu and Cakra have already been described earlier. The rest are as follows:

Hāṭaka is a rod with three or four pointed edges. Śula is a pointed rod without any fixed length. Barāḥakarna is a rod with edges shaped like the ears of a boar. Kanāya is a metallic rod both ends of which are triangular and is 20, 22 or 24 inches long. It is held in the middle portion. Karpaṇa is an arrow or javelin to be thrown by the hand and it goes as far as hundred bow's length when thrown by a skilful person. Trāśikā and Kuthāra are like common axe. Paṭṭisa is same as Paraśu, but shaped like a trident at both ends. Khanitra or Krakacha is a kind of stone cutter or stone digger. Kuddāla and Kāṇḍachchedana are small and big axes respectively.

Among other weapons of earlier period in India mention may be made of the weapons used by the Rājputs, Mārathās and the Sikhs.

Rājasthān the home land of Rājputs has produced all necessary weapons of warfare and here we find weapons of every age, starting from the aboriginal tribes Bhils and Neena of earliest days down to the latest automatic rifles. Jaipur is famous for its damascening, Sirohi for its blades and Álvar for its varieties of weapons. The weapons other than sword and bow are as follows:
Bichhwa is a kind of small dagger with a zig-zag blade bearing ribs on both sides. In this weapon we find some Mārāthā impact.

Jaghnal is also known as 'Kulang-Guptidār'. It is a plain hollow iron shaft with a blade attached to its side like a battle-axe. The shape of the blade is like the beak of a bird and the hollow shaft contains a Gupti, a long, straight and thin sharp edged dagger.

Tabar is virtually a domestic axe but is used in actual warfare only in case of emergencies. Its steel blade is attached at one side of a wooden rod.

Tāl is a type of club having a curved iron rod at the upper portion and fitted with a leaf-shaped head and usually bears decorations of floral designs. It is used for hitting on the head of an enemy.

Jāmbuwāh is a kind of curved dagger with medial ribs on both sides of the blade. While the handle of Bichhwa is usually silver plated, the handle of Jāmbuwāh is generally made of wood.

Spears of various types namely 'Nāzā', 'Barchhā', 'Bhala' etc., are often being used by the Rajput. Maharana Pratap is often depicted as carrying a 'Bhala'. In the National Museum, New Delhi, numerous varieties of spears are on display.

Rajputs have the knowledge of using fire-arms but they have not invented any new fire-arm.
In this connection it is worth mentioning here that India is the cradle land of gunpowder and fire-arms. In support of this statement a few passages are quoted below from Dr. Oppert's writings.

"The ordinary components of gunpowder are saltpetre, sulphur and charcoal."

"...... Throughout India saltpetre is found, and the Hindus are well acquainted with its properties. India was famous for the exportation of saltpetre, and it is still so. The Dutch, when in India traded especially in this article."

"In Bengal it is gathered in large masses wherever it effloresces on the soil, more particularly after the rainy season. In the Sukraniti saltpetre is called Suvarcilavana, well shining salt."

"Sulphur, the second ingredient of gunpowder, is also found in India, especially in Scinde; it is, and was, largely imported into India from East. It is well known and it received its name from its smell, being called gandha or gandhaka, smell, or in this case as it has not good smell, rather from its stench. Its quality differs with its color, according as it is white, red, yellow, or bluish. Though sulphur is very important part of gunpowder, it is, in some parts of India, even prepared without it. Sulphur was always in great demand in India, and in medicine it is often made use of."
"Charcoal is the third component part of gunpowder. Its constitution varies necessarily with the plants which in the different countries are used in its manufacture. In the Sukraniti the arka (Calatropis gigantea), the snuhi, snuhi or smuh (Euphorbia nerifolia), and the Rasona (Allium sativum) are given as the plants whose charcoal is best fitted for gunpowder."

"The prescription for making gunpowder is, according to Sukraniti, as follows: mix 5 parts of saltpetre with 1 part of sulphur and 1 part of charcoal. The charcoal is to be prepared from the arka, snuhi and other similar plants in such a manner that during the process the plants are so covered that the smoke can not escape. The charcoal thus obtained must be cleaned, reduced to powder and the powder of different charcoals is then to be mixed. After this has been done, the juice of the arka, snuhi and rasona must be poured over the powder which is to be thoroughly mixed with this juice. This mixture is to be exposed and dried in the sun. It is then finally ground like sugar and the whole mixture thus obtained is the gunpowder."

"The proportion of saltpetre varies, as some take 4 to 6 parts instead of 5, but the quantities of sulphur and charcoal remain unaltered. These two are the usual receipts. Nevertheless the mixture is often changed when the gunpowder is to be of a particular color or it has to serve a special purpose. The three principal ingredients are mixed in
different proportion, and realgar, opiment, graphite, vermi-
lion, the powder of magnetic iron oxide, camphor, lac, indigo,
and pine-gum are added to the compound accordingly as they
are required."

"In an extract taken from the Mujmalut Tawārīkh —
which was translated in 1126(?) from the Arabic, into which
language it had been translated a century previously from a
Sanskrit original — we read: 'that the Brāhmans counselled
Hai to have an elephant made of clay and to place it in the
van of his army, and that when the army of the king of Kashmir
drew nigh, the elephant exploded, and the flame destroyed a
great portion of the invading force. Here we have not only
the simple act of explosion, but something very much like a
fuse, to enable the explosion to occur at a particular time."169A

"Vaiśampāyana mentions among the things to be used
against enemies smoke-balls, which contained most likely
gunpowder, and which were according to the explanation
proposed by his commentator made of gunpowder.170

It is curious to note that gunpowder has not been
mentioned in any other sanskrit work, so far my knowledge
goes. Probably, the actual methods of preparing different
kinds of gunpowder have been kept secret within certain classes
and such affairs coincide with the Indian system of caste.
India is a land of fire-works; no festival is complete here
without them. Explosive powder either used for enjoyment
or for discharging projectiles was known to Indian people
since time immemorial and the art of preparing such explosives was never forgotten. Particularly, the materials for its preparation are all indigenous and easily available in India; so there is no difficulty to fulfil the desire of its preparation.

Regarding the fire-arms, Dr. Oppert writes: "Two kinds of firearms are described in the SukranitijOne is of small size and the other is of large size. The former is five span (a span is the distance between the extended thumb and the little-finger) long, has at the breech a perpendicular and horizontal hole, and sights at the breech and muzzle end of the tube. Powder is placed in the vent, near which is a stone, which ignites the powder by being struck. Many dispense with this flint. The breech is well wooded and a ramrod compresses the powder and ball before the discharge. This small musket is carried by foot-soldiers."

"The big gun has no wood at its breech; moves on a wedge in order to be directed towards the object to be shot at, and it is drawn on cars."

"The distance which the shot travels depends upon the strength of the material from which the gun is made, upon the circumference of the hole, and the gun's compactness and size. The ball is either of iron or lead or of any other material. Some big balls have smaller ones inside. The gun itself is generally of iron, occasionally also, as we have seen in the Nitiprakāśikā, of stone. The gun is to
be kept clean and must be always covered."

"The gun is very seldom mentioned in Sanskrit writings, and even where it has been mentioned the meaning of those passages has been generally misunderstood. In all European Sanskrit dictionaries the 'Nālika' or 'Nālika' has been rendered as stalk, tube; arrow, dart, &c., but the third signification gun is not given; though it is one which is known to every learned Pandit. At the outset every body can easily see that the meaning of arrow and of gun can be rightly applied to a reed; the arrow is a reed which is discharged as a missile, and a gun is a reed out of which missiles are shot."

"In the ślokas 21 and 24 of our extract of the Śukraniti we read that a king should keep on a big war chariot two large guns, and in śloka 31 we are further informed that his beautiful iron chariot should be furnished with a conch, a swing, and among other things also with sundry arms and projectile weapons. This tallies with an account concerning the fortifications of Manipura, as described in Mr. J. T. Talboys Wheeler's "History of India": 'On the outside of the city were a number of wagons bound together with chains, and in them were placed fire-works and fire weapons, and men were always stationed their to keep guard.' This statement is very important, and if substantiated would be of the greatest weight in this inquiry; but none of the Sanskrit Manuscripts of the Mahābhārata which I have searched contains this śloka."
However, the above mentioned statement appears to rest on good authority, as tho Sukraniti declares, that the wall of a fortress 'is always guarded by sentinels, is provided with guns and other projectile weapons, and has many strong bastions with proper loopholes and ditches.'

"In the first book of the Sukraniti we find it stated that the royal watchmen, who are on duty about the palace, carry firearms. The Kãmandakiya, acknowledged as one of the earliest works on Nitiðåstra, says that, 'Confidential agents keeping near the king should rouse him by stratagems, gunfiring and other means, when he is indulging in drinking bouts, among women or in gambling.' It seems from this statement that the practice of firing guns as signals was in vogue among the Hindus, if we can trust the evidence of one of the oldest Sanskrit writings."

"Firearms were such powerful engines of war, that every one, who possessed them, kept their construction and handling as secret as possible. This is, in fact, the real reason, why so few books treat on this subject, and why such works are so jealously kept secret that it is most difficult to get hold of them."

"The Mahãbhãrata and Rãmãyana are full of the description of wonderful divine firearms, the Ñgneyastra. It may be that a solid substratum of fact underlies these descriptions, but they are so adorned with wonders that they outrun all reality. Perhaps the reason of these exaggerations was to conceal the real element of truth underlying them."
Dr. Oppert further adds, "It may look strange that while gunpowder and firearms appear to have been known in India since immemorial times, and though we know that fireworks and firearms were always in use — the Portuguese, the first Europeans who came to this country, were struck at their landing with the display of both — so few actual traces of them should be found in this country. But while admitting to a certain extent the truth of this observation, we must also consider that only very few old buildings have been preserved in India from ancient times, that we have nothing which can vie in age with Grecian antiquities, omitting Egyptian and Assyrian antiquities altogether. Yet we can prove the existence of firearms by curved images of them being preserved in some ancient stone temples."

(1) "In the Madura District lies not far north from Râmnâd (Râmanâthapura) on the sea the ancient Tirupâllani. It is celebrated throughout India, on account of its famous temple dedicated to Adîjagannâtha, ....... The erection of this shrine goes back to a far distant period (?). On the outside of an ancient stone mandapa are seen figures of some soldiers carrying in their hands small firearms. The dress of these sepoys is also peculiar, as the belts round their waists are provided with little bells. The soldiers have slippers on their feet and a peculiar cap on their heads." From the statement of the author the date of the erection of the said temple is doubtful so far archaeological
or epigraphical evidence is concerned. On the basis of such doubtful material, one should not conclude in the manner Dr. Oppert intends.

(2) "In Kumbhaghona (Combaconum) is a temple devoted to Śāraṇgāpāṇi, i.e., to Viṣṇu bearing in his hands his bow Śāraṇgā ....... On the left side of the front gate of the fifth story from the top is a king sitting in a chariot drawn by horses surrounded by his troops. In front of the king stand two sepoys with small firearms in their hands which look like pistols .......

(3) "In Kēchippuram (Canjivaram) is a famous maṇḍapa which, as it rests on a hundred columns, is called Śatastambha- maṇḍapa, or Mūtīkālmaṇḍapa in Tamil ....... The maṇḍapa is a square; 12 columns face the eastern and western sides, 8 columns face the northern and southern; besides these 96 columns 4 stand apart. On the 4th column of the north side, when coming from the west, is cut in solid stone, as the principal ornament of the column, a combat between soldiers. A trooper sits on horse back and a foot-soldier aims with his firearm at his enemy. The maṇḍapa was erected about 1624 A.D."

(4) "In the precincts of the Tānjore temple are carved in stone on stone pillars opposite the Svarga ekadāśi-gate sepoys with small carbines in their hands." If identification of the above mentioned weapon is correct, it is to be considered as a startling archaeological evidence to prove the antiquity of firearm as Tānjore temple could be dated to the
19th century A.D. Before any conclusion is drawn it is to be verified whether that part of the pillar or the whole pillar itself was renovated at some much later date. The present scholar attempted to find out the pillar referred above in vain.

(5) "In Perur, a few miles from Combatore, is a celebrated Śiva temple and near it is a fine shrine, known as the Sabhāmanḍapa. On the base of its broad stone pillar stands a soldier with a gun in his hands. The date of the erection can not be ascertained with exactness, and even popular belief does not ascribe to this maṇḍapa more than a few hundred years. As is usual with buildings in the south of the Dekkan Tirumala Nayak is occasionally named as its builder."

In conclusion, Dr. Oppert, remarks, "I trust thus to have proved that gunpowder and firearms were known in India in the most ancient times, that the statement in the Śukranīti about powder is supported by the Niṭiprakāśikā of Vaiśampāyana, ...... I contend further that the knowledge of making gunpowder was never forgotten in India; but that it was not earlier known in Europe is partly due to the isolated position of India, and partly also to the want of saltpetre in Europe, which prevented European nations from discovering the oxydising properties of saltpetre. Moreover it must not be forgotten, that the preparation of gunpowder, even after it had become known, was kept everywhere a deep
The ancient Hindus enjoyed a well-deserved reputation as skilful artificers in iron and steel, the manipulation of which metals requires a considerable amount of ability, and these circumstances go surely far enough to justify the conclusion that the ancient Hindus were as well able to prepare firearms as the modern Hindus are now-a-days.

It ought also not to be overlooked that, as now, so also in ancient times, every thing connected with firearms and their improvement was surrounded with great mystery and the few books written on this subject were guarded like treasures and not communicated to the common crowd. The danger in handling firearms may also have deterred people from availing themselves of them so much as they otherwise would have done. Nevertheless the existence of guns and cannons in India in the earliest times seems to me to be satisfactorily proved from evidence supplied by some of the oldest Indian writings.  

Like Rajputs, the Mahrathas' military skill has always been a source of inspiration to the students and research workers of Indian Military System. The uniqueness of the Mahrath movement lies in their national character. The geographical character of the Mahārāstra made them brave, patriot and heroic. In the 18th century they became a terror to other rulers only due to their military success. In India Guerilla technique of warfare was first introduced and practised by the Mahrath soldiers. These soldiers moved from
one place to another with such an incredible speed and surprised their enemies that the bewildered enemies credited them with the knowledge of 'Black Art'. Hieun Tsang wrote, "the inhabitants (of Mahārāṣṭra) were proud, spirited and war-like, grateful for favour and revengeful for war."  

In Mārāṭhā weapons no evolution is marked; but we find the hybridization of old and new types of weapons. Though they accepted new types of weapons, they never discarded the old ones. Weapons used by the Marathas can be broadly classified under following heads:

Stones — From the forts on the top of the hills the Maratha soldiers very commonly used stones as missiles or shots from their matchlocks as defensive measure. They also tumbled down big stones or boulders to check the movement of enemies.

Spears — Javelin, Barchhā and spear are the three types of spears used by the Pīndāris in the Mārāṭhā army. Javelin and Barchhā are hurled at the enemies while the third type is a thrusting weapon. All these weapons are twelve to eighteen feet long. These weapons consist of steel blade fixed on the head of a wooden shaft, but steel made Barchhā and Javelin are not wanting. In the cavalry battle of Pāṇipath in the year 1761 A.D., Mārāṭhā soldiers used lance and sword against the enemies. As quoted by Pant from T.S.Shejwālkar's writing, 'each Mārāṭhā of note had possibly a handgun by his side but he had neither love for it nor expertness in its use.
He preferred lance and spear at a short distance to the clumsy bow and arrow or heavy, long matchlocks of those days.

Bāgh-nakh — It is much used by the Mārāthās in a close battle or duel fight. This is of two types. In one type five steel claws are fixed on a steel plate lining the palm of the hand and the whole thing is fastened by rings with the fingers, but in the second type of Bāgh-nakh five scythe-like blades are attached to an iron sheet flanked by two finger holes and a curved double-edged blade projecting to a side of the finger-hole. In the arms gallery of National Museum, New Delhi this weapon can be seen.

Mace — Mārāthā maces are of three varieties. In the first category there is a knob on the round head with sixteen ridges. The handle is cylindrical and octagonal in the centre. The second variety is a pike rectangular in cross-section with a round head having a design of seven or more leaves. The handle is cylindrical rod with knuckle guard. In the third variety, the globular head of the mace is tipped with a quadrangular arrowhead of steel and many iron pikes project from the round head. Besides these they use a 'Gadā' having long, heavy barrel shaped body with a rough or clumsy handle.

Daggers — Several varieties of daggers used by the Mārāthās are available. Among these Bichkwā is a dagger having bifurcated blade. Bhid-chur has two blades fixed at
opposite directions with a handgrip at the centre. In the National Museum, New Delhi a fine specimen of Bhid-chur can be seen. Bara-Jamādān is most common type of dagger with a tripronged hilt more or less like a Mughal Khaprā. Khanjar is a curved dagger with a triangular hilt. Jamadhar is like a Mughal Katār having 'H' shaped handle. When the blade is bifurcated at the lower end it is called Jamadhar-Daulicāṅch. Pharsā is single edged concave blade fixed to a long iron handle. Krich is a straight double edged sword like object with knuckle-guard at one end. Its hilt is mostly of ivory and profoundly ornamented with floral designs. Jāfar-tākiyā has double edged blade tapering at one end and the other end is either made of wooden scroll coiled like a snake or a flower bud and an octagonal Tākiyā rod. Kaṭṭa or Karanta is not a dagger but a type of curved sword with serrated blade on one side. On the blunt side of the blade two grooves run along the length and the iron hilt possesses two circular hand-guards.

Firearms — Matchlocks and cannons were both used by the Mārāṭhās. Their matchlocks usually consist of long barrels attached with stocks by leather strips and strengthened by providing with side plates. They had also used three to five chambered pistols and revolvers. Mortars were not unknown to them. Sometimes straight sword like blades are provided with the mortars.

Mārāṭhās are credited with the knowledge of manufacturing
big guns and cannons. There guns are generally large and heavy. They are carried on very clumsy carriage provided with low wheels made of solid piece of wood and that too become worn out within a few days journey. These guns are named after different gods and painted in a very fantastic manner. Captain William Gorden says, "Bājī Rāo had his own foundry in 1739 A.D. I visited the foundry when I saw many coehorn and bombshells said to have been cast there and a frame of thirteen inch mortar." Tone is of opinion that their cannons are never made of any precise calibre but are cast indifferently of all diameters and balls are afterward fitted to the bore. They used wrought iron instead of cast shots and so could never get the precision.175

In Sikh military history we do not find any mention about the invention of any new weapon. Their weapons show a clear fusion of different schools. They only retained those weapons that suited to their own technique of warfare. Sikhs fought according to their own liking in a disorderly manner, more for their personal gain than for mutual collaboration in the common interest of winning a war.

Besides the common weapons like stone, bow and arrows, sword, lances, cakra etc., Sikhs used various types of firearms, such as matchlocks, flintlocks, Jazail, carbine, percussion cup-gun, pistol, serbachhā, double barrel guns and cannons.

Stones and boulders of considerable size are hurled
upon the enemy from the rampart of a besieged fort to hinder the progress of the enemies or to cause their damages.

Swords, bow and arrows used by them have already been discussed. Lances used by them are about ten to fifteen feet long with bamboo or steel shafts and sharp pointed steel blades. They prefer all steel Barchhãs because those are very light, long and pointed.

Sikhs used mostly all dagger-like weapons used by the Râjputs and Mârâthãs. The hilt of those weapons are mostly made of bone, ivory or metal. Wooden and bamboo handles are rarely found. Sikhs used a particular weapon called Quoit (cakra). It is a large thin steel circle of about 6 to 8 inches in diameter and its outer edge is very sharp. It is thrown by rotating with the help of a finger and its effective range is about sixty to hundred yards. This is again of two kinds, one having smooth sharp edge called 'Cakra Sãdã' and the other consists of serrated outer edge called 'Cakra Kãtãvdãr'. Its throwing requires great skill, practice and accuracy and the Sikh warriors have mastered its throwing techniques.

In the 18th century Indian guns were not fully founded. It was made of iron bars bound together by some thick metal rings at several places. At the beginning artillary as a part of armoury was very limited because Sikh Gurus could hardly collect a few guns. Maharajâ Ranjit Singh had a craze for guns and he should be credited for organising
the Indian artillery on the European pattern. During the period 1799-1808 A.D., the total number of his guns of different calibre were about 33 to 40 only. These guns were either made of brass or iron. Some of these guns were heavy and rests were five pounders, six pounders and twelve pounders. In 1807 A.D., he established a few factories at Lahore and elsewhere for manufacture and repairs of guns. The same year he formed two separate departments known as Topkhānā and Topkhānā Khurd meaning heavy guns and light guns respectively. At Amritsar he established another foundry where gunpowder and crude fuses were produced.

By 1808 A.D., Ranjit Singh collected about hundred 'Shatarnals' (swivels) and established another department named Dārogā-i-Zumburkhānā or Superintendent of Swivels. At that time guns were drawn by buffaloes. In 1810 A.D., a new weapon called 'Gubareh' or mortar was produced and horse-artillery started. In 1831 A.D., Maharaja Ranjit Singh reorganised his artillery as Topkhānā Jinsi (mixed Batteries), Topkhānā-Apsi (horse Batteries) and Zumburkhānā (swivel Batteries). Besides all these a separate Topkhānā, exclusively for Maharaja's use, called Topkhānā-i-Mubārak or Topkhānā-i-Khās was established.

