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MUSEUM : ITS ROLE IN MILITARY STUDIES IN INDIA

Thesis

Submitted for the Degree of

Doctor of Philosophy (Arts) in Museology

of the University of Calcutta

SCANNED

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SCHEME OF TRANSLITERATION

	Consonants	Vowels	Diphthongs
Gutturals	k kh g gh ṅ h ḥ	a ā	e ai
Palatals	c ch j jh ñ y ś	i ī	
Linguals	ṭ ṭh ḍ ḍh ṇ r ṣ	ṛ ṝ	
Dentals	t th d dh n l s	ḷ	
Labials	p ph b bh m v h	u ū	o au
Anusvara	ṁ(real), ṃ(unreal);	Avagraha ' .	

Introduction

The idea to explore the documents and artifacts related to wars in ancient India, so as to know the development of the science of war flashed in the mind of the present scholar when he joined in the Post-graduate Course in Museology.

As a Commissioned officer in the National Cadets Corps, the humble scholar enjoyed the opportunity to study Military Science in its practical and theoretical aspects to some extent, and as a student of Museology Course he came to know that hundreds of documents of military history, technology, engineering and organisation in the form of weapons, armours, uniforms, badges, war trophies etc are stored in hundreds of such educational houses which are called Museums without sufficient use of them by the scholars of either fields.

Scholars in the field of military studies have so far dug out literary sources mainly. The present scholar feels that an attempt should be made to integrate the knowledge gained from literary sources with facts which could be brought out by a thorough search of all the museums in India.

Scholars and researchers in the field of military studies have ignored the vast resources lying unused in the

museums, and Indian museologists and historians on the other hand ignored the study of museum materials i.e., materials and documentary collections from the point of view of military study. The purpose of the present paper is to make an attempt in happy wedding of the two.

Science being the major field of the present scholar, the problem of this thesis has been approached in the specific and matter of fact manner as a scientist follows. As a NCC officer for last fifteen years the present scholar used his insight and command over the factual knowledge in the field of military studies to mobilise all available facts related to the problem of the thesis.

As a successful student of Museology the present scholar had the chances to visit most of the major and minor museums which are considered important either for their collection of war materials or modernisation of museological facets of the institutions. The scholar also met and consulted as many historians, defence personnel and museologists as he was fortunate to make appointments and marshalled the ideas and information gathered from them into the present thesis.

From museological point of view the problem has been grouped under two major portions — (a) Curatorial Research of museum materials lying in the museums with the help of literary works, both ancient and modern; (b) organisational discussion for the best use of the materials and

knowledge (so brought out by means of curatorial research) so that the scholars and public could be catered, i.e. organisation of museum of war materials and/or organisation of a gallery of military studies or war and weapons in the general historical and archaeological museums.

Again, from museological point of view, various types of war materials have been classified under functional types relating them to the literary references collected from the ancient texts so far published. Each type of war material has again been discussed with a historical approach to bring out the story of its development and its place in the history of war.

Both museological studies of the facts and materials and historical approach to them have been used as lenses to focus new areas in the study of Military Studies.

The importance of the subject 'Military Studies' can not be under-estimated in a free country. The knowledge of the subject is essential to each and every citizen; so is the training in the subject is imperative.

In view of the growing importance of military studies, and as still to-day no significant effort has been made to popularise this subject in India through museums, the main aim of this thesis, as indicated by its title, is to evaluate the role of museum in Military Studies in India. It is strange to note that in India there is galaxy of museums but not a single museum of war materials with educational

activities for the students and general mass of the country. The present thesis deals with what is undoubtedly the most interesting but at the same time much ignored subject for mass education. This subject, so far the present scholar's information goes, has not been treated by any scholar and has not received the attention it deserves.

Again, this thesis is not to present any final conclusion nor to make trained soldiers for the country but it is an humble attempt to suggest a guide line how museological studies of war materials scattered elsewhere or stored in various museums can help in better understanding of military science in India in a scientific way both by the scholars and the common people. It is to draw attention of the proper authorities and to create interest among the Indian museologists to explore the subject for the benefit of the country and its men. It is a sincere and honest effort to make a survey of war materials in the collection of various types of museums, to make a typological classification of such war materials, to bring out the history of Indian war materials with the help of literary references about them in Indian texts beginning from the Vedas to the works of modern scholars, and lastly, to draw up a plan for the organisation of a museum of war materials for the education of the public in the subject 'Military Studies'.

The present scholar admits that the aim of this thesis is ambitious but due to paucity of fund and above all,

lack of adequate co-operation from different museum authorities, particularly the museums or collections of war materials existing under the control of Defence Department, Government of India, excepting the Infantry School, Mhow and National Defence Academy, Khadakwasla, this work may not be considered as an exhaustive one and there lies ample scope for further research and development.