Maharaja not only produced artillery in the country, he also imported foreign made artillery pieces. His artillery power was at par with that of the East India Company. Matchlocks and Flintlocks used by the Sikhs were
known as Bandook Torādar and Bandook Caqumuque respectively. The matchlocks consist of a long barrel of wrought iron wrapped with metal bands and attached to a wooden casing. It is fired by Fatila, the slow light match. The priming powder is loaded in the barrel with the help of a muzzle loading rod which is always carried with a matchlock. The gun is fired by drawing a trigger which brings the Fatila in contact with the priming powder. Fatilas are prepared from the hanging roots (prop roots) of the tree *Ficus religiosa* and *Ficus indica*.  

Flintlock is a long barrel shaped firearm and is called as Banduk Pāthar or Bandook Caqumuque. It has a self-contained ignition mechanism. For firing, a striking hammer strikes on a piece of flint that produce spark to ignite the priming powder and causes the discharge. A bayonet (sāngin) is attached at the front of the barrel for close-quarter battle. Lord Gough has praised flintlocks and is of the opinion that they are at per with those of the British make.  

Jazail or Jagir is a swivelgun. It is about eight feet long and very suitable for the protection of forts. Its firing balls are about one to three ounces in weight and is fired after putting it on a rest placed on the wall of a fort.  

Carbine is three feet long, light, short firearm with a trumpet-shaped mouth used by the cavalries. It is first introduced in the Sikh army by General Ventura.
Bondook Masāldār or Percussion -Cup gun is first used in the Sikh army in 1825 A.D. It is superior to flintlock gun as it is fired by the help of a detonator or a cap containing some explosive material.

Sherbāchā is a mounting gun with a short barrel than the carbine but of wider mouth of true trumpet shape.

Double barrelled gun is a kind of flintlock gun having two barrels. Ranjit Singh first got it as a presentation from a British officer and later on he ordered its manufacture at Lahore factory.

Mortars are used both as siegeguns and field guns. They are made of gun-metal of about 12 to 14 inches thickness and mounted on carriages. Their calibres are 7 to 8 inches, bore 10 to 12 inches and chamber five to six inches.

Tamānchāh is a kind of pistol, patterned after British pistol and its use is confined strictly to the higher ranks of people.

Cannons are very heavy guns. High sounding and dignified names are given to these guns and each gun bears the name of the founder, the place and year of manufacture. Some of the names of these cannons are Fateh-Jang, Sher-Dahan, Liālā-sur-Majnu, Jang-i-Bijli etc.

All these weapons described above are manufactured in the State Foundaries at Amritsar, Kashmir, Lahore and Wāzirābād.

Again, in the medieval period during the Muslim rule
in India we find, the Mughals innovate some new techniques of fighting and naturally they abandoned the out-dated weapons, retaining only those fitted with the then warfare or for the pomp and grandeur of their court. They relied more on their stirruped cavalry, which created a great revolution in war strategy. So the cavalrymen could stand firmly on the stirrup and shoot arrows, hurl lances or fire guns. Besides the principal weapons sword and bow and arrows used by the Mughals, which have already been discussed, they used the following weapons with great skill.

Mace — Gada, Shaspar, Piyazi, Gurj, Dhara and Garguj are the different varieties of mace used by the Mughals. Gada is a small steel rod with a round head while Shaspar, the lung-tearer, possesses an oval-shaped head. Piyazi looks like that of an onion but in the Gurj steel spikes are fixed on the globular head of the Piyazi. This Gurj is sometimes double-headed, one head above the other. It is about 3 to 4 feet long with the head of three inches diameter. In case of Dhara an octagonal steel shaft is attached on the top but those having eight-bladed heads with basket like hilts are known as Garguj.

Battle-axe — It is also called Tabar. It has a triangular blade with one cutting edge with a handle of 3 to 4 feet long. The head of the axe is 3" x 5" or 4" x 6". It is not used as a common weapon of war but preserved as a curio or to enhance the beauty of the armoury. The battle
axe of Nadir Shah is well preserved in the National Museum, New Delhi.

Spear — Nāzā, Barčhā, Saṅk, Sainti and Selārāh are the five kinds of spears mentioned in Āin-i-Ākbari.

Nāzā was used by the cavalry men. It has a steel head on a ten to eighteen feet long bamboo shaft. Actual operation of the weapon is done by holding in the middle, then raising above the head at full length of arm and then hurled. The Barčhā is fully made of very light and slender steel and can be easily thrown. Different kinds of Barčhā are kept in the National Museum, New Delhi. Saṅk is also made of iron with an average length of 7 feet 11 inches and the head is about 2 feet 11 inches. Its blade is round, two-sided or more and the grip at the centre is covered with velvet. It is used by the cavalries as there is a metal chain to fix it with the saddle. The modern Indian bayonet is called Sangin. This may probably mean a little Sang or Saṅk. The long, slender, three or four sided head of this Saṅk or Sang resembles the shape of a bayonet. Sainti is a type of Saṅk having a shorter shaft and Selārāh is a spear with a head and shaft longer than Sainti but not so long as that of a Saṅk. It is also known as Bhala.

Other kinds of spears as referred by Egerton are Ballam, Pandi-ballam, Panjmakh and Longa. Ballam is described as a spear, pike or lance having barbed heads and wooden shaft. Its total length is 5 feet 11 inches, of which the blade is
18 inches. Pandi-ballam is a long spear having 2 feet 3 inches leaf-shaped blade and a bamboo shaft. The total length is 8 feet 3 inches. Panjmukh is a five-headed spear used by the people of Gujrat. Lange is a spear with hollow shaft and four-cornered iron head. A spear with ivory shaft, highly decorated and painted of the Mughal period is kept in the National Museum, New Delhi. Probably this specimen was a show-piece and was not used in any battle.

Daggers and knives: Katār, Jamadhar, Khanjar, Katāra, Khopwāh, Narsingh Moth and Gupti are the different varieties of daggers prevalent in India during the Mughal regime.

The length of a Katār is two to two and a half feet and half of this length is the blade. The blade is very thick with two sharp cutting edges. At the hilt the breadth of the blade is three inches with a solid point of one inch breadth and it is so hard that nothing can prevent it but a cuirass. The handle is like an English letter 'H' and in between the two parallel bars one or more cross-bars are placed at right angles to facilitate good holding and the extended part of the two parallel bars helps to shelter the hand and a portion of the arm. It is a thrusting dagger. Jamadhar is the most popular type of dagger having a beautiful handle and a broad straight blade. Khanjar is the dagger having double curves in the blade and a sword-like hilt. Katāra is like a Jamadhar with long double edged curved blade.
National Museum, New Delhi possesses two Katārs one concealed within the other. The larger blade acts as the sheath of the smaller one and so naturally the longer blade is hollow.

Khapwā is simply a curved dagger with a simple handle and Narsingh Moth is a variety of Khapwā, but Jambwāh is just opposite to Khapwāh in curvature but with similar hilt.

Gupti is also known as walking stick. This is highly decorated all over the body. It is a complex weapon. There is a walking stick in the National Museum, composed of four weapons — a knife, a long pointed blade, a pistol and a gunpowder-cup.

Peshqabz is a pointed one-edged dagger, having generally a thick straight back to the blade, and a straight handle without any guard. Sometimes the blade may be curved or even double curved, but this weapon has no reference in Āin-i-Ākbār.

Kard is just a butcher's knife and is kept within a sheath. It is the weapon especially of the Afgāns. Its total length is two feet six inches while the blade is two feet.

Sailabāh-i-Qalmaqi is a knife but as long as a sword and used by the soldiers from Kashgahr. Its handle is made of fish-bone called Sher-mahi and is slung from the shoulder belt.

Heavy guns — The Mughals were fond of large and heavy
guns but those were in reality more for show than proper use. These guns produced much noise than any harmful effect. These could not be fired many times in a day and often burst and killed the men behind the guns.

Bābar was interested in heavy guns but Ākbar was interested in preparing matchlocks under his personal direction. The large guns were all identified with different high-sounding names. Some of these large heavy guns are: Gāsi Khān (Lord Champion), Sher Dhan (Tiger-mouth), Dhumāhm (the noisy), Kishwar-Kusha (World-opener), Garh-bhanjan (Fort-demolisher), Fath-i-Lashkar (Army conqueror). Aurangbar (Strength of the throne), Būrj Shīkān (Bastion breaker), Jāhān Kusha (World conqueror), Ālam-sītān (World-seizer), Ātash-dahan (Fire-mouth) and so. Besides the name, these guns were usually provided with inscriptions, sometimes in verse, the name of the founder, the number, the place and date of manufacture. All the guns were mounted on heavy clumsy wooden carriages and drawn by draught oxen, horses, camels and elephants.

Dr. Horn gives the exact measurement of one of the Shāhjān’s cannon, Jāhān Kushā (World conqueror) found at Murshidābād, West Bengal. This gun made by welding bore a poetical inscription of eight distiches to which were added the information that it was prepared at Dacca in October/November 1637 A.D., and it took charge of 28 sirs (≈50 lbs. approx.) powder. Its extreme length 17 feet, depth of bore 15 feet, diameter of bore 6 inches and diameter of muzzle
1 foot.

The gun Malik-i-maidan (King of the battle-field), was described by Dr. Horn as quoted by W. Irvine as the largest piece of ordnance in the world. Its metal is an alloy of 80.27 parts of copper to 19.573 parts of tin. Its dimensions are: Total length - 14 feet 3 inches, diameter at the breech - 4 feet 10 inches, diameter at the muzzle - 5 feet 5 inches and the diameter of the bore - 2 feet 4 1/2 inches.

It was cast at Ahmadnagar in 1548 A.D., during the reign of Burhan Nizam Shah, by a Turk named Muhammad, son of Hassan. It was first described by Moor, who believed it to have been cast by Alamair in 1685 A.D., but the copy of the inscription given by him, does not bear this out, for it commemorates the capture of Bijapur in that year and not the casting of the gun.

The following is the measurement of another big gun commonly known as 'Great Gun of Agra'. It is like an immense Howitzer, above 14 feet long and 22 3/8 inches in the bore. Detail measurements are as follows:

Nature - 1500 lbs. brass.
Weight - 1049 cwt. 1 grs. 4 lbs.
Diameter of the Calibre - 22.3 inches
Diameter of the Chamber - 10.8 inches
Diameter of the Muzzle - 46.5 inches
Diameter of the Trunnion - 11.3 inches
Diameter of the Base-ring - 48.6 inches
Length of the Piece - 169.5 inches
Length of the Chase including the Chamber - 159 inches.
(Pant has given this measurement as 156 inches. Probably, it is printers' mistake.)
Weight of the shot of iron - 1497.39 lbs.
Weight of shot of marble - 567 lbs.
The value of this gun was estimated to be one lac and sixty thousand rupees.

Major Thorn says, "General Lake had a great desire to remove this trophy from Āgrā to Calcuttā, with a view to transporting it ultimately to England; but though a raft was prepared for its conveyance upon the Jamnāh, the stupendous body of metal proved too heavy for the frame-work, and the whole sank in the bed of the river, where the gun lay buried in the sand when I (Major Thom) saw it."

Again in 1805 A.D., Lord Lake found a fine 72 pounder of the same composition as the 'great gun of Āgrā', together with 76 brass guns and 86 iron guns of different varieties, such as howitzers, carronades, gallopers and mortars with 33 tumbrils, at Āgra.

At Lahore, there are a few big guns of the Mughal period. The 'Zamsamāh' (The Thunderer), one of the two of this variety, cast by Shāh Māzīr, by order of Shāh Wāli Khān, prime minister of Āḥmad Shāh Abdālī (1747-1773 A.D.). This is made of brass and Mahammad Latif is of opinion that it was used at the battle of Pānipath (1761 A.D.), but it is
inconsistent with the date the gun bears (1179 H. or 1765-66 A.D.). The other gun was lost in the Chenab river; and later on this gun was removed by a Sikh leader, Har Singh Bhangi, from a village two miles away from Lahore, where Ahmad Saha had his arsenal. This gun bears an inscription of twenty-two lines. The last two lines are as follows:

"Bad taslim bâ guftá : Top; Paikaar-tazhmeh, atash-baz." (1179 H.)

The meaning is, "After obeisance he exclaimed, 'The dragon shaped, fire-vomiting, cannon'.'"

The length of this particular gun is 14 feet 4½ inches and the diameter of the bore is 9½ inches.

Miscellaneous war materials. There are various other war instruments known to us, which are mostly of obscure use and application during this period, as opined by the historians. These are Badalijāh, Manjaniq, Sang-Rad, Sarkob, Top-i-hāwāe, Muqābil-kob, Chādar, Haqqah-i-ātash as mentioned by Horn.

Badalijāh is probably a kind of cannon, but no detail is available. Ghulam Ali Khan uses the word 'badaliji' while speaking of the war materials to be found in Lahore Fort in 1752 A.D.

Manjaniq has been defined by Stæingass as a warlike engine, catapult, balista, sling a pulley, or machine for raising heavy weights. So it is also not clear to us but this seems to be of a nature of a catapult. Similarly, Sang-rad
is probably another name for a catapult for throwing large stones. Steingass calls it a stone ball for a cross-bow or a stone roller for smoothing flat roofs. Sarkab as mentioned in Ākbarnāma, is described by Horn as a wall breaker or batter ram.

Top-i-hāwāe is probably an airgun as referred to by Horn. Irvine referred to Massir-i-Ālamgiri (p.295, line 13, 1098 H.) and described Chādar as something that can be fired off but he could not give us any detail. In another place he described it as a kind of mantel used as a field protection to gunners, or a kind of tent. The second meaning seems to be more correct. Haqqah-i-ātash is a kind of bomb either fired from a mortar or thrown by hand.

Light guns — Gajnal, Hātnal, Shutarnal, Zamburak, Shahin, Dhamakāh, Ramjānki and Rakhalah are the names of some of the light guns used by the Mughals.

Gajnal and Hātnal literally mean 'elephant barrel'. So, it may be inferred that they were fired from elephant's back or elephants were used as its transport and dismounted before actual firing. Likewise, Shutarnal, Zamburak and Shahin refer to the same weapon which is described as swivel-gun or wall-piece. Shutarnal literally means 'camel-gun' and denotes the fact that they were carried on and fired from camel's back. Zamburak means a 'little wasp', probably in allusion to its sound when discharged or its power of stinging or wounding. Shahin means a falcon. Dhamakāh and Ramjānaki are also the usual names for some sort of field-
pieces of matchlock, while Rahkalah is a small size bullock-cart used in connection with artillery.

Matchlocks — Akbar claimed great credit for the improvement introduced by him in manufacture of matchlock. Tufang is the common matchlock chiefly used by the foot-soldiers who occupied inferior position to that of cavalry in the opinion of the Mughal commanders. The barrels of matchlocks were of two lengths, one 86 inches and the other 41 inches. Both were made of rolled strips of steel with two edges welded together and the stocks were highly decorated with the surface ornament. Sakh-i-Tufang was the heavy matchlock and is mounted on a tripod stand at the time of firing. The Tufang-i-Frang was the imported matchlock and very costly, found in possession of the nobels. Flintlocks were little known to the Mughals and the percussion weapon was never seen.

Besides these fire-arms there were many other such weapons namely, carbine, sherbâchâh, mortar, pistol etc. which were the same as used by the Sikhs.

Among the weapons used by the Indian soldiers at present are different varieties of rifles, sten-machine-carbine, light machine-gun, medium machine-gun, mortar, rocket-luncher, cannon, gun, pistol, bombs of 18th century, Hyderabad State, British Indian 1st and 2nd World war, Japanese, Italian, German, Belgian, Iranian, American and Spanish origins, Bayonet etc. I shall not go in details about these
modern weapons for the present, as it is not within the scope of my present study.

War materials as gathered from visual representation in Indian Art:

If we turn our eyes towards the various sculptured and painted caves, paintings of different schools, sculptures, temples and available coins of India, many more evidences can be gathered about different war materials used in different historical period in India. Dikshitar quotes what Baden Powell wrote, a century ago, "It will be interesting when, some day, some antiquarian is found to reproduce the various ancient forms of weapons as they appear in the sculpture."[192] This is exactly what a museologist can and should do in a museum of war and weapons and the present thesis attempts to emphasise on this aspect of the study in museology and Military history based on all kinds of historical documents.

Here, I have made an humble attempt to study, as far as possible, only a few interesting sculptures, paintings, coins and seals relating to India's prehistoric, ancient and medieval arms and war materials which disclose many interesting facts about our knowledge and skill on military studies.

Archaeologists in India have unearthed numerous seals representing different arms and weapons of pre-historic period from Indus Valley area. These seals bear beautiful representation of trident, lasso, bow and different types of
arrows such as simple, batsadanta and ardhachandra type.

In Sānchi sculpture we find sieges and triumphal processions as a regular feature. In a siege operation as represented in one of the reliefs we find the warriors' dresses are tight-fitting, short but broad swords are hanging on their left side and they all have bows and arrows in their hands.

In Sānchi, there are eleven topes. Every tope and its pillars represent some or other historical incidents of great interest. On the gateway and on the towers of Tope No. I representing a besieged city, we notice soldiers attacking their enemies with arrows and big stones. No sword is represented here but we find long shields are carried by some of the warriors. On the left are seen a good number of elephants and a horse with rider and two persons carrying ensigns. Quiver on the back of the right shoulder is distinctly visible.

From here we can get an idea of shields, axes, javelins, tridents, daggers, bells, elephant goads, vajra, flags, umbrellas and musical drums of different shapes used during the period of 2nd century B.C. and 1st century A.D. These war materials are well represented by Cunningham in Plate XXXIII, of his famous work 'The Bhilsa Topes', relating to Sānchi sculptures in general.

Probably Sānchi sculpture is earlier than Bhārūt and Mauryan sculpture is earliest in India. But in the opinion of Smith and Dikshitar Bhārūt sculptures are so far known
as the earliest sculptures of India, datable to 1st century B.C. Here in the relief figures of the old Indian broad sword, carriages drawn by bullocks, chariots drawn by horses, different flags and many musical instruments are well represented. The swords are very broad but the length is about three cubits. In close fights these swords are held with both hands so that the blow may be stronger. A more interesting feature is a procession of warriors with uniform and armour, possibly made of leather used during first century A.D. The design of the arrangement of scales on the armour resembles similar discoveries in Khätän by Stein. First representation of stirrup in the arts of ancient world appears in Bhärut relief.

On a pillar of the Amarāvati tope we find straight sword, long spears, warriors on horses and elephants with long bows are nicely sculptured. No chariot is found here but this does not prove that the chariots were not used during those days. More or less similar swords and long bows are noticed in the Hill Caves of Orissa. In the relief sculptures of the temples of Bhabaneśhwar we come across processions of foot-soldiers, horsemen and elephants and small daggers hanging from the waist of every foot-soldier. Here in a frieze, on careful observation a scene of heroes on horses' back followed by foot-soldiers in marching order with straight swords and long bows will come to our notice. This is followed probably by commissariat and other soldiers.
carrying straight swords and oblong shields. On the other side is seen, possibly, military advisers in deep consultation and the army priest engaged in some rituals.  

Further we notice a number of tableaux on the upper verandah of the Rāni Gumphā (Queen’s monastery) in Khêndagîrî near Bhubaneswar dated about 200 B.C. Here a beautiful battle scene between a prince and a princess has been represented. The prince is carrying an unsheathed sword while the princess has no sword but a shield in her hand. It is apparent that the sword of the princess is lost in the battle. In the Gânesha cave too there is another series of tableaux depicting the same story with little modifications. The prince is seen here escaping with the princess on an elephant and a number of soldiers pursuing them. In a hunting scene bows and arrows are represented. In these sculptures we are astonished to see the representation of a lady warrior with sword and shield quite capable to resist a prince. Representation of woman-warrior fighting with arms in ancient India is rare and hence remarkable. 

Bows of 2nd or 3rd century A.D., can be examined in the Nâgarjunakonda railings. These bows are long and may be considered as a link between the bows of the Mauryan period and Gupta period in India. A bronze sculpture of 3rd century A.D., belonging to Ikshwâku dynasty, now displayed in the Nâgarjunakonda Museum, Guntur district of Andhra Pradesh depicts a prince standing with a bow in his hand.
On a stone sculpture of c. 8th century A.D., now preserved at Batavian Museum, Java, Dharmapala, the famous king of Pāl dynasty in India, has been depicted holding a bow. That, during the period of Garjara-Pratihāra (c. 775-1018 A.D.) and the Pāls (c. 750-1150 A.D.) the bows and arrows have undergone no such material change can be proved from illustrations of chariots and armed soldiers on a terracotta plaque from Pāhārpur testifying the use of bow and arrows.

Next when we turn our eyes towards the Konārak temple in Orissā datable to 12th century A.D., we are amazed to see outside the southern façade two big horses, one intact and the other damaged, guarding the gate. The horse is wearing bosses and bands round over the face, chain armour on the neck, tasseled neckless, jewelled bracelets on four legs and tasseled breast-band to keep the saddle in position. Two soldiers with shorts and curved swords are seen being trampled under the foot of the horse. Here we also find circular shields and a number of musical instruments like drum, cymbals and lute resembling modern ones. Other notable objects are a horse led by a soldier, an elephant lifting an 'Asura' and a griffon trampling and goering 'Asuras'.

Again we find a fine representation of bow and arrow in Dilwārā temple (12th century A.D.), Mt. Ābu, where Chakreswari is holding a bow in her left hand and a barbed arrow in the right hand.
When we go through the different text on Hindu Iconography we come across various kinds of objects placed in the hands of the Hindu images. Such objects are called Āyudha which means weapons. These objects can be classified as — weapons and implements, animals and birds, musical instruments etc. They are the respective emblems or attributes of different Hindu gods and goddesses. Among the weapons and implements following are wortmentioning — Cakra, Gadā, Daṇḍa, Kheṭaka, Dharuṣa, Śara, Ankuśa, Pāśa, Khadga, Paraśu, Śula, Śakti, Vajra, Agni, Musala and Khaṭvanga. Rao adds to the above list three more objects, such as Śankha, Tāṇka and Hala or Śīra. In the true sense of the term Śankha can not be called as a weapon of defence or offence but it (Śankha or conchshell) was blown by the ancient warriors to create terror in the mind of the enemies and at the same time for the purpose of inspiring their own men with hope and courage. It would be better to place this Śankha under the category of war musical instrument. Tāṇka, a stone-mason's chisel, and Hala a ploughshare, too, fall under the category of implements but these two might have been used as offensive weapon in by-gone days. Tāṇka is the particular emblem of Lord Śiva as Hala or Śīra is of Sankarsana-Saladeva. Cakra, the wheel represented in two ways, either as a cart-wheel or as an ornamental disc; sometimes looking like a lotus in which petals serving as the spokes and Gadā, the Indian club or mace, usually represented as stouter than Daṇḍa or a cudgel
are attributes particular to Viṣṇu along with Śankha mentioned earlier. The mace or Gadā held in the hand of Viṣṇu is also called 'Kaumodaki' or 'Koumodi'. Kheṭaka is the shield, round or oblong in shape and made of wood, metal or hide is basically a weapon of defence. Kheṭaka made of hide is also known as Garma. Dhanus and Śara are a bow and an arrow. Different names are given to the bows held by different gods such as Pināka, Sāranga, Puspahanva etc. Ankuśa is the elephant goad and Pāśa, a noose or lasso is the weapon for binding the enemies. This Pāśa is sometimes represented in the form of a snake and then it is called Nāgapāśa. Khāḍga denotes a sword and various other names are also used to denote a sword particular to different deities. Paraśu and Śula denote a battle-axe and a trident respectively and these two are common weapons of Lord Śiva. Śakti is the spear, the special weapon of Kārttikeya and Durgā. Vajra means a thunderbolt. This weapon is particular to Indra and Śiva. In earlier art Vajra has been represented either as a club, narrow in the middle portion and wider at both ends or as a double-faced weapon ending in projecting prongs. Agni represented as a ball of fire placed in one hand of Śiva-Natarāja. It may be depicted as a torch serving the purpose of an incendiary weapon. Musāla is an ordinary cylindrical wooden rod used as an offensive weapon. It is held in one of the hands of Balarāma, whose most particular weapon is Hala or Halikā i.e. plough. Khatvanga is a peculiar type of club made of
humorous or femur bone to which a human skull is fixed through its foramen. The description of the weapon shows how ugly and frightful it is but in some medieval representations the osseous shaft has been replaced by an ornamented well-carved wooden handle. This weapon is peculiar to the awe-inspiring forms of Śiva and Durgā such as Cāmunda and Bhairava.

Lastly, I must mention about the image of Virabhadra, another manifestation of Lord Śiva, which stands on the Kalmunda with Bhadrakāli in the Perur temple, in Coimbatore district. The image has one head but three eyes, matted hairs and thirty-two hands. The sixteen hands of the right side hold respectively the symbol of protection from fear (abhayaprada), sword, trident, cakra, damaru, bow, arrow, ploughshare, lotus, scad of knowledge, barbed spear, dagger, rudrāksamālā, khatvanga, club and battle-axe. The other sixteen left hands hold respectively the symbol of blessing, a piece or wood, the hammer, the goad, the noose, the fire, the snake, the deer, the bell, the bow, the gun, the lotus, a water pot, the shield and two others not identified.

No study of Indian weapons and war materials will be complete without any reference to Indian paintings. The Indian paintings unfold a picturesque view of contemporary life. The paintings portraying hunt, warfare etc., give us an idea of the war materials in use, their technique and strategy.
Pre-historic painting in India is rare. On the walls of caves in the Kaimur Range, Central India, we find primitive records of hunting scenes crudely drawn. Drawings of latter Stone Age are found in the Vindhyā hills and graphic representation of hunting scene is located in the caves in Rāigarh. "The earliest datable paintings are in Jogimā caves, which depict the long spear, bows and arrows. In the scene the arrow has pierced right through the animal's body."

The weapons depicted in the Ajentā Cave paintings are very primitive, simple and common variety. Here we find curved daggers, scimitars with or without scabbard, shields, quivers, long lances with diamond shaped blades and streamers from the spears flying in the air. Pant writes, "Of the two dozen different types of weapons, sword has been painted not less than fifty times. In Cave No.1, a painting shows two soldiers armed with short swords and shields. In Cave No.2, a lady is seen kneeling before a king who is brandishing a naked sword. A painting in Cave No.17, depicts the Rājā of Benaras being escorted by armed soldiers. In it could also be seen a sleeping king whose sword along with the belt is by his side. A series of paintings depict the flight of a whole army of elephant riders, horsemen and infantry which was routed by king Saudās."

In the battle scene of "Vijay's conquest of Ceylon" war elephants, horses and archers are carried in curricles, are represented. Almost every variety of weapons then in use
can be found here. Cakra, Lance, Chopper, Shields, both oblong and crescent shaped, double curved Bows, square and round Quivers, and pot-shaped skull-cap helmets have been painted nicely. The warrior's dresses appear to be made of two pieces — one from the breast to the waist and the other from the thigh to the soles. Standards flying from the sharp ends of the lances and instruments of martial music like drums and kettle-drums are also vividly represented. The horses and elephants are provided with beautiful ornamental trappings but one peculiarity is noticed that no stirrup is seen anywhere. "Representation of ships and boats in the wall paintings are mostly found in Cave No.2 (522-650 A.D.). One such vessel is a sea-going ship with a huge stem and stern. The other type is a crocodile-headed large vessel. A few of them are loaded with infantry, cavalry and elephants under the command of Vijay are ready for the landing in Ceylon."

The illustrated copy of Babar-Nama, a copy of which is lying in the National Museum, New Delhi contains 183 paintings. Babar-Nama depicts a typical method of Mughal expedition. Babar's flanking parties, his barricade of chained carts, his mobile reserve and his excellent combination of cavalry and artillery are well represented here. It gives us an idea of the successful exploitation of almost all the major principles of warfare. In the scene of the Battle of Pánipath (1526 A.D.) we find Babar protecting his
vanguard by rows of numerous movable carts tied together by ropes of hides. Small iron breast-plates are seen arranged in succession in between the wagons to protect the musketeers and just behind the artillery is the advance-guard. Bābar himself took his position in the centre, flanked by his heroic soldiers.

In another scene we notice, Bābar himself directing the war, riding on a horse. His army detour right and left to make contact with his enemies and on reaching the enemies' rear shower arrows on them. Here the Indian elephants are depicted with their māhouts shot down and the wounded animals running backward treading and trampling their own soldiers.

During Akbar's reign Mahābhārata was translated into Persian by Naqīb Khān, Ābdul Qudir Bahainī and Sheikh Sultan and was named as Rasnāmā. A copy of this book which contains illustrations of war scenes, contemporary weapons etc., is well preserved in the City Palace Museum, Jaipur. All the important weapons and accoutrements used during Akbar's reign have been illustrated in Āin-i-Ākbarī — a copy of which can be seen in the Prince of Wales Museum, Bombay. In it we also get the technical names and the methods of handling of these weapons. In the National Museum, New Delhi, we find a painting of early 17th century, depicting confronting warriors. In a Mughal miniature painting datable c.1740 A.D., emperor Shāh Jāhān has been shown as holding a long spear. In its background army movement and operations have been
portrayed. During Aurangzeb's reign Mughal paintings declined rapidly and the skilful painters migrated to Áudh, Bengal, Mysore, Hydrábad etc., but Rájasthán paintings continued to flourish and in most of the Rájput paintings weapons and battle scenes can be discerned. A Rájput warrior with his sword, shield and dagger has been portrayed in a painting of Jaipur School, now preserved in the National Museum, New Delhi.

Pant refers to some rare manuscripts depicting battle scenes now in possession of the National Museum, New Delhi. "Yusuf Zuleikha written by Maulána Abdul Rehman Jani in 9th century A.H., contains battle scenes in which the king is seated on a 'Hordah' fully equipped and being escorted by his soldiers. .... Khamsa-i-Nizami of Muhammed Mumina dated 996 A.H. (1588 A.D.) contains dramatic war scenes. Horse-fighting is specially noteworthy; dead soldiers, wounded horses and the heroism of the warriors have been boldly portrayed. The fight with camels can be seen in the 'Lišá Majma' written by Katib Mustafa. The Sháhnama of Firdausi is a treasure house with minor details of battle arrays, camping and drilling. The National Museum, New Delhi has several copies. The one, dated 1060 A.H., is fully illustrated. The war tactics of the medieval Sultans have been remarkably sketched. The soldiers are fully armed with armours and so protected were the horses and the elephants. Mehr-o-Mushtari, Bhágvat Puráña (Devnágrí script), Mahábhárata
(Udyoga Parva, 18th century A.D.), Durga Saptasati (miniature copy), Kalpasutra (illustrated), Bhāgavat Purāṇa (late 18th century A.D.) are equally interesting manuscripts for the visual study of warfare in India. The history of Nizâms of Deccan has been described in Tuzuk-i-Asafiya, (12th century A.H. or 18th century A.D.). In Folio No. 47 the fighting forces are facing each other. A big fort is being bombarded by the artillery and cannons on wheels. Horses and elephants are fully protected with armours. The chariots are not to be seen at all. ..... Darab Nâma containing the paintings of Kashmir School A.D. 1797 is an informative treatise for our study.

Similarly, a careful study of the Deccani, Mârâthâ and Sikh Schools of painting is sure to provide us with fascinating information of the military traits of the then soldiers. Thus the study of Indian paintings also enlighten us with the knowledge of weapons and warfare.

Though coins are issued mainly for the purpose of trade and exchange, yet they serve as an invaluable aid for the study of weapons and other war materials in different ages. On close examination of the various coins found in different places in India we notice some kinds of weapons and armours depicted on them and they are as follows:

Bow, arrow and quiver – The bow and arrow along with other weapons are frequently seen on the coins of Indo-Bactrian and Indo-Greek kings of 3rd to 1st century B.C. On
Indo-Greek coins, Apollo is shown with a bow held in his hand or resting on the ground. The king on the coins of Artemidorous stands with a bow either in Sampada or in Vikāta position. Many specimens of this Indo-Greek coins are preserved in the State Museum, Lucknow. Bows kept in a case with narrow bottom and broad top can be noticed on the coins of Zoilos preserved in the British Museum. Simple bow with curved stave and straight string is usually marked on the obverse of early Andhra coins from Kolahpur, and a second variety includes a wheel and bow and arrow illustrated by Cunningham on Taxila coins. Apolo is seen in a standing posture facing left, holding a bow in his left hand and an arrow in the right on the copper coins of Apollodotus; likewise on the coins of Ziclus, Apollo is seen facing right with an arrow holding with both hands and a quiver hanging from his back. On coins of Demetrius (c.200 B.C.), Artemis is represented as standing with a bow in his left hand and pulling an arrow from the quiver by his right hand.

Andhra coins of Vasiṣṭhipura and of Gautamiputra (c.100 A.D.) represent a simple bow string and a broad barbed arrow, but the coins of Bhumaka (c.120 A.D.) depict a Vajra (thunderbolt) between a pallet and an arrow pointing upwards. Again on the lead coins of Mathāriputra Sivalakur (c.200 A.D.) as unearthed from Kolhapur we find a bow with its string hanging and an arrow facing upward. On coins of Nahapana belonging to Kṣaharata family, barbed arrow is
marked on the reverse and on the obverse we see outline representation of early semi-circular bow and a simple arrow.

On Gupta coins we get representations of bow and arrow of various forms — from simple curved stave to five curved stave where the ends of the stave curved upwards. Again on close study of these coins one can easily conjecture the different modes of shooting bow and arrow.

Spears and javelins — The representation of spear and javelins on ancient Indian coins are numerous. The coins of Aryanamitra (c. 1st century B.C.) show a male figure in standing position holding a spear in his right hand. The coins of Bhānamitra too depict spears. The Lord Kārtikeya standing with a spear in his right hand has been shown on some Ujjaini coins. Again six-headed Kārtikeya with a leaf-shaped pointed spear has been depicted on the Yaudheya silver coins (variety III).

Many Indo-Greek, Indo-Pārthian and Indo-Bactrian coins too depict spears. On gold coins of Diodatus (c. 240 B.C.), Zeus is represented as hurling a Vajra and a spear is seen on his right. On the coins of Bukratides, Dioscuri is seen with a long spear and Nike is seen holding a spear on the copper coins of Antimachos. Again on coins of Heliodres, Zeus is shown with a lance in his left hand. On coins of Aces, the king on a horseback with a couching spear is seen. Similar posture is depicted on a silver coin of Vonones. From the study of these coins it can be concluded that
Indo-Greek and Indo-Bactrian kings were good horsemen and they preferred spears, lances and javelins than the weapons like swords and daggers.

Among the coins of Kusān dynasty we find Kanishka has been depicted as carrying a spear. On the reverse of another coin of the same king, a person with a head-gear with plume is seen holding a spear. The spear has been very frequently represented on numerous coins of the successive rulers of this dynasty.

Smith has identified the so-called 'standard' as a spear on the 'Standard Type' coins of Samudragupta. Again in Gupta period we find on the reverse of the 'Peacock Type' coins of Kumārgupta-I, spear has been depicted in the hand of Kārtikeya.

Sword — It is really strange to note that though sword has played an important role in ancient and medieval Indian warfare, still it has been rarely depicted in Indian coins. What we find on Indian coins is not a sword proper but sceptre only. Very rarely on Indo-Bactrian and Indo-Greek coins sword is represented. On a silver coin of Heliodor (c.150-140 B.C.) Zeus is represented with a long sceptre in his left hand and similarly on the coins of Antialkidas (c.140 B.C.) Zeus is seen with a sceptre holding in the left hand. In the State Museum, Lucknow, there are several Indo-Greek coins but none of these coins represent a sword or sceptre.
On the Kushān coins however a sword is often depicted. On a gold coin, Kanishka is depicted as offering at an altar with his right hand in standing position and holding a spear in his left hand while a sword is hanging from his left side. Likewise, another coin of Kanishka represents a figure with a helmet with plumes and sword hanging from his left side. On the coins of the subsequent rulers of Kushān dynasty sword is also depicted. On the reverse of a gold coin of Huvishka, the figure of a man seated on snakes with a double edged, broad ended sword in his right hand is nicely depicted.

On the various types of Gupta coins such as 'Chhatra Type', 'Horseman Type', 'Cakravikram Type' and 'Rhinoceros-slayer Type', different kinds of swords are depicted. On the 'Chhatra Type' coins the swords are straight with plain pointed blade and a cut on its right. On 'Horseman Type' coins we see the swords having straight long blade with triangular pointed end and the knob of the hilt is short, round and simple. Straight double edged swords are represented on 'Cakravikram Type' coins and swords having sharply curved blades with blunt pointed end similar to 'Shāmsher' of latter period are depicted on 'Rhinoceros-slayer Type' coins.

Dagger — Like the swords, daggers too are very rarely represented on ancient coins. On punch-marked, tribal, Indo-Greek and Indo-Bactrian coins it is never found till
to-day. However, on many Pandyan coins and Vijayanagara coins dagger has been represented. Again on ‘Elephant-rider Lion slayer Type’ Gupta coins of Kumārgupta I, the king is portrayed with a dagger in his right hand.

**Battle-axe** — The battle-axe attached with a trident is portrayed on Audumbara coins. On the silver coins of Dharghosa and Vimaki, similar tridents with battle-axes have been depicted. The battle-axe is further shown on copper coins of Jayadaman, son of Chastna (c.120-150 A.D.). Pant has referred to ‘Battle-axe Type’ coins of Samudragupta. He finds the battle-axe in the left hand of the king and the shaft of this weapon is of the same height as the king.

**Mace** — The mace or a club has been depicted on many ancient coins. On the reverse of Rajuvala, Class III, variety-A, of coins (c.40-20 B.C.), Hercules is depicted with a club or mace in his hand. On the obverse of a square copper coin of Lysias a mace is shown over the shoulder. Again on the coins of Spalahores and Vodonos, Hercules has been portrayed with a club on his left shoulder. Knotted club is depicted on the reverse of the square copper coins of Menander. Among the Gupta coins, Pant refers that “mace has been depicted on ‘Cakra-vikram Type’ of coins of Chandragupta-II. Here it has been shown as an attribute in the left hand of Cakrapurusha.”

**Trident** — The representation of trident along with an axe has already been mentioned before. On the
obverse of the coins of Brihaspatimitra-II (c.2nd century B.C.) of Kausambi and of Dhanadeva and Agnimitra (c.100 B.C.) tridents are clearly depicted. It is also seen on Pāṇḍya coins and on Chola coins associated with bow.

Ankuśa — Actually Ankuśa or goad is not a defensive or offensive arm but it is an essential war material associated with elephant corps to control the elephants. On coins of Gomitra, Vishnunmitra, Purushadatta, Balabhuti and Rāmādatta of the same dynasty, elephant goads have been depicted.

Vajra — On the gold coins of Diodotus (c.240-230 B.C.) and on the copper coins of Demetrius II (c.200 B.C.) Vajra or thunderbolt has been depicted. Again, on the coins of Rajuvala (c.40-30 B.C.), Pallas is seen holding Agni (fire) in the left hand and hurling Vajra by his right hand. A Vajra along with a shield has been depicted on the reverse of the silver coins of Menander. Vajra is also found on the coins of Bhumaka (119 A.D.) and Nahpana of Kesararata family.

Helmet — Generally on Indo-Greek coins we find that all kings have been depicted as warriors with helmet on. On the obverse of silver coins of Sophytes (c.305 B.C.), the king's head with helmet on is seen. Flat head-gear is portrayed on the obverse of a silver coin of Antialkidas. Similarly, on the obverse of square copper coins of Strato and Agathokleia a female figure probably a queen has been
depicted as wearing a helmet. Again, on the obverse of silver coins of Menander, helmeted head of Athena can be seen.

Shield — On careful examination of Indo-Greek coins we find that the goddess Pallas holding a shield is depicted on the reverse of Menander's coin and similarly Zeus is portrayed with a shield on Agathocles' coins.

The discussion on Indian weapons is concluded here with the remark of Sir George Birdwood: "For variety, extent and gorgeousness, and ethnological and artistic value, no such collection of Indian arms exists in this country (England) as that belonging to the Prince of Wales. It represents the armurer's art in every province of India, from the rude spear of the savage Nicobar islanders to the costly, damascened, sculptured, and jewelled swords, and shields, spears, daggers and matchlocks of Kashmir, Kutch and Vizianagram. The most striking object in the collection is a suit of armour made entirely of horny scales of the Indian armadillo, or pangolin, encrusted with gold, and turquoise, and garnets."

Armour.

An armour may be called as a defensive weapon. For an easy and clear understanding in a museum gallery it is better, to classify the armours under two main heads — (a) Armour used by the soldiers and (b) armours used by the animals engaged in warfare. The different kinds of armours
and their mode of wearing have a direct bearing on the arms used in the battle. To a museum visitor the armours used by the heroes and the animals through ages are sure to produce a lively interest.

The armours used by the soldiers are again classified as shields and body armours. In Sanskrit language the common terms for the shield are Āvaraṇa, Carma and Phalaka whereas body armours are called Varman, Kavaca, Sannāha and Tamu-trāṇa.

Indians knew the use of armour since the days of Rg Veda. Lord Varuna is mentioned there as wearing a golden mail with lustrous appearance.

Shields — Mahābhārata furnishes us with many details about the materials of early shields. There the frequent use of the term Carma for a shield probably expresses that the heroes preferred hide-shields than others and these hide-shields are prepared from the skin of bulls and tigers. They are profusely decorated and damascened with golden stars, moons and crescents. But from the description it is now difficult to guess how they were prepared or held.

In latter period, Sarkar is of opinion that the shields used by the soldiers of king Porus are made of a coiled cane branch frame, with a cover of raw ox-hide, but not metal coated. Sensarma expresses his doubt 'whether the Carmas used at Kurukṣetra were similar or prototype of the same could not be clearly made out.'
During Mauryan age, in Kautilya’s Arthasastra we get various types of shields — Peti, Carma, Hastikarna, Tālamula, Kavāṭa, Kiṭikā, Apratiḥata and Valāha-kāṇṭa. Peti is a mat like shield made of creepers, Carma is prepared of hides of different animals, Hastikarna as the name suggests is a broad cover made of leather to save the face and probably it looks like the ear of an elephant. Tālamula and Kavāṭa are wooden shields. Probably the former is made from the wood of palmyra tree and the latter one is like a simple wooden board. Kiṭikā is a light shield made of reed and leather. Apratiḥata is the shield used for self-protection but the material by which it is prepared is not explained though the name indicates that it is very strong. Similarly, Valāha-kāṇṭa as suggested by the commentator is like Apratiḥata but its edges are wrapped with iron fringes.

In the literary works of still latter period (c.1100-1200 A.D.) in Mānasollāsa and Yukti-Kalpataru shields are mentioned. Someśvara is of opinion that the shields should be round (vartulāṇi) in shape and the materials to be used for their preparation must be canes, bamboo, wood and hide as already mentioned in Arthasastra.