This venture will be considered amply rewarded, if this humble work can generate some interest among the Indian museologists, the different museum authorities of India, the State Governments and Central Government of India and the authorities of educational institutions within the country to popularise the subject 'Military Studies' for the benefit of the country and its people. This is the excuse of the present scholar for his venture to work on this topic. The field of work is new and almost unexplored and one has to work on it single-handed. The scholar had to depend mainly on his own resources under the guidance of his teacher for the discovery, collection and arrangement of the materials.

CHAPTER ONE

THE CONCEPT OF A MUSEUM[1]

The Constitution of the International Council of Museums (ICOM) defines the term 'Museum' as any permanent establishment set up 'for the purpose of preserving, studying, enhancing by various means and, in particular, of exhibiting to the public for its delectation and instruction ..... artistic, historical, scientific and technological collections.'

By assimilating with museums botanical and zoological gardens and other establishments where living specimens are presented, and public libraries and public archival institutions maintaining permanent exhibition rooms, the ICOM Constitution specifies the widest interpretation which can be given to the term.[2]

In a wider sense, any establishment, without considering its nature, having collections such as collections of temple and church relics, accumulated treasures of royal and noble families, ornaments and valuable curio objects of private collectors etc., are also included in this definition.

To elucidate further, a museum is an organisation or establishment where objects from different places of the world are collected, preserved and maintained for inspection, study and other aesthetic purposes. It primarily collects various objects widely distributed through both time and space under

a single covered place for close observation. Secondly, these objects are provided with identification and annotations for easy understanding, and lastly, the museum collections are displayed in such a way that helps the visitors to study and enjoy their time and feel happy to visit the museum galleries again and again. So, a museum is a unique institution that collects and displays examples of three-dimensional world for study and enjoyment.

With the passage of time museums have developed along different lines and according to their necessities various rules and regulations evolved for each particular case. From these accumulated particular cases, rules of common generality and of sufficiently proven worth have formed the basis of a set of practical recommendations, subject to any addition, alteration and improvement.

Museum : a growing organism.

"The museum is a growing organism" is an authoritative saying and is self-evident. Biologists accept that a growing organism alone survives. An organism that ceases to grow perishes soon. In case of a museum the dictum draws our attention to the fact that a museum, as an institution, possesses all the attributes of a growing organism. A growing organism takes in new matter, changes in size or volume, acquires new shape and form. It is also subject to a 'variation' in biological parlance leading to the evolution of forms. The same principle is equally true for any museum.

A museum may start in a very humble way but gradually develops into a huge organisation with more museum specimens, the visitors and the staff. So a modern museum is a trinity of these factors. A collection of objects without any visitor is a storehouse and can not be termed 'Museum'. Similarly, a simple juxtaposition of objects and visitors without any staff to provide the communication bridge at proper time and with competence can not even constitute a museum. As the number and variety of exhibits in a museum would increase, the infrastructure should also correspondingly increase in competence, library, manpower and publications. So, a prudent experienced museologist always plans his museum in a way to keep pace with necessary future growth of the three main factors mentioned above and various other related activities performed within the campus of the museum.

While tracing the history of evolution of museum our main aim is to show how museum became public through the march of time.

The present day public service implied to an existing museum was not the characteristic of all the museums. Men of culture have always wanted to preserve carefully the beautiful and interesting objects from loss and decay. In the earliest days a museum meant a place for hiding objects. The term 'museum' bears a connotation of privacy where the public has no entrance. The ancient Romans took pride in storing war trophies they gathered from Greece and Magna Greecia, Asia and Africa.

'Treasures may have meant not merely a stored treasure, but a secret hoard'. In ancient Greece subterranean chambers under some of the temples were referred to as 'Thesauri' and to Roman law a 'Thessurus' was a treasure which had bean hidden so long. The collection of Prince of Brandenburg in the 17th century was known as Thessurus Brandenburgicus although it represented an accumulation of 'Artificialia' and 'Naturalia' like any public museum of present day.

In the 15th century, Jean de Berry, Duke of Burgundy, kept his beautiful collection or rarities in his 'Guarda ropa'. 'Chamber' is another term used in reference to rarities as chamber of rarities which was surely anything other than public.

The connotation of privacy underlies the term 'Penetralia' used in connection with the collection of Alfanso, master of Naples in the mid-fifteenth century.

Similarly, in 1611 A.D., the splendid collection of the pictures of Henry, Prince of Wales was kept in a secret room in White Hall known as the Cabinet room.

All the terms so far mentioned to refer collections are the private collections and privacy is the characteristic feature to them. Though much of these terms have become obsolete in reference to modern museum, the idea that 'No admission except on business' has not yet been psychologically deleted from the entrance gate.

In the medieval period, rich and cultured people hunted after ecclesiastical relics. Practically in this

period the museum objects were preserved like low category prisoners under lock and key and none excepting the owner, his friends and relatives was allowed to see them.