When we go through the military history of the Mughals, Rājputs, Māhrāthās and Sikhs in India we again and again come across the references of shields made of the materials used by the earlier heroes of India.

In the Mughal period shields were of steel or hide,
generally from 17 to 24 inches in diameter. If of steel, they were often highly ornamented with patterns in gold damascening; if of hide, they had on them silver or gold bosses, crescents or stars. The kinds of hide used were those of the Sambar deer, the buffalo, the nilgau, the elephant and the rhinoceros, the last being the most highly prized. Brahmans who objected to leather had shields made of forty or fifty folds of silk painted red or ornamented.

Tilwah and Chirwah are two types of shields carried by the Shamshebaz or gladiators, who always remain surrounding emperor Akbar when on the march. The description of these shields are not available. Likewise, Kherah is a fencing shield but I do not find any figure of it. Irvine presumes it as Girwah or Garwah, both meaning a round or circular shield, but not Kherah, because he too does not find any such word in the dictionaries. Phari is another kind of shield described by Blochmannas a plain small shield made of cane or bamboo. Mara or Singhauta is constructed of a pair of antelope horns tipped with steel and united at the butt-ends may be classed as parrying shields. A few Mughal shields painted with hunting and fighting scenes are kept in the National Museum, New Delhi.

Rajput shields are famous for their designs, colour schemes, 'ganga-jamuni' and other pattern of welding. The shields bearing the ornamental work of 'ganga-jamuni' produced by the combination of copper and brass or silver, gold and brass are well preserved in the Central Archaeological Museum,
Jaipur, depicting scenes from Hindu epics.

Marāṭhā soldiers used complete steel shields or shields made of rhinoceros skin. "As to their targets they are exactly round convexing almost to a point on the outside, light and covered with so smooth and hard a varnish of lacquer that if tolerably good they will easily turn a pistol ball."\(^\text{256}\)

To a Sikh warrior, shield made of 'Gāidā' (rhinoceros) hide or buffalo skin is an indispensable item even when he is not engaged in war. At that time generally he slung the shield across his back. Sikhs also use metallic shield studded with four or more gilt bosses on the convex side and shields made of crocodile skin. These shields are mostly circular in shape with a diameter of 20 inches and fitted with a cotton pad with two leather straps at the centre of the concave side for holding in position.\(^\text{257}\)

Shields are represented also in ancient frescoes. At Ajantā we get three types of shields — round, curved oblong and parrying type. Mrs. Cordington is of the opinion that the round variety was probably made of hide. The curved oblong shields might have been made of black and white bamboo basket work, while the parrying type was probably made of metal. She further says, "The patterns of these long shields are most interesting and vary greatly. Round hide shields are common in modern India, elephant and rhinoceros hide being chiefly used. The little parrying shields to be seen
at Ajantā is iconographical and appears in many Southern Indian sculptures.\textsuperscript{258}

Body armours. — Besides the shields mentioned above, there are various other kinds of protective devices worn by a warrior on different parts of his body, starting from the head down to the feet. All these devices are described here as body armours.

At the site of Indus Valley culture, some small domed pieces of copper with two perforations on each of it have been excavated. Probably, these were sewn on to a tunic and used as a coat of mail.\textsuperscript{259} No other evidence of pre-historic armour has been found till date.

The term Varma and Drapi as referred to in the Rg Veda prove that some kind of corselet is being used by the Vedic people. The materials used for this purpose are not known to us. Macdonell and Keith are of opinion that the Drapi means a mantle or cloak.\textsuperscript{260}

In the epic epoch we find lots of references of body armours such as Kabaca, Sirastrāna, Kanṭhatrāna, etc. Though no single chapter is devoted in Mahābhārata on the particular aspect still we get their references scattered in different chapters of the book. In Kurukṣetra war all warriors had put on coats of mail made of the skin of deer and other animals. It may be mentioned that Kabacas worn by Yudhiṣṭhirā, Duryodhana and Aśvatthamā were all golden. Similarly, we get references of Sirastrāna for protection
of head, Kanthatrāṇa for protection of throat and neck region, Hastatrāṇa for protection of arms and hands and Angulitrāṇa for the protection of fingers. Duryodhana had a head-piece formidable to look. In Rāmāyana too we find that when Bharata went to meet Rāma, Guhaka, the Nishāda king thought him as an enemy and so asked his men to be ready for an attack with their mail accoutrements, but we have no detail descriptions of these body armours mentioned in Rāmāyana and Mahābhārata from which we may reconstruct those things for the present study. 261

Passing over to 4th century B.C., it is noted that the corselet used by the king Porus in the battle of Hydaspes was shot-proof and "remarkable for its strength and the closeness with which it fitted his person, as could afterwards be observed by those who saw him." Still king Porus was, "wounded in the right shoulder, where only he was unprotected by mail." 262 According to Curtius the armour of Porus was embellished with gold and silver. 263 So, it is believed that king Porus's mail was made of some kind of metal but here too no description is available to determine whether it was of the cuirass type or an interlinked chain mail. Sarkar writes about king Porus's foot-soldiers, that, "they wore no armour, and thus had no metallic plate to protect their heads and breasts." 264

Arthaśāstra refers to several varieties of body armours made of horns, skins, hoofs of animals like rhinoceros,
elephant, buffalo and cow and of iron.

The four important varieties of armours, all made of iron are Lohā-jāla, Lohā-jālikā, Lohā-pātta and Lohā-kavaca. The first two are undoubtedly a hauberk of interlinked chain-mail. Lohā-jāla covers the whole body including the head but Lohā-jālikā is either a cover of iron-net that keeps the head unprotected or a coat of mail that protects the bare-headed body. Lohā-pātta is an iron cover for the whole body except the arms whereas Lohā-kavaca is a cuirass only. Sutra-kankaṭa is most probably a quilted cotton jacket. The armours for other places of body are summed up by Kautilya as Śirastrāṇa to protect the head, Kanṭhatrāṇa to guard the neck and throat region, Karpēsa, a cover for the trunk region, Kancuka, a protective coat extending as far as the knuckles, Varabana, a cover extending upto heel region, Pāṭṭā, an iron cover for the other parts of the body except the arms and Nagodarika, the gloves for the fingers. Here again the detail description as well as the figures of these armours are lacking.

In the early medieval age, Mānasollāsa (c.1100 A.D.) mentions about coats of mail (sannādah) made of iron, cotton, hide and bark of a tree. King Bhoja’s Yuktī-kalpataru (c.1200 A.D.) too as edited by Pandit Iśwar Chandra Śāstri refers that metal armours, though known at that time were used by the heroes of higher classes only for their intricacies and high cost. The ordinary soldiers were satisfied
with simple coats of quilted cotton as body armour. It further refers that a good armour must fully surround the body, and in character it must be light, tough and impenetrable; whereas too heavy, thin and easily penetrable armour with hole or fissure is a bad armour.267

When we pass on to still latter period of Indian military history it is noticed that during the Mughal rule armours were used in large number. The arms and armours are commonly known as Silāh (plural Āsilāh) which is worn by warriors of all classes. High ranking military persons may use costly, decorated and damascened armours. The main varieties of body armour (bagṭār or baktār) are as follows:268

(i) Baktār — Though it is the general name of a body armour, 'baktār' in a more specific sense means a fish-scale armour.

(ii) Cāhar-āināh — It literally means 'four mirrors'. It is composed of four pieces — one breast plate, one back plate and two smaller side plates. All the four pieces are provided with steel hooks and connected together with leather straps. The front and the back plates are rectangular in shape but the side pieces are curved on the top for easy insertion under the arm-pit.

(iii) Zirīh — This is a coat of mail with sleeves and composed of small iron chains. It generally reaches up to the knees but the variety used by the horsemen is short reaching up to the waist. The Baktār or the Cāhar-āināh is worn over the Zirīh.
(iv) Jaibah — It is any kind of coat of mail studded with small studs all over the body.

(v) Joshan — Probably it is a steel breast-plate reaching up to the region of stomach and abdomen and so it is an armour for the chest and the belly.

(vi) Angarkhah — This is the Hindi term for a coat. Possibly it is an ordinary tight-fitting quilted coat of cotton which reaches up to the knee region to guard against sword-cuts. It may be used just beneath the chain armour.

(vii) Dagla or Daghlah — It is an ordinary coat of quilted cloth used by ordinary soldiers.

(viii) Jamah-i-fatahi — It is a fine silken robe used by the men of higher rank beneath the coat of mail during the battle and on it, extracts from the Qur'an are embroidered or sewn.

(ix) Chihalqad — It is a doublet worn over the body armour.

(x) Sadiqi — It is a coat of mail more or less like the Joshan having the rectangular and convex shape to protect the chest and the belly but provided with epaulettes.

(xi) Kothi — It is a long coat of mail worn beneath the breast-plate and opens at the front.

(xii) Bhanju — It is just a sleeveless jacket.

(xiii) Kamal — The word literally means a blanket. So, it is a wadded coat of quilted cotton or wool and possibly made of blanketing on the outside to stand the stroke of a
sabre. "Almost every soldier in the service of a native power has his head secured by many folds of cotton cloth, which not only pass round but likewise over it and under the chin and a protection for the back of the neck is provided of similar materials. The jacket is composed of cotton thickly quilted between cloths, and so substantial as almost to retain the shape of the body like stiff armour. To penetrate this covering with the edge of the sword was to be done only by the practice of cutting." It is also considered that a Kamal stuffed with silk refuse may withstand a bullet.

(xiv) Patkah — It is some sort of military equipment but Irvine could not describe it. Pant describes it as a leather or multicoloured cotton belt wrapped round the waist to hold different light weapons.²⁶⁹

(xv) Khud — This is a kind of helmet and is also called as Top or Dabalgah. Several varieties of it have been noticed. This head-piece may be round or oval shaped with visor or nose-guard and surmounted by a small steel rod of square, pentagonal or octagonal shape. It may be inverted mango-shaped or square shaped with chains on all sides hanging down, It may also be flat cap like without a visor or a surmounting rod. Separate steel pieces hinged together with chains or long network of chains with a very small round iron knob on the top has also been noticed.²⁷⁰

(xvi) Khoghi — As no figure or specimen of it is available, Irvine failed to identify the word 'Khoghi'. He
is of the opinion that the word might be 'Ghughl' which
denotes folds of cloth adjusted on the head as a defence to
protect it from the rain or a sword blow. 271

(xvii) Mighfar — It is a mail or a net-work of
steel hanging down from the head-piece over the neck and
back or it may be worn under the helmet as a protection for
the face. 272

(xviii) Jiblam — Irvine is not definite about its
nature or form, because the Hindi dictionary meaning of the
word is armour or coat of mail or visor of helmet. However,
he suggested the word equivalent to 'visor of helmet'. 273

(xix) Kantha-sobba — It is a neck-piece or gorget
worn by a warrior but Blochmann wrongly described it as
attached to horse’s neck. 274

(xx) Ranak — It is a sort of iron leg-piece or
greaves made of small steel rings and fastened with hooks.
It is worn over a cotton trousers. 275

(xx1) Mosāh-i-achāni — It is a diminutive form of
Ranak or iron-stockings which are simply wrapped over the
shoes as foot-guards. 276

(xxii) Dastwānah — It is the gauntlet or a mailed
glove consisting of two separate steel pieces hinged together.
The upper part extends from the wrist to the elbow but the
lower portion is shorter in size and a velvet piece is
attached to this lower portion for covering the fingers. 277

Like the Mughals the Rajputs too use helmets, body-
armours, foot-armours, trousers of mail, hand-armours etc.
and they are all made of damascened steel with heavy decora-
tion. Rajput helmets are beautified with peacock's plumes. They have not invented any amour for their use. Some Rajput body armours are well preserved in City Palace Museum, Jaipur and other palace-museums at Udaipur, Jodhpur, Bharatpur and National Museum, New Delhi.

Among the Marāṭhā soldiers it is noticed that the officers are better protected with helmet and chain amour but ordinary warriors are not encumbered with heavy baggage and equipment. They only wear a turban, a simple jacket and tight-fitting trousers. The helmets used by the high-ranking officers are generally of steel. "It was a recurved pointed cap of steel springing from a circle of conventional gilt-leaves. The front had a sliding nose-guard which extended under the chain and was flanked by a pair of portaigresteel(?) Their complete body armour consists of a helmet or top, Chārāinā, Zirih, pair of arm-guards and a broad belt made of stripe of steel.

On careful study about the military system of the Sikhs in India, it reveals that the Sikhs used helmets for protection of the head, steel plates for chest, back, waist, arms, legs, and other parts of their body. The helmets are provided with nose-guard and are surmounted in the centre of the convex side by small iron shafts to hold plumes of Kashmir-herons or white horse's hairs. The visor is of thin flat steel plate, triangular in shape and fixed at the front side
with steel hooks. It can be moved upward and downward at the will of the person using it. A curtain of interwoven small chains is attached to helmet in such a way as to protect the neck and the ears. Sometimes metal plates of proper size are fitted to the neck and a portion of the shoulder and the outer side of the helmet is nicely engraved with inscriptions and geometrical designs. It is further decorated with floral designs in golden colours. This helmet used by high official is known as Zirikullah, whereas an ordinary sepoy uses flat circular or rectangular cap having chain armours all-round. Inner side of the helmet is provided with cotton pads which may in some cases be too long to cover the neck and the ears.279

The armour for the protection of the front and back of the body is either made of chains or of plates. Chains are formed of small iron rings hinged together and the chain armour fitted with four metal plates, fixed or detachable, is of common use and is known as Char-aina. There are instances of armour entirely made of one piece metal block but due to its heaviness it is rarely used. These coats of mail are either sleeveless and reaching up to the waist of the wearer or full-sleeved and long enough to reach the knee region of the wearer. Further the inner side of these armours is well padded with velvet or cotton and the outer side of the plates are nicely damascened with inlaid gold work.280 The lower part of the body is protected by 'Pyjāmā-Zīrā', the mail
trousers made of small iron rings joined together with leather straps and buckles. Fingers are also protected by short chained armour lined with velvet pads. Upper arms are however protected by the shoulder pads of cotton or velvet studded with short mails. Again, the foot-armour used by a Sikh warrior is an oval shaped chain armour padded with velvet and placed upon the shoes to afford full protection and free movement of the feet. Besides these armours, leather girdle with decorations and Kimkhab padding is worn round the waist and it holds daggers, sword, pouches etc.  

Armours used by the animals:  

Horses and elephants are mainly the animals deployed in battle-field and they are always protected with armours.  

Since the days of Mahābhārata we get references of dresses and ornaments used by the horses and elephants though, no descriptions of those things are available. Kautilya too refers that trainer of horses will advise about the dresses and the person in charge of a particular horse (suta or sārathi) will advise about the armours of his horse.  

The Mānasollāsa, a medieval text speaks of horses 'well-protected by means of body armour' — 'Gātra-trāna surakṣitāh aśvaiḥ'. During the Muslim rule in India, mounted archery became popular and at that time we get the following names as horse's armour:  

(1) Kājim — It is a piece of armour for the back-quarters of a horse and is stitched over a quilted cloth called 'artak-i-kājim'.  

(ii) Gardāni — Pant describes it as a frontlet, Blochmann describes it as a thing which hangs down in front of a horse's chest. Irvine reports, "Gardāni, however, is the name still applied to the head and neck-piece, the hood, of a set of horse-clothing."^265

The other articles worn by horses are — Paltah, a headstall; Inan, the reins; Dumachi, the leathern strap looped under the horse's tail; Khogir, the saddle; Zerband, the martingal; Ustak (?), Balatang, the surcingle; Rikāb, the stirrups; Shikarband, the ornamental tassels at corners of saddle. Pant however described Balatang as ornamental tassels at corners of saddle, though he also referred to Irvine as his source of information. Similarly, Ustak has been described as 'shabracque' and 'sharbrasque' by Irvine and Pant respectively but I failed to identify the thing. ^266

The elephants on the other hand are provided with armour called Pakhar. This is made of steel plates fixed to a carpet and fitted tightly on the back with the help of ropes. The term Kājim is also generally used for an elephant armour. As elephants are used to batter in the gates of fortresses, they are provided with steel frontlets. The riding elephants carry an armour-plated, canopied seat, called an Imari, whose sides are about three feet high to protect the rider with the exception of his head and shoulders from all long range attack. Irvine quoted Hāji Mustāphā that the Imari and the Rāndāh "are different, the former has a canopy and is used for travelling or for purposes of state, the
latter has no cover and is employed in war." Again he says, "the Haudah is made of boards strengthened with iron, having the shape of an octagonal platform, with sides eighteen inches high. In war time the sides were raised to two feet, and were then covered with iron or brass plates. It was divided into two unequal parts; in the fore part, about three-fourths of it, a man can easily sit with his pillows and cushions, or upon a stretch, two men. The hind part held one men, and that with difficulty." He further adds that when, "covered with a canopy it is called 'Amhari' and is not used in the field." 

Elephants thus protected with armour can be seen in the paintings of the Mughal school, preserved in the National Museum, New Delhi.

The Forts.

The instinct of self-conservation and protection from the vagaries of nature and the attack of wild animals probably drove the primitive men into the natural shelter of caves or structural huts built on the tree or inside the lake on wooden or bamboo platforms. With gradual progress of human skill and knowledge man constructed houses with earth, leaves, bamboos etc. Society also become more and more organized. Everyone's desire of self-protection transcended into the collective desire for the protection of the society; presumably this basic motivation led to the creation of fenced villages and walled cities — the probable precursor of well organised forts.
Forts normally means a building or a set of buildings well protected from external aggression with adequately preplanned defended structure, providing required facilities of pouring sufficient attack on the enemy to repulse the same. Forts, however, always remained essentially defence oriented structures and were never meant for aggressive operations.

In the days of individual or clanish warfare probably no significant fort existed. In India, however, forts were constructed even before the arrival of Vedic Aryans. The towns of Mahenjodaro and Harappā were walled towns with adequate arrangements for protecting themselves and their inhabitants for months together from external aggressions. The Vedic literatures, the Epics, the Purāṇas, the Jātaka and other ancient literatures contain massive informations and descriptions of forts; unfortunately most of these forts have not yet been excavated. It is also difficult to imagine whether all those forts could be found out even by considerable excavations, as many of those might have been converted into ruins. But, from the available descriptions from various literatures and archaeological reports, models of those forts can be constructed. It must be admitted that these reconstructed models, in some cases, may not be the ideal replicas of those which they would represent, but undoubtedly would be very near to them and thus a base may be prepared for improvement through more excavations and researches.
During the early Hindu period of Indian history, forts do not appear to have played conspicuous role in war, but fortified cities, defended localities or defended areas existed. Some of those still exist, while many of those could not withstand the destruction by the nature coupled with prolonged neglect and lack of necessary care and conservation. Like the forts described in the ancient literatures, these forts also can be reconstructed from the available descriptions and/or ruins so far excavated.

Forts became very important in the medieval (Muslim) period. In those days most of the battles were fought to capture the forts. The Muslim rulers or other rulers of the medieval India, by and large used to keep their families and royal seat in some fort or the other and govern their states from a fort or to completely fortify the royal city. Most of those forts still exist, though many had been modified subsequently for various purposes, while some of them had met the similar fate of the early Hindu forts.

Study of the forts — their plan and construction, administration — makes interesting inroads in the military engineering skill, storage arrangements, architecture, nature of war, as also it gives a better picture regarding the evolution of military culture. It also forms a major part of the military history. Thus from the museological point of view the galleries with the models, maps, charts and photos of the forts and fortified villages, towns and cities of the different ages arranged chronologically would not only be
colourful and attractive but also be highly educative. For this reason the descriptions of various types of forts have been compiled and analysed. On the basis of these descriptions gallery models of different forts may be prepared.

Indus Valley civilization is recorded as the earliest civilization in India. Its date is calculated between the period c.2500 B.C. and 1500 B.C. Before 1946 A.D., prior to the excavation at Harappā, it was believed that Harappā and similar other towns were unwalled. It was Sir Mortimer Wheeler, who disproved by excavations our wrong belief and Mackey finds out some traces of walls at Mohenjo-dāro.290

Both Harappā and Mohenjo-dāro sites have certain striking common features visible even on surface before excavation, and these similarities have been confirmed by the works of archaeologists. Both the cities were situated by the side of a river, Harappā lies beside an old confluence of two branches of the river Rāvi while Mohenjo-dāro stands on a narrow strip of land between the main bed of the Indus and the Western Nārā loop. Both the cities are surrounded by great rampart or 'bund' of mud and mud bricks which forms the earliest phase of the citadel of defences.291

In the matter of actual planning and layout of these two cities, Wheeler's work at Harappā has thrown much light. In both the sites the extant remains consist of an irregular series of mounds towards the east and the higher
and compact mound placed centrally on the edge of the site to the west. In both the places this mound is roughly a parallelogram, measuring about 400 yards north-south and 200 yards east-west; at Harappa its height is 50 feet above the level of the surrounding plain but at Mahenjo-daro it rises up to 35/40 feet. At Mahenjo-daro much has been recovered from the original street plan to show that this high mound to the west stands centrally between the two main east-west streets. Those mounds are the ruined remnants of impressive fortified citadels, in which, on an artificial platform of mud brick 30 feet high, stood certain buildings of peculiar plan, defended by a battered wall of baked bricks facing mud-brick core, with rectangular towers at intervals interlaced in the wall and great gateways. The Harappa evidence is full, and is derived from the first excavation conducted on the Indian proto-historic sites which follows modern archaeological techniques, but here the buildings on the top are so ruined as to render their plan incoherent.

But for details on this site we can turn to Mahenjo-daro, and interpret the unexcavated remains of the defences there from the discoveries at Harappa.292

Here the defence shows two phases of reconstruction. After the original work has been weathered and has suffered substantial damage, the burnt-brick revetment was built again in better fashion than the original work and broadened in some places. In the second phase of rebuilding,
the north-west corner was reinforced by additional salient and the two entrances of the western gate systems were wholly or partially blocked which proves fall of the city due to flourished intrusive culture in that area. Wheeler remarks significantly, "In this latter phase of the city the Harappâns were on the defensive." 293

At Mahenjo-dâro Wheeler shows by a little field work rather than by actual excavation, that similar defence must have surrounded the western most mound on that site, now crowned by a Buddhist stupa of the 3rd or 4th century A.D. 294

There are other smaller mounds representing villages and towns dominated by massive fortified citadels. The site Âli Murâd in Sind is surrounded by a stone wall 3 to 5 feet thick, which encloses an irregular rectangular area, within which lies houses and at least one well — such an humble village fortification must have been the normal provision for safety. At Sutkagen-dor in the Makran, however there is a more massive fortification, and a rectangular area 125 x 170 yards is enclosed by a wall, built of roughly squared stone blocks, 30 feet wide at the foot and with vertical inner face, and the outer face battered at an angle of 40 degrees. Stein considered its probable original height to have been from 30 to 25 feet, and the whole site is clearly a very strongly defended citadel. There are traces of an entrance only 8 feet wide, with probable flanking
towers or guard houses, in the south-west corner, and there had been houses both inside and outside this gateway.

At Kohtrās Buthi in Sind of undivided India, there is a small settlement on a hill spur to form, in European archaeological terminology, a 'promontory-fort' of the site. This fortification suggests comparison with another Sind site that lies on the Tharro Hill. Here is an isolated, flat-topped hill, now inland, from which it would have projected as a promontory. The fortifications at Kohtrās Buthi, take the form of double walls, curved and massive construction and 250 feet apart, cutting off the southern headland of the hill in true promontory-fort manner.

In Vedic literatures, references of fort can be seen. The word 'Durga' in Sanskrit means 'difficult to go into'; hence it means a fortified area or simply a fort.

That the Vedic people knew the use and construction of forts is certain because in Rg Veda we get the mention that the tribal people live in fortifications known as 'Pura' and 'Dehi' meaning rampart and defence-wall respectively made of clay and mud strengthened by a kind of palisade of unknown ingredients or by a stone wall. Rg Veda also refers to forts made of stone and iron if "ayas" is to be translated as iron. Regarding iron forts, Pant is of opinion, that "iron forts appear to have been used in the metaphorical sense. It refers to the forts stronger in nature and not the one really made of iron." But in much
latter period during 13th century A.D. we get the reference of a citadel made of iron in 'Manasāmangal Kābya' where Chand Swadāgar, the father-in-law of Behulā constructed an iron stronghold on a hill. In another place we get the reference of cities with hundred enclosures or 'Satabhūjī'. Bhāṭṭāchāryya translated it as hundred cities made of stone, but Muir says that "This no doubt suggests the idea of forts consisting apparently of a series of concentric walls as actually existing in the country at that time." In the opinion of Macdonall, the Purās are fortified enclosures constructed at the time of danger, without any building within it.

The Kauśīṭāki Brāhmaṇa describes the 'Upasadas' as the citadel of the Asuras. They used to take refuge here against the gods. Similarly, in the sacrifice portion of the Aitareya Brāhmaṇa, the three Agnis are described as forming three forts to prevent the Asuras from disturbing the sacrifice.

Coming to the epoch of Indian Epics, we find different types of forts. The Rāmāyana describes fortified cities and mentions about four different types of forts such as Nādyā Durgā (river fort), Parvata Durgā (hill fort), Vana Durgā (forest fort) and Kytrima Durgā (artificial fort).

Here, from the descriptions of the cities of Ayodhyā, Kiśkindhā and Lankā the capitals of Rāma, Sugrīva and Rābana respectively we get a clear pen-picture of well
developed fort architecture.

The famous city Ayodhya was built by Manu near river Saraju. It was twelve *yajanas* in length and ten *yajanas* in breadth provided with well planned broad and spacious roads throughout. Strong gates with massive doors provided with good locking system were there at regular intervals. The whole city was surrounded with high wall and just by the side of the wall was a fathomless moat. The buildings were well protected with hundreds of *Sataghnis*, and well decorated with flags. Numerous artisans, merchants, soldiers and other classes of people used to stay there. All kinds of arms and ammunitions were stored there and garrisoned with trained horses, cows, elephants, camels and donkeys, and above all, corn fields and gardens met the eyes everywhere. On the whole the city was impregnable to the enemies and was stocked with necessary food and arms for its protection.

The fortified city of Lankā has been beautifully described in the Yudhakanda of the Ramayana. Here Ramamāna narrates the description of the city as he saw. The city was garrisoned with horses, elephants, chariots and hundreds of brave soldiers. Its doors were huge, massive and fastened with big and strong bolts. The four entrance gates were provided with automatic projectile machines to throw stones and arrows at the invaders. Hundreds of *Sataghnis* made of iron were stationed in a regular order. Unscalable walls
surround the city and their sides were decorated with precious metals and stones. Just outside the wall there was a deep and wide moat filled with ice cold water containing wild aquatic animals like crocodiles. Over the moat there were four mechanised bridges protected on both sides with huge destructive engines. Four-fold forces were on constant watch over the area. The royal citadel was situated on the top of a hill and further protected by various other types of natural and artificial fortifications.

In Mahābhārata six kinds of forts have been mentioned, such as desert fort, earth fort, hill fort, human fort, artificial fort and forest fort. But here we do not find any mention of water fort which seems to be very peculiar. Human forts seem to be unfortified cities well protected by vigilant guards and loyal population.

The Sānti Parva of the Mahābhārata contains several chapters dealing with the fortifications of cities specially during the time of state emergency. Yudhiṣṭhira, the eldest Pāṇḍava enquired Vishma about the cities in which the king should live. In reply Vishma was of opinion that a king should construct his cities keeping in his mind the six types of forts mentioned above having all kinds of affluence and every kind of materials of use in abundance.

The forts should be protected by inaccessible walls and trenches, must contain sufficient stock of food and provisions, be teemed with cows, steeds and elephants and be inhabited by men well conversant in different kinds of
mechanical arts, and lastly, the arsenal must be full with the stock of different types of weapons and ammunitions. He further advised that the king must increase his stock of timber, iron, horns, bones, bamboos, fuel, chaff, charcoal, marrow, oil, ghee, fat, honey, medicine, flax, shafts, leather, catgut, cane, resinous exudations etc.

In the Adi Parva, of the Mahabharata the development of the fortified city Indraprastha, present Delhi, has been nicely described. Being advised by the king Dhritarashtra, the Pândavas went to Khândabprastha which was at that time an unreclaimed desert. There the Pândavas first selected a suitable land area, performed some ritual ceremonies and started to construct their capital city. They fortified the city by cutting deep and wide trench surrounding it and constructing high massive walls encircling the city. Gateways were well protected and the walls were furnished with darts or pointed missiles. The turrets on the walls were manned with armed soldiers and the whole length of the wall was lined with armed men. Moreover, sharp hooks, Śatāghanis and various other machines were decked on the battlements.

In Mahabharata we get the reference of a city named Giri Braja as the capital of king Jarasandha. The city was naturally fortified by five hills called 'Vaibhara', 'Varāha', 'Vrishabha', 'Rishigiri' and 'Chaitaya'. The gates of the city are closed after sunset for everyone including the king. The city is presently identified with Rāja Griha.
of Buddhist literature and consequently the modern Rājgir in Bihār. From the ruins of the Rājgir, the Giribraja of Mahābhārata is still recognisable. The city was surrounded by a strong ten feet high and sixteen feet wide wall made of uneven and undressed stone blocks, each measuring about four square feet and very carefully adjusted and bounded together. This stone wall has joined the tops of all the five adjoining hills encircling the whole valley. Above this rampart there were small super-structures made of stones, bricks and wood. At intervals there were solid rectangular bastions made of same materials of about two-hundred square feet (50' x 40') to strengthen the wall. From the inner side of the wall there are stairs and ramps to give access for the soldiers to the top for defensive purpose. Still to-day ruins of some of the watch-towers and gates are visible. One such watch-tower of fifty square feet made of unfinished stones piled one upon the other is called by the local people as 'Jarāsandha-ki-Baithak' and similarly local peoples are of the opinion that in those ancient days Dauvārikas used to sound trumpet from the top of the tower to announce 'Praharas' (time) at regular intervals.

Again in Mahābhārata we get another detailed description of fortification of the city Dwārakāpurī, the capital of Lord Krishna. On request of Yudhisthira, Vāsudeva described that on hearing that the son of Śrutasravas (Śiśupāla) had been slain by him, the king Śalva stationing his horses
in array, besieged the city around and above and stationing himself in the upper region began his fight to enter the city, but the city at that time was well-fortified for defence on all sides, according to the science of fortification with pennons, arches and miners, streets barricaded with spiked wood-works, towers and edifices with gateways well-filled with provisions and engines for hurling brands of fires, balls, bullets and hot liquids, vessels of deer-skins for carrying water, trumpets, tabors, drums, lances, sataghnis, plough-shares, rockets, balls of stone, battle-axes and other weapons and shields embossed with iron. The warriors placing themselves on commanding posts, aided by cavalry and standard-bearers began to defend the city. To prevent carelessness and chaos orders were passed throughout the city that nobody should drink, everyone must remain calm, sober and watchful, mimes, dancers and singers were to be driven out of the city, bridges over rivers were to be destroyed, boats were forbidden to ply, trenches around the city must be spiked with poles at the bottom, two miles land area around the city were made uneven and holes and pits were dug there on and combustibles were scattered below the surface, all streets and open spaces of the city were filled with numerous horses, elephants and warriors of tried valour. This was Dwārakā, abounding in well-ordered arrangements, was defended by Ugrasena.

From the descriptions of forts and fortifications given in the Rāmāyana and the Mahābhārata, we get a clear
pen-picture about the defensive methods adopted in a fort. The forts are protected by strong walls and ramparts. To provide additional protection deep and wide ditches are dug surrounding the citadel, that can be compared to an ocean. It is so described that the ditches of Rāvana's fort are unfathomable and full of dangerous aquatic animals. The ramparts resemble like masses of white clouds or radiant like the moon. Here the adjectives clearly prove that the walls are coated with white plaster or paint. Generally in every fort four gateways called 'Gopurams' are constructed for entry into the city and each gate is approached by crossing a bridge over the ditch supported by pillars and platforms. The entrance is protected by strong doors and bolts. Watch-towers and various other structures are there to watch the movements of the enemies outside the city wall and the soldiers there from can throw various types of weapons aiming at the invader without themselves being watched by the enemies. By studying all these features, it can be safely said that during the epic period we had well developed fort architecture.

The Jātaka period is datable not later than 1st - 2nd century A.D. The Jātakas are the stories of Lord Buddha's former births in this world. The numerous stories told in Jātaka Kāhini have references of forts and fortification. Ottāhaka, Attālaka, Prākāra, Parikhā etc., meaning simple towers, towers with quarters for the watchmen, ramparts
and ditches respectively are the essential features of the citadels of the Jātaka period.*

The Kautilya's Arthaśāstra contains description about four types of forts, such as Audaka-dūrga (water fort), Parvata-dūrga (mountain fort), Dhanvana-dūrga (desert fort) and Bana-dūrga (forest fort). Of these four types, according to Kautilya, Audaka and Parvata forts are best suited to defend populous areas while Banadūrga and Dhanvana dūrga are habitations in wilderness where the king may take shelter in extreme emergency.

Kautilya further says that all these four types of forts may be subdivided into two types in each case according to their nature of position and construction.

The forts shall be surrounded by three artificial moats of 84 feet, 72 feet and 60 feet wide at an interval of six feet distance from one-another. The depth of the ditches will be less by one-half of their width. The bottom will be square in shape and width will be one-third of the width at the top. Its sides will be constructed with stone and bricks and must always be filled with perennial flowing water or with water drawn from different sources. Lotus plants should be cultivated and crocodiles reared in this water.

A rampart 36 feet high and 72 feet wide is constructed at a distance of 24 feet from the innermost moat by putting mud upwards and shaping it square at the bottom and oval at the centre. Thorny and poisonous shrubs are planted and the gaps in the rampart is filled up with earth.
Parapets in odd or even numbers keeping intermediate space of about 18 to 36 feet in between them are constructed above the rampart by bricks and raised to a height of twice their breadth.

A path for chariots is constructed by thick stone slabs on the rampart. Square towers with movable ladders are also constructed. In the space between two towers there shall be two-storied buildings with broad roads. In between the tower and this broad street there shall be a 'seat called 'Indrakośa' for affording seats for three archers. Inside the 'Indrakośa' a secret path is constructed. In the unassailable part of the rampart, a passage for flight and an exit door are to be made.

The paths exterior to the rampart shall be filled with traps or made difficult by artificial obstructions like knee-braker, trident, wells or pits, small heaps of earth, wreaths of metallic thorn, iron instruments prepared like the tail of a snake, triangle, dog's teeth, plmyra leaves etc., small ditches filled with spikes and covered with sand, frying-pans fitted on small holes and lastly water pools containing poisonous water.

The rampart is made bulging on both sides to the extent of 9 feet and the entrance gate of the fort is fixed to it. The gate should be one-sixth as broad as the width of the street. A turret starting from the top of the parapet shall be constructed above the gate and its front should
resemble like a makara (crocodile?). The apex of the gate will be 3 feet wide and the doors shall consist of 3 to 5 parts so that it can be opened wide as required. At the centre of the door there should be mini-door of 7½ feet opening. The opening of the complete door will be so wide that four elephants can enter at-a-time.

A lotus pool, a rectangular house of four compartments, one within the other, a circular building with an archway and with the availability of space and materials, canals are to be constructed in the centre of the parapets. In those canals various types of deadly weapons shall be collected.

Kautilya further states about the buildings within the fort according to the following plan. Allocation of ground inside the fort shall be made by opening six royal roads, three from west to east and three from south to north. There shall be twelve gates provided with land, water and secret paths. Besides these there shall be roads of different width leading to villages, burial ground, military stations, gardens, forests etc. The royal palaces will be constructed on solid lands. On the north of the palace reside the royal tutelary deity of the city, iron-smiths, artisans working on precious stones and also the Brahmins. On the north-east quarters for teachers, priests and ministers, sacrificial place and water reservoirs shall be situated. The stables of cows and horses are to be constructed on the north-east. On the eastern side there
shall be accommodations for traders of scents, garlands, grains and liquids, and for expert artisans and people of Kashatriya (warrior) class. Royal kitchen, elephant stables and store houses shall be constructed on the south-east side of the palace. The treasury and the accountant's office shall be placed on the south-east. To the south will live the superintendents of the city, commerce, manufactories, the army and also those who trade in cooked rice, liquor and meat. Accommodations for prostitutes, musicians and the people of Vaiśya caste should be made here. On the south-west store house of forest products and the arsenal shall be constructed. By the west dwell the artisans manufacturing cotton or worsted threads, bamboo-mats, skins, armours, weapons and also the people of Śudra caste. Lastly, in the centre of the city, the apartments of gods, such as Aparājītā, Apratīhata, Vaijayanta, Śiva etc., shall be situated.

There shall be one well for drinking water for every ten houses. Materials for war and daily uses shall be stored in the fort in such quantities as can be used and consumed for years together without feeling any want or shortage.

According to Manu, hill fortress is the best type of fort. Standing under cover of the battlement of the citadel one bowman can easily withstand one hundred bowmen. Manu also ordains that forts should be garrisoned with sufficient
equipments of soldiers, machineries and water supply. All sorts of food items should be stored in huge quantity. Without ample provision of these things any amount of defence would be inadequate.

Besides those we also get references of Parikhā Durga, Ratha Durga and Misra Durga. All these forts are generally encircled with strong walls and ditches. The walls are made of bricks, stones and other similar materials and provided with watch towers. The height of the wall is about twelve cubit and its thickness at the base is at least six cubit. 315

In Mānasāraśilpa-śāstra we get references of a few more types of forts such as Padmaka, Svastikā and Karmuka. In Padmaka type fort there may be eight, twelve or sixteen gates and it is surrounded by high wall and a moat. The gates have double doors fastened by strong bolts and above them are placed soldiers with fire arms and other destructive machines. It is mentioned that the best site for a fort is that where sufficient water is available in all seasons. The Svastikā type and Karmuka type forts are more or less cross-like rectangular and bow like semicircular in shape. Here the royal palaces and the residential quarters of the principal officers of the fort are built near the main gateway. The private residences for the ladies of the royal family are placed just behind it. Kitchens and store rooms are located in between them. In the north four-fold forces
are stationed and in the south we get the arsenal and the pleasure gardens. Over the towers coloured flags are flown, watchmen stand near them and musics are played. In the interior portion separate quarters are situated for different classes of men and there are separate water tanks for men and animals. The family deity of the king is worshipped in a special area. Lastly, the streets of various width are all equipped with lamp-posts.

Kanakasabhai has given the description of the fortified city of Mādura, the capital of Pandyān King. The city was provided with beautiful big roads with palatial buildings on both sides. The city was surrounded by a deep forest of shrubs and trees. This was also protected by a very deep moat full of pure and clear water. All round the city there were strong massive walls with huge gates and lofty towers. The royal palace with multistoried buildings crowned with flags of various colours stood high above this.

Viśvakarmā Vāstuśāstra has described in detail about the Gupta fortification. In the 10th chapter of this book we get references of few more new types of forts and their nature of construction based on the site chosen for the same. Besides the forts mentioned earlier, here we find mention of Daivata Durga, Ekaṇukha, Dimukha and Caturmukha Durga, Kurma Durga, Yuddha Durga and Prabha Durga. In case of Daivata (natural) Durga ramparts like formations are formed by nature. Ekaṇukha, Dimukha and Caturmukha Durgas are built on river sides or along the sea coast. They are
provided with one, two or four gates for the purpose of safety and defence and hence named as Ekmukha, Dimukha and Caturmukha respectively. Kurma Durga as the name suggests looks like a tortoise. It is intended to entrap the enemy. It is being provided with concealed approaches and spring traps worked by hidden machines. This is constructed temporarily at a short notice to entrap the approaching enemy and is demolished soon after the purpose is fulfilled. Yuddha Durga or battle-fort is a self-defended place for safety and short rest in the midst of a fierce battle. Lastly, the Prabhu Durga is same like other forts with special devices in the walls for sounding alarm when required. Such special structures in the walls are known as 'Karnas' i.e., ears of the fort.

During Gupta period, the construction of forts is regarded as the prime duty of the king. Here the doors of the fort's gate are secured with double latches. The gateways are surmounted by towers having special structures on either side to serve as an armoury for the vigilant guards.

Thus we find, as days passed the types of forts increased and their layout also changed according to the necessity of time and nature of emergency. However, in ancient and early medieval periods it was considered that a king without a fort is like a snake without poison, but to live in a fort not furnished with sufficient food and weapons is to live only in imprisonment.
In the medieval period of India, we find that the conception of fortresses have not changed much. Though with the introduction of heavy artillery and modernisation of war tactics the importance of fort have much reduced but still the real value of some form of fortresses cannot be undermined. The mere possession of a fort can not by itself be of strength and value.

In this connection the opinion of Rāmdhandra Pant, the shrewed Mārāṭhā statesman counts much. He said, "Fortresses are the very soul of the kingdom. Without forts the population becomes helpless, the country is laid bare and is at the mercy of the invader. Hence everybody aspiring to a kingdom should bear in mind that forts are nation's wealth, constitute the strength of the enemy and are the only place where monarch could enjoy a sound sleep ....... The king should not depend on anybody and should undertake the maintenance of old and construction of new forts himself."

In medieval India the practice of constructing forts and fortified cities was not abandoned. Forts held by Hindu chiefs and by grantees from Mohammadan sovereigns were scattered all over India. Practically, the whole of India was protected by forts or fenced cities and towns. Some of the celebrated forts of that period were situated at Allāhābād, Āgrā, Āligarh, Bharatpur, Ahmednagar, Bharunkā, Chitor, Chumār, Basankot, Daulatābād, Dhārwār, Ekdālā, Golconda,
Beyond vague generalisations and hyperboles, medieval historians did not give us any useful details about how these forts were originally constructed. Probably the military architecture of this period had received little attention from the archaeologists and so the available data are not sufficient for us to determine definitely which parts are attributable to the Hindu kings or chiefs and which to the Muslim rulers that followed them.

These forts were constructed by running massive stone walls round the summit or the highest contour of the hills. The walls were strengthened by making bastions and towers at irregular intervals. In the plains, they were usually constructed on an artificial mound, the earth for which was carried from the foot of the site, thus making on one or more sides big lakes or marsh which serve the purpose of defence against sudden attack. Besides the high walls provided with bastion or tower, each fort had a fortified gate on one side. The path leading inside the fort was of zigzag fashion and was generally enfiladed with guns and loopholes on either side. As an additional protection forts were often surrounded by screen of bamboos or thorny bushes and deep ditches full of water.

A brief study of a few of them will provide us a general idea about medieval fort architecture.
1. The fort of Chitor.

This fort stands on a hill top 500 feet above the ground level of the surrounding country and has steep declivities on all sides. The summit is about four miles long, north to south, but is only half a mile long at its widest part, east to west. The fort is surrounded by a strong curtain wall and approached on three sides, north, east and west, by sinuous paths, checked by massive gates at intervals in their ascent. The curtain wall follows the contours of the edge of the tableland at the top. The main approach road is very steep, serpentine and winds up from the town at the foot of the hill on the western side. Seven massive gateways are situated at strategic points on this approach road. To prevent bypassing of the gateway by flank across the hill face, crosswalls are built. The sinuous path of ascent is commanded by the battlements of the curtain wall as well as from the gateways in its course. The steep path on the north is guarded by one gate at the top but the eastern path is guarded by four gates in succession. At the southern end of the fort there is a small opening in the wall through which criminals and traitors were thrust to be dashed to pieces at the hill foot hundreds of feet below. The curtain wall and parapet run all round the fort at the edge of the steep sides of the hill. The construction of the loopholes at the embrasures ensures both lateral and frontal attacks on enemies just below as well as those further away.
2. The fort of Gwalior.

The Gwalior fort is situated on a long narrow hill of sandstone and basalt, 300 feet above the surrounding land. The area is about two miles long, north to south, and the width varies from 600 feet to 2000 feet, east to west. A thick curtain wall runs all round the fort following the irregular contours of the summit. The citadel is situated at the highest point at the north end of the hill and is defended on the east by a large and powerful outwork that extends down the side of the hill to the plain below and encloses the main approach road to the fort. In the middle portion of the western side of the hill there is a wedge shaped gorge. The mouth of this gorge is defended by a crosswall with bastions at intervals and a gateway in the middle.

3. The fort of Ruhtas.

The Ruhtas fort was constructed by Sher Shah Sur on a hill — 33° degree latitude and 73°20' longitude — on the road to Khurasan to guard Kashmir. It was well fortified but Sher Shah could not complete its construction. The ruins of this fort can be seen in the district and tahsil of Jhelum. The circumference of the fort is about two and half miles. The walls are about 30 to 60 feet high and about 30 feet thick. There are 68 towers and 12 gateways. One of the gates is more than 70 feet in height, which is known as Sohal gate.
4. The Purāna Quilā of Delhi.

The Purāna Quilā at Delhi stands on a long flat mound, about 30 feet above the ground. The shape of the fort is an irregular rectangle. The long side of the fort runs from east to west. Its perimeter wall is high and thick with stairs at intervals. The wall is built of rubble and is about 60 feet high. Its thickness at the base is about 50 feet and this thickness gradually diminishes to 12 feet at the top. The perimeter wall contains numerous apartments which probably used as barracks for the soldiers. There are two tiers of fighting platforms, one from the upper arcade and the other one from the wall-walk at the top. There are three lofty gates — north gate, west gate and the water gate. One side of the fort is protected by river Jumna which flows from north to south and the other three sides are defended by moats.

5. The fort of Rohtāgarh.

The geographical location of the fort of Rohtāgarh is on 24°38' latitude and 82°25' longitude. The fort is situated on a part of tableland about five miles from north to south and four miles from east to west. The perimeter is about 28 miles following the winding of the hills. The area is rocky and barren. Two wide and deep depressions, Kariyāri Kho and Gulunjā Kho, separate the fort from the tableland on the north and the west respectively. The river Sone flows by the eastern side of the fort. Between the south
end of the fort and the rock overhanging the river Sone, there exists a rocky neck region of about two hundred yards wide. Both the sides of the neck are vertical in shape. The sides of the whole circumference are very steep. Rajghat towards the south is perhaps the easiest ascent, which is also very steep. To get inside the fort, it is necessary to ascend a perpendicular rock by means of stairs for a very considerable height. There even the works are narrow and strong and is scarcely visible from below.

6. The fort of Chunär.

From strategical point of view this fort is very important. It may be called as the key to the province of Bihar. This fort is practically invincible without a strong fleet of boats to cut-off supplies from across the Ganges. The rocky neck of the land that leads to the outer fortification is very narrow, where numbers have no advantage in an assault.

7. The fort of Kalinjar.

The fort of Kalinjar is situated on a tableland slightly undulated and about five miles in circuit. The whole area is fortified by a rampart rising from the very edge in continuation of the scarp of the hill. The fortifications are massively constructed of big blocks of stone and is about 25 feet thick. Access to the fort is by a pathway sloping up the face of the hill in an oblique manner at the south eastern side. The path is very rough and narrow
and in some places almost perpendicular up to the lowest gateway that leads into the fortress and is situated at about a fourth of the ascent.

In spite of the general preference of hill forts, the old practice of constructing fortified cities and towns in the plains also continued during medieval period. Some of these cities are Agra, Ajmer, Delhi, Jalore (Jalewar), Kanauj, Meerut etc.

Probably it is clear — and this is the testimony of archaeology — that during medieval period, the wall with towers remained the leading idea of fortification. Though not always, but usually the enclosing wall was further reinforced by a deep moat.

Though the Turks, Afghans, Moghals and Rajputs in India have constructed and maintained many forts all over the country but the Maratha king Shivaji is famous for his forts and his name has been associated with mostly all the old forts of his kingdom. During his time, his empire was secured by a network of forts. Shivaji captured most of his forts by use of bribes, by clever stratagem or by well planned assault. He also constructed new forts for which the hills of Maharashtra offered him suitable sites and Shivaji made full use of the topographical features to ensure complete security to his kingdom. According to Dr. S.N.Sen, "Not a pass was left undefended, not a peak was left unfortified,
and every Taluk was provided with one or more strongholds and the whole country was secured by a net-work of forts.\textsuperscript{320} Shivaji's forts are well defended by stout stone walls and the hill is inaccessible due to natural thorny bush of Opuntia cactus that forms the natural feature of the land. Every fort is provided with Darakhānā (gunpowder house), Ambarkhānā (granary), and Bhāndār (store-house) for oil, ghee and other necessary materials used as daily food for the Mārāthās. The supply of drinking water is another important item which is not over-looked in those days. In a small fort at Sātārā, even to-day we find several tanks and wells that yeild excellent, sweet drinking water. Raigad fort also possesses a good number of tanks and Gorse was told that it was, “the most completely impregnable place in the universe, for the enclosure of it is large enough, independent of the stores accumulated there, to grow grain sufficient for the maintenance of its garrison, which, were it but a handful of men, could with pleasure defend it against the greatest armies that could be brought to take it.”\textsuperscript{321} In Panhālā fort there are three big stone and cement built Ambarkhānā to store 25,000 Khāndis of food grains and they are named after three rivers Gagā, Yamuna and Saraswati.\textsuperscript{322} The soldiers in those days believed in supernatural forces and so the main gateway of a Mārāthā fort is defended by a mini-figure of Hammānji, the great general of the Rāmāyana and inside the ramparts temples and mosques are built. Kinead
observes some skeletons below the foundation of Lohagad. Probably, their owners were sacrificed with the belief that they would render the fortress invincible.

All the forts of Shivaji are built according to one pattern. "The site chosen is usually a cliff or a spit of land more than half surrounded by the sea. The whole top of the hill or the end of the promontory is surrounded by a wall which is relieved by numerous bastions. There is seldom more than one entrance to the fort, and this is generally the strongest part. The outer gateway is thrown forward and protected by a bastion on each side and often by a tower above. A narrow passage winding between two walls leads to the inner gate, which is in the face of the main wall and is defended by bastions which command the approaches..... Inside the main wall there was generally an inner fortress or citadel and surrounding this were the various buildings required for the accommodation of the troops, and also magazines, tanks and wells. The larger forts had generally a town or Pethā clustered about the base of the hill on which the fort stood."  

Gherla or Vijaydurga "is the most perfect example of a great coastal fortress, which was also a place or residence of a chief. It stands on a spit of land projecting into the broad estuary of a river (the Vāghtan), and the communication with the continent was cut-off by a ditch which extended across the spit. The outer part of their extent, and ...... out-works are thrown forward down to the
shore ...... The walls are immensely massive and lofty, and thus looking up from the landing place a triple line of most formidable defences is seen. On one side a great round tower rises from the highest part of the main wall ...... From it the view is lovely and varied. In front the open sea, on one side the broad estuary, and on the other a little cove of white sand bounded by black rocky promontories. Behind, the river stretches away to the blue line of the distant ghâts.325

Songarh or Suvârnâ-durg is a striking example of Sivâji's island fortresses. Its lofty walls seem to rise straight high out of the sea, on a low irregular island having an area of eight acres. Major parts of the fortifications are cut out of the solid rock, and the rest of the portion is built by stone blocks of ten or twelve feet square. Inside the fort there are many reservoirs with sufficient water for a large garrison.326

The west end of the north arm of the Ratnagiri harbour contains a series of fortifications on its high land. Sivâji renewed the massive wall that crests the eastern ridge south to the lighthouse point, and protecting towers were constructed on two commanding points. "But Malvan is the most interesting and formidable of his naval forts. This base consists of a fort on the mainland and two fortified islands about a quarter of a mile from the shore, lying in a bay which is so studded
with rocks and reefs that at low water it looks as if nothing larger than a rowing boat could enter. The largest of these islands Sindhudurga was (probably) meant by Śivājī as a place of refuge from the main land. It is very extensive, little less than two miles round the ramparts. The walls are low, 30 feet in height, and on an average 12 feet thick and have about 32 towers, generally outstanding semi-circles with fire embrasures for cannon. Narrow staircases lead from the inside to the top of the walls. Śivājī is said to have worked with his own hands in fortifying it, and his stone image is worshipped as an 'Avatār' in a temple in it. A smaller fortified island is called 'Pandavgarh'; it is said to have contained Śivājī's ship-building establishments. "The only entrance to the bay at Malvan is by a narrow channel through the rocks and the passage from the land to the island is equally intricate. From the landing place the approach to the front is even narrower than usual....."

Śivājī never entrusted a single man as the sole in-charge of a fort. Three officers of the same status having separate duties were jointly and individually responsible for the protection of the fort. For any matter relating to the fort they must consult each other and their duties also were so clearly allotted and adjusted in such a way that no one can do any work without consulting or taking approval of the others. It was the personal duty of the
Hāvalīdar of the fort to see the gates properly bolted and locked after dusk and opened at dawn and this duty can not be delegated to any other person. It was Śivāji’s strict order not to open the fort gate during night on any account. This system of joint responsibility to protect the fort had two effects, that is mutual co-operation and at the same time effective checks on each other. This system of appointing three officers in a fort was not new in Southern India. It had been advocated and practised by Muhamad Ādil Šāh. But, as Śivāji was much clever and shrewd judge of human nature, he clearly laid down that those three officers must be of different caste only to give an effective check on their joint action against the king and at the same time exploit their dislikes and differences to his own advantage. His officers’ service were transferable and this he did only to provide check against other danger, the vested interest, that may develop among the officers posted in a particular fort for a long period.

Besides the three officers mentioned above every fort had one or more Tatsarnobat according to the size and importance of the fort. This officer was in charge of defence and supervision of the rampart or a portion of it. If the area under control was too big for a single officer, then a section of nine soldiers under the command of a petty officer called Nāik was posted. In times of emergency the fort was reinforced with soldiers and provisions but this
number of soldiers never exceeded 500. These men were equipped with bows and arrows, swords and spears, matchlocks and muskets. They also used rockets only to frighten the elephants of the enemies or to set fire, by chance, at the gunpowder store of the opponents. The bombs as an effective missile were used in the defence of Purandar fort. Śivāji's artillery force was very poor because he had to depend upon the European merchants for supply of guns and ammunition.

Fryer saw, "on the tops of the mountains, several fortresses of Śivāji's only defensible by Nature needing no other Artillery but stones, which they tumble down upon the foes, carrying as certain destruction as bullets where they alight."328

For guarding the outskirts of a fort during day and night Śivāji employed peoples belonging to Bhils, Ramoshis and other predatory tribes in his patrol party. The knowledge of the jungle by-ways made these people good watchmen and as they were of nocturnal habits, loyal and sincere they proved themselves specially efficient in keeping vigilance during nightfall.

Thus it may be concluded that to fortify the forts following points are most important:

(a) In earlier days loosing or occupying forts meant actually the loosing or winning the battle. So the selection of sites for construction of forts are of utmost importance.
(b) Forts must be well protected by water, forests, hills or thorny, poisonous bushes.

(c) Several successive deep and wide moats filled with dangerous water plants and animals are to be constructed and sharp pointed metallic spikes of various sizes are to be fixed at the bottom of the moats for obstructing crossing by the enemies.

(d) The walls of the forts are to be defended by use of guns and other fire throwing machines.

(e) Vigilant soldiers with proper weapons are to be posted round the clock upon the bastions and ramparts. Guard-rooms and watch-towers are to be constructed to watch the enemies from a long distance without being seen by the enemies.

(f) Gateways are to be provided with massive two sets of doors, properly secured by strong bolts and fitted with sharp pointed spikes as a safeguard against attack by elephants.

(g) The forts must be garrisoned with people of all classes but the number of artisans should be proportionately greater because they are required to manufacture war materials.

(h) Underground tunnels and secret paths are to be constructed with connections at different important centres of the city for emergency purpose.

(i) In case of hill forts moats are replaced by
scarp and to make the approach impossible the hill to be scraped in an absolutely perpendicular line all round the main plateau. The artificial scarps are also constructed. Singādā, Āsamṭārā, Jinjar, Pānhālā and Sundergard forts are some of the examples of hill forts.

(j) Besides scarps and moats other measures may also be taken to prevent easy entry into the fort. Some of these measures are such as very narrow and difficult steps for a long distance close to precipices, steep stairs with successive quick bends, low secret passages and trap door that allows single person at a time to pass.

**Battle-formations.**

When two hostile armies face each other, whether looking for the enemy or advancing to kill the enemy it is the usual practice to draw them up in battle orders. It is the duty of the commander to deploy his troops suitably in a formation so as to be ready for immediate action. The battle order or formation is known as Vyūha in Sanskrit. Battle orders are many and of various types and they have been dwelt upon with great importance in all texts on war since ancient age in India.

The basic principles on which different formations to be adopted are: (a) command and control of the commander, (b) the type of ground, (c) the volume of weapons required, (d) the direction of enemy attack, (e) availability and visibility of cover, (f) communication facilities, (g) and
lastly the speed. Those factors may be conflicting but the commander must strike a balance to gain best advantage and so adopt a flexible formation adjustable to suit the ground and the tactical situation.

For an easy understanding of the common people about different types of battle formations in a museum gallery, the following types of Vyūhas as collected by me from various texts on war in India, since the Vedic period, are enumerated below,

**Danda (staff like) vyūha** — This is an array in which the troops placed in the different divisions are arranged in columns or curved lines. Kantilya however describes it as a battle formation where the wings, flanks and vanguard of the army are maintained in equal strength.

**Pradara (breaking the enemy's army) vyūha** — The Danda-vyūha becomes Pradara-vyūha when its flanks are projected forward.

**Drdhaka (firm) vyūha** — When the wings are stretched backward the formation is known as Drdhaka.

**Asahya (irresistable) vyūha** — When the wings are stretched forward to a great length, the formation is known as Asahya.

**Śyena (hawk) vyūha** — When the front portion is made to bulge out after the formation of the wings then the vyūha becomes Śyena-vyūha.

**Cāpa (bow), Cāpakuksi (the middle of the bow),**
Pratistha (hold) and Supratistha vyūhas — When Pradara- 
vyūha, Drdhaka-vyūha, Asahya-vyūha and Syenavyūha are 
arranged in reverse orders then they become Cāpa, Cāpakukṣi, 
Pratistha Supratistha vyūhas respectively.

Sanjaya (victory) vyūha — The formation in which 
the wings are arranged in a bow like shape is called Sanjaya-
vyūha.

Vijaya-vyūha — It is just like Sanjaya-vyūha but 
with a projected front.

Sthulakarna-vyūha — The array in which wings are 
drawn up in the form of a flat ear is called Sthulakarna-
vyūha.

Viśalavijaya-vyūha — Here the wings are made twice 
as flat as those of a Vijaya-vyūha.

Camumukha-vyūha — In this formation the flanks 
and the vanguard are projected towards the wings.

Jhasahya-vyūha — It is the reverse order of 
Camumukha-vyūha.

Sucimukha-vyūha — The formation in which troops 
are ordered to stand one behind the other is called Suci-
mukha-vyūha.

Valaya-bhyūha — It is same as Sucimukha-vyūha but 
the array consists of two such files.

Durjaya (invincible) vyūha — It is also like Suci-
mukha-vyūha having four such files.

Bhoga-vyūha — In this type of battle order the 
troops in the different divisions are arrayed in one continuous
chain. According to Kautilya the main distinctive character of this type of vyuha is that its wings, flanks and front are of unequal depth.

Sarpasari-vyuha — This is a variety of Bhoga-vyuha where the whole army has a serpentine movement.

Gomutrikā-vyuha — This is again a Bhoga-vyuha where the movement of the array is like the course of a cow's urine.

Śakata-vyuha — Here the front is divided into two lines and the wings are like those of Daṇḍa-vyuha.

Makara-vyuha — The converse order of Sakata-vyuha is the Makara-vyuha.

Paripatantaka-vyuha — It is again a variety of Śakata-vyuha having in its columns a good number of horses, elephants and chariots.

Mandala-vyuha — In this vyuha the wings, flanks and front lie in close proximity to one-another, without having any space between them.

Sarvatobhadra-vyuha — Here the army is so arranged as to face enemy in all directions.

Durjaya-vyuha — In this battle order the front is divided into two halves and the wings into four but keeping the flanks as usual.

Asambata-vyuha — This is a kind of formation where the wings, flanks and front are set apart from each other.

Vajra-vyuha — In this vyuha the front is short,
flanks are less extended lines but the rear is made strong with columns.

Ardha-chandrika-vyūha — Here the formation is like a crescent in outline having no depth and the rear is too weak.

Ariṣṭa-vyūha — It is a formation where the chariots form the front, the elephants form the wings and the rear is composed of cavalry.

Acala-vyūha — In this type of formation infantry, cavalry, chariots and elephants stand one behind the other.

Apratihata-vyūha — This formation is like Acala-vyūha but the order or arrangement is elephants, horses, chariots and infantry standing one behind the other.

Cakra-vyūha — In this formation elephants are placed at wings, horses on the flanks and chariots occupy the front.

Madhya-vedi-vyūha — Here the elephants occupy the front, chariots are placed at the flanks and the cavalry takes its position at the wings.

Antarvedi-vyūha — This vyūha is formed by placing the elephants at the flanks, chariots at the wings and the cavalry occupies the front position.

Besides the different battle-formations mentioned above there are many more vyūhas such as Godha-vyūha, Udyanaka- vyūha, Kākapadi-vyūha, Karatkāśringi- vyūha etc., but the details of these vyūhas are not available. Moreover, a commander may
form many more new vyūhas by combination of two, three or more vyūhas mentioned above according to his need and plan for attack or defence.

However, it should always be kept in the mind of a good commander that prime consideration should be given on the nature of the ground before making any particular type of vyūha. The common practice is that, if the ground is level, the army may be arranged on staff-like array or a circular array but if the ground is uneven then snake-like arrays or detached arrays are preferred. In case of complex nature of the ground irregular arrays are recommended.

On a close examination of different types of battle-formations used in various battles in India since the epic period we get the impression of the existence of four kinds of movements common to them — circular, crooked, separate and compact.

During medieval period in India it is noted that the battle-formations adopted by the Mughal emperors in battles of 1526 (First battle of Pānilpath), 1527 (Babar and Rana Sanga), 1556 (second battle of Pānilpath), 1576 (battle at Haldighāti) etc., were very scientific, clearcut and effective till in later days' luxury, pomp and grandeur ruined the entire machine.

Here we find a strong vanguard of well equipped selected troops with artillery. In front of them there spread a few horse-archers who advance and fall back without disturbing the vanguard and at the same time striking its flanks to
the rear when necessary. Just behind the vanguard marches
the main army forming two wings — left and right, and the
central body. Lastly stands the rear-guard or the reserve.
This arrangement was improved by inclusion of detached flank
corps to each wing and the centre, when the total army rose
to unmanageable number.

But the Marathas on the other hand always followed
enveloping tactics with the intention to harass the enemy
and cut-off his supply lines. They never offer a stand-up
fight nor offer a pitched battle like the Rajputs when the
odds are against them. They are the pioneers of Guerilla-
warfare in India. There is a fanciful etymology to the word
'Marhata' by saying that it is the short term for 'Mar Ke
Hat Jata', i.e., 'They hit and run away'.

With the introduction of fire-arms a great change
took place in tactical disposition of armies. But still
to-day modern formations — Single-file, File, Arrow-head,
Spear-head, Diamond and Extended line — are modifications of
different formations mentioned above. This proves that the
erlier formations have stood the test of time and still
serve the purpose both in defence and attack.

So it is observed that the change in armaments in
different periods of history have affected changes in forma-
tions of troops but every method served the purpose of its
own age.

The last word regarding battle-formations is that
we shall not become blind followers of any particular method.
The nature of a battle-formation to be adopted by a commander on a particular occasion depends on various conditions mentioned earlier and so the disposition of troops on the battle-field may take any form or shape according to the suitability of the commander for quick and decisive manoeuvre.

Though there is no set formula regarding battle-formation during an operation, still to conclude I must write that Kautilya is not in favour of giving absolute latitude to a commander in the choice of a battle-formation. He is of opinion that the army should not be arrayed facing the sun or the south or against the wind. It must not take up a position where long stay or quick retreat would not be possible. It is always better to take a position in front of but not long away from a hill or river fortress having all its resources.

**Indian Navy**

It appears that ancient civilization flourished on the river banks and sea coasts and boats and ships acted as the key conveyance to all subsequent progress and development.

India is geographically land bounded on the north by the Himalayas and on the east, west and south by the seas. And historical evidences reveal that from very ancient days she maintains contact with different parts of the worldly land and water. From early proto-historic period Indians had sufficient expertise in shipping and maritime trade. The
antiquity of Indian shipping can be estimated by direct and indirect evidences available from literary and archaeological sources.

Traces of Indian shipping during the Indus Valley civilization are still available in a sketchy drawings scratched on a sherd of pottery and another a more carefully executed engraving on a seal. From the drawings on the sherd one can recognise the high prow and stern, a mast with furled sail and a steerman with a long steering oar. The seal represents a vessel with very high prow and stern, the lashing of which can be distinctly seen. At the centre there is a square cabin or shrine probably made of reeds. A boatman is very roughly drawn in, seated on a high platform in the bows. Stuart Piggot is of opinion that this type of boat represents prehistoric Mesopotamian type but on close observation it proves its indigenous origin. These ships indicate that the people of 'Indus Valley Culture' period were fairly acquainted with shipping and maritime trade. The discovery of Indus Valley objects in Mesopotamia and Mesopotamian articles from the Indus Valley sites also prove direct contact and probably shipping between the people of these two countries.

The excavation at Lothal near Ahmedabad in Gujrat in the year 1959-69 A.D., resulted in the discovery of a big dockyard which indicates the existence of shipping there during the period c.2000 B.C.
Dr. W. Vincent is of opinion that though naval battle in Vedic period cannot be proved, the extensive foreign trade of India from pre-historic period with countries including Mediterranean lands and the African continent probably attracted piracy on the water and so he writes, "at the outset the merchant vessels of India carried a small body of trained archers armed with bows and arrows to repulse the attack of the pirates, but later they employed guns, cannons and other more deadly weapons of warfare with a few wonderful and delusive contrivances." By guns and cannons the author probably meant missile weapons which were used to throw stone and iron balls.

The Rg Veda mentions about seafaring activities of the people of India of the Vedic age. There are several hymns which speak about shipping and ship-wrecking and its rescue by 'Aswinis' in their hundred-oared ship. Another hymn of Rg Veda as mentioned by Dr. S. R. Das runs as follows: "Do thou, Agni, whose countenance is turned to all sides, send off our adversaries, as if in a ship to the opposite shore. Do thou convey us in a ship across the sea for our welfare." Still, Keith in the Cambridge history of India mentioned that, "the Vedic Indian seems to have been very little of a navigator. The use of boats, probably dug-out, for crossing rivers, was known, but the simplicity of their construction is adequately shown by the fact that the paddle alone was used for their propulsion. There is no mention of
rudder, or anchor, mast or sails, a fact which incidentally negatives the theory that the Vedic Indians took any part in ocean shipping. However, Dikshitar does not agree with Keith. He says, "this argumentum silentii does not however prove anything." The Rāmāyana and the Mahābhārata, the two Hindu epics also contain numerous informations about boats, ships and shipping. References of vessels being used for military purpose are also not lacking.

In the Adiparva, when Vidura scented danger about the life of five Pāndava brothers, he planned their escape into the forest through water path by a vessel equipped with weapons. From the description of this vessel we find that it was a mechanised ship fitted with sails and had the power to withstand heavy wind and strong waves and at the same time very comfortable for journey.

Similarly, in the Digvijoy portion of the Sabha-parva it is stated that Sahadeva the fifth Pāndava, crossed the ocean and brought under his sway many islands after defeating Nishāda, the Mlecha king, and other tribal kings ruling there. In Vanaparva it is narrated that the Kalakeya and his associates hide themselves under the sea during day time after killing the Brāhmaṇas during the night. Though it is a mythological fiction which can not be accepted as a fact, yet, according to a class of analyst, it probably suggests the use of sub-marines or ships on the high sea in
which they took shelter. To conclude in this matter, we need more factual evidences.

In Śāntiparva too we find that the navy is one of the branches (anga) of the armed forces.\textsuperscript{342}

It is mentioned in Rāmāyana that Guha, the Nīshāda Raja, ordered thousand Kaivarta youths to keep themselves ready with five-hundred ships to put strong resistance to Dhārata.\textsuperscript{343} Again, Durmukha, who being angry at the deeds of Hanumāna, offered his service to Rāvana, the king of Lanka, to fight on the sea.\textsuperscript{344} Those clearly suggest the use of a fleet for the purpose of war without which fighting on sea is impossible.

Further, in Kiskindhā Kānda, Sugriva speaks of sending his men to Sumāṭrā, Jāvā and even the land beyond the Red-sea in search of Sītā which proves beyond doubt the existence of a naval force in India during the epic period.\textsuperscript{345}

Buddhist text, particularly the Jātakas, gives us detailed information about shipping in India. The story of Vijaya is full of description regarding shipping and seaborne trade. So, in the story of Punna we find that he made a voyage in a big ship which could accommodate more than three-hundred
passengers and cargoes. Digha-Nikaya gives us an interesting account of sea-going vessels with sight-seeing birds. These birds were set free when the ships were far away from the coast for the indication of direction of the land. In Baveru-Jataka there are references of shipping between India and Babylon. The Samudra-Bānipudda-Jataka mentions about ships that sailed to an island in the midst of the ocean. In another place it mentions of a blind mariner piloting the vessel in perilous seas.346

Kautilya's Arthasastra (320 B.C.) clearly states that shipping and ship-building were absolutely a state monopoly. Navādhya or the Superintendent of shipping was in state charge of navigation in rivers and seas. His jurisdiction was on everything concerning ships and shipping including vessels bound for commerce also. Kautilya distinguishes Samudra-Samyanapatha (ocean-routes) from river routes and routes for coastal traffic or Kulapatha.347 Among the sea-going vessels war-ships also figure, bound for enemy's country (amitrāvyayatigah). In Kautilya we get reference of Captain (Niyāmak), steersman (Dātragram or Raśmigrāhi) and servants (Utsecaka) who used to throw out water sipping inside the vessel. It was also the responsibility of the state to look after the ships in distress and to protect the ships against pirates who frequented the seas. Kautilya recommends that the pirate ships and vessels which are bound for the country of an enemy, as well as those which have
violated the customs and rules in force in port-town shall be destroyed. For the greater development of ship-building and shipping, Kautilya enunciates detailed and elaborate rules and regulations. The Navy was an important part of Mauryan Armed Forces, and the state maintained a large naval force; and in peace time those ships were employed in trade is proved by the description of the Board of Admiralty. 343

After Chandragupta, his son and grandson also maintained maritime trade relation with foreign countries by direct and efficient shipping. King Asoka fought deadly against the Kalingas only to have an access to the sea routes. King Asoka's wide diplomatic relation with Ceylon and other distant foreign powers like the Hellenistic monarchies of Mediterranean and ancient Egypt is a sure proof of his sea-going fleet.

In the Sānchi sculptures (1st century B.C.) interesting representations of ships are available. On the eastern gateway there is a representation of a canoe crossing a river with three passengers of which two are steering the boat. The boat is made of rough planks bounded together with hemp or string. On the western gateway of Stupa No.I, a boat is represented with a pavilion, and inside the pavilion, a vacant throne; a male attendant is holding an umbrella and another person steering the boat. These give the idea about shipping in the 1st century B.C., and their popularity.
In the post-Christian period the Indian shipping had reached its highest excellence. In the 1st century A.D., the story of Indian shipping has been recorded by an adventurous navigator, who is a Greek by birth but a Roman subject, whose name is yet unknown but his work has come down to us under the name of the 'Periplus of Erythraean sea'. Periplus throws much light on Indian shipbuilding. He gives us descriptions of different classes of country made ships named 'Sangara' and 'Colendia'. The Sangara seems to be made out of hollowed logs with planks sides and outriggers. The larger Sangara is made of two such canoes joined together by a deck platform. The Colendia is similar to the Chinese 'Junks' and Burmese 'Laung-zat'.

During the period of Gupta imperialism (4th to 6th century A.D.) Indian colonies were being established in far off islands. Inscriptions, literary texts and sculptural representations etc., speak of active shipping in this period.

'Baudhāyana' describes loss of caste to a transgressors of the sea and 'Mama' simply says that such persons should be excluded from participating in sacrifices. Both of them condemn sea voyages but 'Mama' describes definite rules for the guidance of maritime trade. Kalidāsa's 'Śakuntalā' describes the story of a merchant whose all wealth devolved on the king only because he perished in the
Many inscriptions of this period mention navigation and shipping as part of education to be imparted to the princes. In some inscriptions from Bengal there are mentions of docks, dockyards and the custom officials as reported by Sri Das of Calcutta University.

In the 2nd and 3rd century A.D., on the Andhra coins we find figures of ships with masts. This 'ship-type' coins justify the probable existence of a powerful navy during those days and Mahābalipuram was an important port at that time.

Maritime communication with China became more frequent in the 4th century A.D. Fa-hien gives a detailed record of shipping to China. He from an ancient port of Eastern India sailed for months together and went to Ceylon, Java and at last reached the shore of 'Shantung'. From an account of Hieu-en-Tsang, it can be gathered that in the 7th century A.D., the people of Eastern India knew the sea-route from Tamralipta to China.

Representations of ships and boats are found on the wall paintings of Ajantā. They are mostly in cave No.2 (522 - 650 A.D.). Here we see crocodile-headed large ships along with foot soldiers, cavalry and elephants under the command of Vijaya, who is ready to land in Ceylon.

During post-Gupta period (8th to 12th century A.D.) the colonisation of Java was completed and the temple at
Borobudur is still a living monument to Indian shipping and maritime enterprises. In Southern India, during this period we hear about Tamil kings maintaining an efficient and powerful naval force. The Nilgundā Plates of Vikramąditya VI say that king Mangalisa of the early Western Chālukyas set out a naval expedition against the island of Revati and captured it. The Aihole inscription credits Pulakesin II with the reduction of Puri with a fleet of 100 vessels and the Kandur Plates of Kirtivarman II state that Vineyāditya, the grandson of Pulakesin II, subjugated Ceylon with war boats.

The Cholas too maintained a strong fleet. The Chola Rājarāja and Rajendra had powerful naval forces which conquered large number of islands, and the Bay of Bengal was converted into a 'Chola Lake'. King Rājendra's overseas expeditions are most remarkable. He conquered Ceylon. Among the other places conquered by him were Pani or Pani on the east coast of Symārā, Malāiyur at the southern end of Malay Peninsula, Nangasokam in the Malay Peninsula, Mappappalam, a place in the Talaiing country of Lower Burma, Talaitakkolam or modern Takkola in the west of Malay Peninsula, Madammaligam, a place facing the gulf of Siām, Nakkavaram or the present Nicobars etc. During this period active trade relation was established between south India and China and friendly missions were sent by the Chola king to China.
From Elliot's History of India we got a beautiful account of a naval fight in the eleventh century. This happened during the seventeenth expedition of Sultan Mahmud to India. Here we see each ship provided with three iron spikes, one on the prow and the other two on the two sides with the intention that whoever comes in contact with it could be easily destroyed. Moreover each ship was furnished with two archers and also naptha-throwers.355

The Vijayanagar kings too claimed supremacy over the sea. Since the days of Harihara I, the rulers of Vijayanagara adopted the title of the Lord of the Eastern, Western and Southern seas and established three hundred ports in the empire.356 Timoja who commanded the Vijayanagara fleet in 1506 A.D., 'was entrusted with the task of waging perpetual war with Goa' which was then under the Bijapur Sultans.357

The descriptions of Indian ships as given by John of Montecorvino are as follows: "Their ships in these parts are mighty, frail and uncouth with no iron in them and no caulking. They are sewn like clothes with twine. And so if the twine breaks anywhere there is a breach indeed. Once every year therefore there is mending of this more or less if they go to sea. And they have a frail and flimsy rudder, like the top of a table, of a cubit in width, in the middle of the stern, and when they have to tack, it is done with a vast deal of trouble, and if it is blowing in any way hard, they can not tack at all. They have but one
sail and one mast and the sails are either of matting or of miserable cloth. The ropes are of husk. Barbose observes that the Moors used to prepare keeled vessels of a thousand and twelve hundred 'bahares' burden, which would be about 224 tons. Similarly, Varthema observes that the ships built at Calicut were generally 200 tons.

The ports of western India, specially the Mālābar region continued to be the important shipping centres, even after the Muslim conquest. Marco Polo in the 13th century, has given us an excellent account of Indian ships. He says that the ships were double planked and the bottoms were pointed. These ships were moved by oars and each requiring four men. They could accommodate 300 men and cargoes. Each ship used to carry a number of small boats which slung over the sides of the main ship for serving different purposes and the ship used to have a single deck with a number of cabins.

During this period the seafaring activities of the people of Kalinga is well represented on the walls of the Jagannātha temple at Puri, Orissa. Here the ship is a royal barge in stone relief depicting oamen's desperate bid for a run.

After Marco Polo, Mahan in the 16th century gave a graphic account of the great emporium of Calicut, a shipping centre, often visited by ships from different parts of the world. Nicolo Conti opined that the "Natives of India build
some ships larger than ours capable of containing 200 berths and five sails and masts.\textsuperscript{362}

Muslim history in India also speaks that Babar, after the battle of Panipath in 1526 A.D., and Khurwā in 1527 A.D., crossed the river Jāmnā and in 1528 A.D., fought a naval battle with the help of his reverine fleet on the Ganges near Kānnauj, in which he seized forty enemy's vessels.

During the reign of Akbar the Board of Admiralty was an efficient one. He too had a full fledged naval department under Mir Bebory. His ships were of different sizes and the main centres of ship-building were Bengal, Allahabad, Lahore and Kashmir. On 15th June, 1574 A.D., Akbar marched against Dāudkhān of Pātnā and Nasipūr, armed with several boats. Each boat was equipped with twelve officers headed by a Nakhūdā, the commander. These boats were so big as to accommodate elephants, horses and even officers. Again in 1604, A.D., Mān Singh launched a second naval fight against Kedar Rai, the lord of Sripūr, with hundred war vessels and arrested Kedar Rai, who later died of his wounds.

Akbar's son Jahāngir further developed and organised his fleet to check the recurrence of aggression of Afgans and Maghs. In 1633 A.D., Islām Khān proceeded for a naval attack over hostiles of Assam, who descended into Bengal in their boats.
During the reign of Aurangzeb, in 1668 A.D., Mir Zumā repulsed the hostile force of Cooch-Bihar with a fleet of 323 ships under his command and control. When Shāista Khān became viceroy, he equipped his boats with all necessary war weapons and materials.

In the 16th century Ralph Fitch mentions a large number of shipping centres in Bengal, such as Tondā, Śripur, Sonārgāon, Satgāon etc. The city of 'Gour' was the most important centre of shipping trade. It is also interesting to note that some very old masts have been excavated in some villages near Pāndua.

It is rather difficult to determine when the navy was first organized in Bengal, but in all ages it remained the principal arm both in aggressive and defensive operation. All the emperors of Bengal maintained large fleets consisted of different types of boats. In the days of Pālas (8th to 18th century A.D.) possibly this arm rose to the zenith of its development, and enjoyed precedence over all other arms. Many of the boats were equipped with sails. The size and number of the sails differed from one type of boat to the other. Some of the boats had huge sails which the then poets compared with the hills.

The Khalimpur copper-plate of Dharmapāla runs thus: "Now, from his royal camp of victory at Pātaliputra, where the manifold fleets of boats proceeding on the path of Bhāgirathī make it seem as if a series of mountain-tops had
been sunk to build another causeway."

During the reign of the Senas also the navy was possibly considered as the most important arm; and due to the efficiency of the riverine navy the Khiljis were bewildered and could not take Lakshman Sena as a captive.

According to Ibn Khurdan, and Dr. B.K. Majumdar, Rampala had marine navy. 364

Ishâ Khân had a good riverine fleet. Possibly he had the following types of boats in his fleet — Jâliâ, Chip and Bajrâ. Jâliâ was a long narrow boat which could move with or without sail. Chip was also a very narrow small boat but very fast in movement and could move without the splashing of oars. Both the types of boats were good for narrow river and creeks. But Bajrâ was a large and heavy boat. It had sails and covered rooms and could carry many men and equipment. Bajrâs were good for wide and big rivers. 365

During 17th century A.D. too Bengal continued its shipping and ship-building activities. At that time Hooghli, Bâlásore, Chilmâri, Jessore, Karibâri etc., were the main centres for ship-building and it is during this time Sivâji started with great enthusiasm shipping and ship-building in western India and also built several well-protected docks there. Solvyns made a beautiful assessment of the Indian shipping in the following lines — "in ancient times the Indians excelled in the art of constructing vessels and the present Hindus can in this respect offer models to Europe
so much so that the English — attentive to everything which relates to naval architecture have borrowed from the Hindus many improvements which they have adopted with success to their own shipping. The vessels unite elegance and fine workmanship."

By scientific explorations carried out by the Ásutoš Museum of Calcutta University it has been proved that Bengal with its estuarine coast inhabited by civilised people long ago crossed the sea and kept maritime trade relation with other foreign countries of east and west and also discovered a great chain of ancient ports and fortified cities in lower Bengal.

The archaeological treasures of Ātgharā, Tāmralipta, Harinārāyanpur, Chandraketugarh etc., show that Bengal not only flourished during Nanda, Maurya, Sunga, Kushān and Gupta periods but also made a regular trade with the Graeco-Romans and other nations of the west. The decorative earthen vases of Egyptian and Minonān type from the site of Tāmralipta, the present Tamluk of Midnāpore district, draw our attention to the pages of Argonautica of Valerius Flaccus describing how the brave warriors of Gangāridae (Bengal) joined the Scythians and arrayed on the coast of the Black sea to encounter the Calchians and the followers of Jason.

Chandraketugarh, now known as Debālaya or Berācāmpā, about 24 miles east of Calcutta was also a big naval port of ancient India and it is possible that the river
Vidyādhari, which is at present running four miles away to the south of Chandraketugarh, and the river Mātla connected the place with sea. At this region, excavated antiquities from the level of Northern Black Polished Wares not only include rouletted dishes but also a class of black polished footed bowls with pinched spouts at the rims, the form and the treatment of which remind us about Hellenistic pottery. The Garceo-Roman contact of Chandraketugarh, dating c. 1st century B.C., is proved by the discovery of different terracotta moulded figures, specially male warriors donned with typical Garceo-Roman cuirasses rarely to be noticed in Indian art except at Gāndhāra. In one such terracotta plaque a warrior is seen on its right thigh hanging from the belt or shoulder strap a long double-edged sword.

Other important port sites in Lower Bengal are Ātgharā, Harinārāyanpur, Bāhiri, Bachri and Betor. Ātgharā is at present a neglected village situated about two miles away from Bāruipur, near Calcutta. It conceals vestiges as found in Arikamendu near Pondicherry and shows an Indo-Roman trading station, whose origin as a city goes back to pre-Mauryyan times. Harinārāyanpur, near southern outskirts of Diamond Harbour to the south of Diamond Harbour Railway Siding, Bāhiri near Contai in Midnapore district, Bachri on the bank of Rupnārāyan opposite the town Tamluk and Betor, near Mallikāpur, Howrah in the valley of the river Lāvanyavatī
are the sites yielding Northern Black Polished (MBP) wares and also rouletted and grey pottery.

It can be safely said that Bengal had many cities developing from pre-Christian days down to post-Gupta period which were big naval ports. Bengalees' spirit of navigation is also referred to in the 'Periplus of the Erythraean sea' and the writings of Ptolemy besides the Inscription of Maukhari Isānavarman and the Mālācā Inscription of Mahānāvika Buddhagupta. It is also probable that there were many more ports in the river-valleys of eastern Bengal, the present Bangladesh, in early historic times, for which the places like Chandradvipa (Bākarganj), Samata (south-east Bengal) and Harikela (part of East Bengal with Sylhet) were prosperous during Gupta-Pala days.

The Marathas too maintained a powerful naval force. Creation of naval force and naval bases undoubtedly proves Śivāji's genius as a great commander. He perceived that without command over the coastal water, his inland territories could not be protected and also the economic prosperity of his subjects could not be maintained. As he believed that men-of-war can not do their work unless they had well-defended naval bases close at hand for repair, supply of stores and shelter during rough weather, he prepared a number of naval forts on the west coast of India along with the growth of his war-ships and trading vessels. Gherla, Songarh, Ratnagiri and Mālvan are some of the noted naval forts of Śivāji.
The Maratha fleet consisted of Ghurabs and Gallivats. The Ghurabs have generally two masts. They are very broad in proportion to their length, narrowing from the middle to the end, where they have a projecting prow, covered with a strong deck, level with the main deck of the vessel. On the main deck under the forecastle are mounted two nine or twelve pounder cannons which point forward and fire over the prow. The cannons of the broader side are from six to nine pounders.

The Gallivats are large row boats built like the Ghurab, but of smaller dimension. They have two masts, of which the mizen is very slight and the main mast bears only one very large triangular sail. The Gallivats are covered with a spar deck made of split bamboo and these carry only patteringoes, which are fixed on swivels in the gunnel of the vessel, but those of the largest size have fixed deck on which they mount six or eight pieces of cannons from two to four pounders. They have forty to fifty stout oars, and be rowed four miles an hour.

Besides Ghurab and Gallivat other types of water vessels used by the Marathas for war and trade are Machuā, Shibar, Tarand and Pagar.

Machuā is a big cargo-vessel with a square sail and single mast. On the Ratnagiri coast these vessels varied in size from one to three ton burden. In Portuguese it is called Machuā which is derived from the Sanskrit word 'Māncā' meaning the raised platform of a cargo. The Machuās of the
Portuguese fleet, carried twelve oars, fifteen soldiers and four small guns. Shibar is a large, deep, narrow vessel of great speed with square-sterned and flat bottom. It has two masts but no deck. Tarand is a kind of large vessel. In Marathi language the word 'Taramb-tarandi' means any kind of ship. Similarly, in Marathi 'Pagar' means a canoe well-scooped, smoothed and well finished, used for carrying provisions.

Air ships

Modern history tells us that the first aero-engine flew in the sky in 1825 A.D., by a French engineer, Henri Giffard and this was driven by steam. But it is more interesting in present situation of the world, to note that India's contribution to science of aeronautics is still far older. We do not know whether Indian scientists have conquered the sky for the transport of men and messages long long before the modern airships came into existence and proved its usefulness, but references from Puranic and Epic literatures can be quoted to show that ancient Indian scientists had the imagination to form an idea about the shape, likeness, use and mechanism of aerial vessels.

We note the earliest reference of aerial navigation in Ag Veda. There it mentions that Asvins safely rescued and conveyed Bhujya by means of a winged ship. As details are not available of this winged ship we may raise doubt about its existence and explain it as a naval
ship having wing like sails. Satapatha Brāhmaṇa however mentions about a vehicle that can move heavenwards.\textsuperscript{372}

Chapter 43 of the book Harivaṃśa beautifully describes an animated golden car with four wheels owned by the Asura (demon) Māyā by name. The circumference of this vehicle was about 12,000 cubits with the power to fly at any place and it was equipped with various types of weapons.

Similarly, Vishnu Purāṇa mentions that Lord Kṛṣṇa, Brahmā and Kārtikeya used to move in air on Garuḍa (eagle), Rājhamsa (swan), and Maiura (peacock) respectively.\textsuperscript{373}

If we consider the Rāmāyaṇa and the Mahābhārata as written history then there are references of airships more than once. In Droṇaparva of the Mahābhārata it is referred to that Ghaṭatkaka fought with Kama, the great hero, from air.\textsuperscript{374} Likewise, in the Rāmāyaṇa Rāvana while describing his power to Sītā once referred that he captured the aerial car of Kubera.\textsuperscript{375} Again there is a beautiful description of aerial duel between the giant bird Jāṭāyū and Rāvana, the king of Lankā, while Rāvana was fleeing with Sītā in his aerial car.\textsuperscript{375} Here mention may be made that Golikere has drawn our attention to a number of instances referred/in his book, 'Through the wonderlands of the Universe' where fierce duels have been fought between man and the bird of prey resulting in the damage of the aeroplane and its inmates and thus leading to a forced landing.\textsuperscript{377} Further, after rescuing Sītā while returning home, Vibhiṣana offered
Rāma a Bimāna (aeroplane) which was well decorated. That Vimāna flew high with great sound and landed at Kiskindhā at the desire of Sītā to take Tārā, Sugrīva's wife, with her to Ayodhyā. Here we get the charming description of the aerial view of the whole journey from Laṅkā to Ayodhyā as described by Rāma to his beloved Sītā. These prove the use of flying machines as transport apart from their use in actual warfare.

Samarangana Sutradhara of Bhoja, a literature of c.11th century A.D., contains a chapter fully devoted to the descriptions and use of flying machines. It narrates the power of attacking visible and invisible objects, uninterrupted movements and the construction, strength and durability of the then airships. Three movements are attributed to these aeromachines .......... ascending, cruising miles after miles in different directions in the sky and lastly safe landing on the ground. It is also stated there that in an airship one can fly as high up as to the solar region (Suryamaṇḍala), the stellar region (Nakṣatra maṇḍala) and also the regions of air over the earth and sea. They move with such a high speed that the noisy sound produced while on move can be faintly heard from the ground. These aerial cars are of different shapes like chariots, horses, monkeys, elephants and different kinds of birds. These airships are well built with light wood and are durable. Two resplendent wings are propelled by air and can move in harmony in every
direction carrying several persons in it. They can do many a feat which is otherwise difficult to execute. For constructing these airships iron, lead and other metals are used. These airships have in their belly mercury as fuel and fire at the bottom for facilitating movement into the sky and moves like a celestial house. It has been specifically stated that the working formulae of the machine, that is, its main mechanisms have not been spelt out, lest the secrets should be out and the whole purpose comes to naught. This may be a reasonable ground why the principal mechanism is not found in any text and books of ancient India.

However, to conclude, it is believed that like other scientific discoveries, in near future our energetic scientists and research workers who plod persistently and carry their torches deep into the caves will dig out and find out valid testimonials pointing to the misty antiquity of airships. How it can be denied that descriptions of shape, form, use and apparent mechanism of Vīmān i.e. aerial ship given in ancient literature in India so graphically tally with the actual aeroplane of to-day?

**War musical instruments**

Music has secret power that enables everybody to undergo great exertion. 'There is the whole secret, and it is the military step of the Romans.' It is an interesting
usage of the battle-field, and so musical instruments are no less important to military activities of a nation.

Chakravarty refers that Marshall Saxe considered music as a detail of great military importance and remarked, 'Make them march to music'.

According to the nature of use, musical instruments may be classified as Savya, Grahya, Bahirdwrika, Mangalika and Sangramika. Savya instruments are those which are used in musical conferences or in aristocrat gatherings such as Harmonium, Tabla, Pakhoa, Sitar, Binah etc. The examples of Grahya instruments are Ektara, Dotara, Khanjani, Dougudi etc., as because they are mainly used with folk songs. Tikara and Sana are the examples of Bahirdwrika as they are played in front of the main entrance of a building or enclosure during some festive occasions and are also played in every morning in the palace-door. The room on the top of the entrance in a palace is meant for such musicians when they play daily music at fixed hours and called Nahavatkhana. Khol, Dhol/Dholak, Saamha, Kamsa etc. come under the class Mangalika as they are used where religious songs are played. Sangramika instruments are those which are used mainly by the armed forces. The best examples are Veri, Turi, Dhak, Dunduvi, Bugle, Ramsingh etc.

Here we are mainly concerned with the musical instruments which are used only for military purposes in
India through ages. Different types of musical instruments are used during war for various purposes. They are mainly played to call the soldiers, to warm them up, to instigate them against the enemies, to signal orders across the field, to announce the fall of a chief or knight, to rejoice at the time of victory and lastly to stimulate and refresh the tired soldiers while they relax.

The use of musical instruments by armed forces goes back to the early Vedic period and proves that the music was a feature of ancient Indian warfare, not a military step of the Romans as supposed by some Western scholars.

Rg Veda and Atharva Veda contain sweet hymns in praise of battle-drum. The Rg Veda hymn runs as follows as translated by Griffith: "Send forth thy voice loud through earth and heaven, and let the world in all its breadth regard thee, O Drum, accordant with Gods and Indra, drive thou afar, yea, very afar, our foemen. Thunder out strength and fill us full of vigour; yea, thunder forth and drive away all dangers. Drive hence, O war-drum, drive away misfortune; thou art the Fist of Indra; show thy firmness. Drive hither those, and these again bring hither; the war-drum speaks aloud as battle's signal." This hymn clearly states that war drum is meant to drive foemen and fill the soldiers of its side full of vigour and it is also played to drive away misfortune and bring forth fortune in war. The latter statement emphasises the magical power of the war music which is to be considered as mángalika.
Likewise Atharva Veda describes a drum as 'loud-noised', 'shrill-crying', 'exciting the weapons of the warriors', 'thundering like a lion' and 'over-powering hostile plotters'.

In the Vedic age we mainly get reference of three kinds of war musical instruments, such as Dundubhi, Bhumi-Dundubhi and Bākurā. Descriptions of these instruments are lacking but Sanskrit dictionary describes Dundubhi as a large kettle-drum and Bākurā as a blowing instrument. Like Dundubhi, Bhumi-Dundubhi was probably a colossal drum which is placed on the ground as it can not be carried for its weight and it was used mainly for transmitting signals from one place to another. Bākurā was sounded probably by blowing through the mouth and not by beating like a drum. It is narrated that Aśvins blew this instrument to help their army in course of an expedition against the Dasyus. From its nature of use it may be presumed as a musical instrument mainly employed for war purpose. This instrument was probably made of horn or some metal which can produce sound in high pitch for calling the soldiers to a particular place.

Music played an important role in the epic military encounters. There we get references of various types of musical instruments which clearly shows the advancement made by the epic people. The musical instruments referred to in the Mahābhārata are Dundubhi, Veri, Mahāveri, Patāha,
Puskara, Anaka, Jharjhara, Damaru, Dindimã, Dhakkã, Upanandaka, Mahânaka, Krakaca, Gobisânika, Sankha, Mrdanga, Nanda and Panava; and the fact is that two or more of these instruments are often mentioned together possibly to show that they were not merely different names of the same instrument. In many cases two different musical instruments belonging to the same class have been compounded together such as Dhak-Dhol, Kamsã-ghantã etc. in later Indo-Aryan languages. Among the instruments referred to in the Mahâ-bhârata some were used in battle-field and some in the camp. So in the epic period we find a sharp distinction between the music in the battle-field and music in the camp. The instruments used in the camp were Mrdanga, Nanda, Upanandaka and Panaba; all producing sweet soft melodies to greet the soldiers. Govisânikas and Sankhas were probably trumpeting instruments. The Sankhas were again of different kinds and every hero own Sankha, which he blew as a war cry and signalling purpose as well, at the starting of the battle, during actual operation and on his victory. Panchajanya, Anantavijaya, Panunda, Devadatta, Sughosa and Manipuspaka are the Sankhas used by Lord Krsna, Yudhisthira, Bhima, Arjuna, Nakula and Sahadeba respectively. It may be presumed that each of them had a distinguishing sound of its own so that whose call it was could have been easily recognised.

Chakravarti refers about war musics from Jatakas in the following verses of 'The Sonanda Jataka' and 'The Mupakkha Jataka' respectively.
"Who marches here with tabour, conch and beat of drums
Music to cheer the heart of kings? who hear in
triumph comes?" (Cowell's tr.V 170)

"The horse to the chariots yoke,— bind girths on
elephants and come;
Sound conch and tabour far and wide, and wake the
loud-mouthed kettle-drums.
Let the horse tom-tom fill the air, let rattling drums
raise echoes sweet .......

Bid all this city follow me....... I go my son once
more to greet." (Cowell's tr.VI 14)

While going through the records of Alexander's
invasion in India it is noted that the king Porus had a
good number of drummers in his army and he placed them with
the infantry and archers behind the elephants. 397

In the Maurya period, Kautilya's Arthasastra mentions
about trumpet-blowers (turya-karas) and it is written that
they used to get double the wage of ordinary musicians
(kuśilas). 398 Elsewhere Kautilya says that the trumpet
(turya-ghosa), flags and banners are the signals i.e.
Nayaka's orders to his troops. 399

Hiuen Tsang wrote that king Harsabarman while
in his marches always accompanied by a few hundred men with
golden drums beating one stroke at each foot-step. 390 A
Chālukya grant of king Kirtivarman-II, dated c.758 A.D.,
refers to a 'Dhakkā' drum, a lotus-mouthed trumpet and a
drum called 'roar of the sea'. Similarly the Kurram Plates of the Pallava king Paramesvaravarman-I, speaks about the 'thunder-like-sound' of kettle drums and conch-shells, inspiring terror in the battle-field. So also, Patāha and Dhakkā are mentioned as war musical instruments in the Kadba Plates of Prabhavarsa. Nagpur stone inscription of Malwa rulers, dated c.1104-5 A.D., mentions about 'Nākāra', 'Jharjhar' and 'Damaru'.

Rājatarangini refers that in Kashmir kettle-drums were beaten between the night watches in a fort or camp, and a surprise attack was often announced by the sound of drums and trumpets. For instance, Sujji announced his surprise attack at night on the retreating Kashmiri troops by beating drums.

Dikshitar has mentioned about some South-Indian war musical instruments such as Kodumparāi, Pandil, Neduvayir, Māyirkkan murasu, Nyaya murasu, Tyaya murasu, Karadikai, Valvalai and Varivalai which have references in Tamil literature 'Silappadikaram' without mentioning any date. He further writes that Pandil is perhaps cymbals, Neduvayir is a long horn instrument, Valvalai and Varivalai are varieties of the conch, and others are different types of drums of which 'Māyirkkan murasu is the drum covered over with the hairy skin of the dead bull which had vanquished a tiger when attacked.'

Among the Mughals, Rājputs and Sikhs, a bugle-type
musical instrument known as Singa and Ramsinga was very much in use. This was a metallic instrument, long, tubular and curved in shape with narrow proximal end and wide circular distal end. It was blown by mouth through the narrow end.

From the above discussion it is clear that instruments of war music were many and of various types, but the use of conches gradually became obsolete in the march of military history until it was restricted for use in temples and other rites and ceremonies of the Hindus. The drums and trumpets are still in use to enthuse Indian armed forces to march with redoubled vigour and energy. There names are different, probably because of different shape, size, mode of beating and due to different local languages.

Flags.

It is the normal custom among the Indians to decorate their dwellings on any festive occasion. They hang pennons and banners of coloured paper and cloth and wave them when marching in procession. At the top of Hindu temple a flag is attached to its pinnacle so that to which sect the temple belongs could be known from a distance.

The flag is no doubt an emblem of past resolves, past deeds and past heroes. No sooner mankind started to assemble together for some common purpose, some kind of distinctive object became necessary as the symbol of the common sentiment, as the rallying point of the common force
and so flags became essential for military purposes. The ancient Egyptians had their own emblems; the Assyrians had various insignias, the Greeks and Romans too bore different distinctive marks on their flags. In modern age we notice that each nation possesses its own standard. The stars and stripes emblem evoke patriotic sentiments in the mind of the Americans. Similarly, Union Jack means a world to the Englishmen. So every nation regards its standard as a most sacred thing in the world.

The idea and the use of a flag is not foreign to the traditions of Indian history. The use of flags can be traced in India to the earliest known culture that flourished in Punjab and Sind. In a seal found at Mohenjodaro one person carrying a flag fixed in a pole and leading a procession is depicted.

The use of flags and banners in all wars of ancient India is an old custom. In Vedic literature a flag is termed as Dhwaja and Ketu. It is doubtful whether the two words mean the same thing. Most probably Dhwaja means the banner which is used as a mark of a clan, sect, group of people or class as Dhwaja also means sign, mark, sex mark etc. and somewhat associated with religion and festivity whereas Ketu is a general term for flag and sometime bears an emblem i.e. Minaketu etc. The term Brihat-Ketu and Sahasra-ketu may denote a big flag and thousand flags respectively. The later term may also mean a hero who has captured
thousand Ketu (flags) or has defeated thousand heroes.
The idea behind this might be that if the flag of a hero was once captured or torn anyhow, then he was humiliated. But we do not know whether such flags were taken to home by the heroes as trophy or souvenir as it was done in the mediaeval Europe.

Dikshitār refers that, the Vedic heroes used banners in their wars. "The word Dhvajā (banner) occurs twice in the Rg Veda. (VII.85.2; X.103.11)" 399

Talcherkar too refers, "In the Vedas — 6th Mondal Rg Veda — contains verses which lay down that banners and drums formed the emblems of ruling monarchs, which shows the very ancient origin of flags. In Atharva Veda two lines clearly indicate a common flag with device of the Sun on it for the Aryans." He is of the opinion that, "As time advanced and Aryans came to be settled in different areas conquered by them, they had naturally to resort to different badges and emblems to mark out their lines and stations of their encampments. Thus originated different standards to enable the leaders to keep in order the bands working under them when marching or on the battle-field." 400

As we enter the period represented by the Hindu epics our information becomes more definite and the Mahābhārata devotes a chapter to enumeration and description of the flags used by the heroes of the contending parties in the Kurukshetra war. Here we find every hero
had his own distinctive flag. The different flags used by the royal nobles as reported by Sanjaya to Dhṛtarāstra are described below:

Dronācharyya: His flag was a representation of a golden 'Kamandalu' covered with deer-skin.

Yudhisthira: His flag represents the moon surrounded by brilliantly shining planets in golden colour.

Bhima: His flag is known as 'Siṃhadhāvajā' i.e., representing a lion whose eyes set with diamonds.

Nakula: His flag is known as 'Saravadhāvajā'. The meaning of the term 'Sarava' is not clear. In Sanskrit or in Bengali it means either a camel or a small elephant, or a kind of eight-footed(?), deer like animal. However, the flag represents the emblem of a Sarava(?) whose back is golden in colour and who is terrific in appearance.

Sahadeva: His flag represents the emblem of a swan with bells and festoons to terrify the enemies. His flag is known as 'Hamsadhāvajā'.

Abhimanyu: His flag represents a bright golden colour 'Sarangapakṣi'(?). Probably the Saranga is a kind of bird.

The five sons of Draupadi carried flags representing the figures of 'Dharma', 'Pabana', 'Indra', and two Asvani brothers respectively.

Neela: His flag was a simple blue coloured festoon.
Arjuna: His flag was known as 'Kapidhwajā' representing the figure of a monkey with a long tail creating terror among the enemies.

Aswathama: His flag was called as 'Siṃhalēnguladhwajā'. It represented a bright golden colour tail of a lion.

Karna: His flag too was golden in colour representing the eyes of an elephant and adorned with flying garlands. It was known as 'Hastikākṣayadhwajā'.

Kṛpācarya: His flag 'Govṛṣadhwajā' depicted the figure of a bull.

Vṛṣasena: 'Mayuradhwajā' was the name of his flag representing the figure of a peacock.

Jayadratha: He carried the flag known as 'Varāhadhwajā' representing a white coloured wild boar.

Salya: His flag was known as 'Sītaladhajā' representing the figure of a flame shaped golden plough.

Saumadatti: His flag is called 'Yupadhwajā'. The 'Yupa' is a kind of 'Y' shaped wooden material used for sacrificial purpose of the Hindus. The flag represented the figure of a 'Yupa'.

Duryodhana: His flag 'Nāgadhwajā' represented a snake set with gold and gems.

Kalinga Rāja: His flag had the symbol of fire.

Bhiṣma: He carried the 'Tāladhwajā' representing a palmyra tree on a white back-ground.
From Kautilya's Arthashastra we learn that every battle-formation (vyūha) of the Mauryan army was differentiated by the device of 'dhvajas' and 'patākas'. It is mentioned that the commander should arrange to signal his own men with the help of trumpet, flags and banners (turya, dhvaja and patāka). Kautilya's use of the two terms raises again a doubt that 'dhvaja' was different from a 'patāka'. Possibly patākas were festoons used for adornment of an army. These patākas were such an important feature of the army that in latter period an army came to be designated as 'Patakani' by Kālidasa. Kautilya further suggests that the preparation of a certain medicinal mixture which, when besmeared over these dhvajas and patākas, would tend to remove the poison at the very look at these dhvajas and patākas.

Dikshitār referred to a Tamil literature 'Perumtōgai' by M.R.Āiyangār that "the early Tamil kings of South India had their own standards. The emblem of their crests served as the sign of their banners." He mentioned about Kayal (fish), Silai (bow), and Puli (tiger) flags used by the South Indian kings.

Epigraphia Indica tells us that the Cālukayas had their own flags and it was known as 'Palidhwaja'. Vinayāditya Satyasraya won this decoration of Palidhwaja after defeating a Northern king.

Coming down to the latter period we notice that the Mārathā army possessed two types of banners — the
terracotta coloured Bhagavā Zāndā and the Jaripatakā, but it is doubtful whether both are used for military purposes. Most probably, the honour of carrying Jaripatakā, the golden standard, was conferred on distinguished Maratha generals. Similarly, the saffron coloured flags of the Rājput warriors in India are well-known to us. The Mohammadān rulers in India too used green as their distinctive colour with the emblem of star and crescent. The students of history are well-aware of instances of men who have laid down their lives for the glory and honour of their own banner.

During the last days of Muslim rule and at the beginning of British rule in India we find a good number of independent kings and feudatory chiefs ruling in India holding small or big areas of lands under their command and control. These kings and chiefs always maintained their own armed forces. These were not regular armies but by the end of 19th century A.D., they organised their armies till they were merged with the Indian Armed Forces and lost their separate identity. These State Forces are no more existing but the glorious deeds of heroism of the brave soldiers attached to them shall remain fresh in the military history of India to inspire the posterity. Each of these State Forces has got different units having different flags with emblems. Roughly there were about fifty such Princely States and feudatory chiefs. The designs of the emblems
of those units were different. The collection and display of those emblems in the museum gallery will surely be interesting to the visitors.

Further, it would also be very interesting if any of our enterprising cotton-mill owner prepares sets of flags used in India in early days with original colour and design relying on the descriptions available in different old literatures, records, paintings, etc. These sets of flags will be cheap and can be used freely on national festive occasions. These flags in museum galleries or in decorations, are bound to strike a new note and awaken the echoes of an old one in the heart of every citizen and lover of India's past glory. These flags of ancient and medieval India will have an educative effect on our younger generation and also arouse in them a deep national spirit.