With the Renaissance and the Reformation in the 16th century, the intellectual curiosity of Western Europe burst all bounds and probably a better stage of evolution in museology started. Kings and nobles eagerly paid for excavations and bought treasures, classics, paintings and other objects of art and archaeology from curio merchants. From the East and the West, from the strange continent of America, recently discovered, poured in plants, minerals, coins, medals, arms, armour and many other items of interest. Scholars vied with each other to get hold of choicest specimens of art. Upto the end of the 17th century, collections were made on personal efforts and locked in the residence of the scholars or the rich. Only limited number of selected visitors were allowed to have their look or access to those objects.

When the function of these private collections seemed to fulfil their main fruitfulness by enhancing their owners' social prestige, these collections became more public. This 'public display' of the pride collections with the intention to enhance social prestige, as it was upto 19th century does not result in any public benefit nor give the collections a public character and community value. But, it should not be overlooked that this desire of public display with a view to increase social prestige played a great role in making the private collections public. This acted as a stimuli to give

birth to public museums.

The public significance of museum however, began to be recognised during late 17th century. The year 1683 A.D., is a memorable year for the history of the public museum. The Tradescant Museum in South Lambeth in London was presented to Oxford University by Tradescant's heir, Mr. Ashmole. On 21st May, 1683 this museum opened with a new name — Ashmolean Museum. In fact, this museum was intended to be a place for research and not an aid in general education.

The next public museum was the British Museum, London, founded in 1759. This museum was made by an Act of Parliament with the acceptance of the offer of a famous physician, Sir Hans Sloane. The collection of this museum was opened to the public, but access in this museum was not really free and easy. The visitor had to give his credentials at the museum office and after scrutiny, he used to get a ticket for admission at least after a period of 14 days. The museum was kept open for public inspection on every Monday, Tuesday, Wednesday and Thursday. On Friday the selected visitors were allowed access. Again, certain days were reserved for the students of the Royal Academy. Further, not more than eight batches of not more than fifteen persons in each batch were allowed in the course of one day. Requests for information were often rebuffed by the guides, the labeling was scarce and the guide very rapidly traversed the exhibition halls and display galleries ignoring the visitors' interest, and allowing any time to examine the objects carefully. In 1808 A.D., the first printed synopsis

of the contents of the British Museum was published which could serve as an aid to the visitors.

Colbert, Louis XIV's minister transferred Francies I's collection to the Louvre for studying good pictures by the art trainees. Louis XIV at his later years again transferred the collection of the king's private residence at Versailles closing the doors of the museum for the public till the summer of 1791 A.D., when the new Republican Government decided to establish a public museum at the Louvre. It was opened in 1793 A.D., and was accessible to the general public. The revolution of 1848 A.D. caused the museum in Louvre to be struck from the civil list and to become a national property.

In Italy, Pope Benedict XIV, established the first Christian museum at the Vatican. Pope Jullias II installed some of his fine ancient statuary in the precinct of the Vatican. Leo X, opened the Antiquario Delle Statue to the general mass of Rome. Pope Clement XIV gave new life to this Antiquario. He assembled the statues of outstanding qualities in a newly erected gallery and the Museo Pio Clementino was opened to the public in 1773 A.D. and was enlarged by succeeding Popes.

The Prado in Madrid also evolved from former royal collections. The idea of public museum took shape under the succeeding kings Charles III and IV and gained its strength during the French invasion. Joseph Bonaparte desired that there shall be founded in Madrid a museum of paintings. The graceful task of opening the Prado was left to the legitimate

king of Spain, Fernando VII. It was a gallery of paintings and sculptures for the education of the pupils and learned scholars and to satisfy the noble curiosity of natives and foreigners.

All the Museums so far mentioned were mainly formed out of royal collections. These museums were public museums but the spirit in which they were created does not appear to be true public museum. There admission was very much restricted and sometimes visitors were insulted if they forgot to observe the curious practices followed there. As for example, mention may be made that in the museum of Madrid it is the practice to uncover visitors' heads while entering the museum.

The colonial expansion of Europe acted as a great impetus in the collections of curios and objects of archaeological interest. Further, Darwin's famous theory on evolution aroused an universal interest in the past history of mankind. Archaeology became a science and biology devoted itself to the study of relationship between the animals and plants. Natural curiosities stimulated an interest in the natural sciences and anthropology, and exploration of the world provided an ever increasing volume of specimens. Learned societies formed and contributed their collections to the museums of their society which were centres of education. These museums offered their collections for public view. In different exhibitions museum objects were displayed systematically and chronologically. The closed museums were thrown open to the general mass. They became democratic in character.

The visitors got a better perspective of man's achievement on earth than one could gather in the libraries. The cultural value of museums were felt to be pervasive. With the rapid expansion of scientific studies experimental laboratories and sets of teaching aids became essential and thus gradually museums extended their services outside the four walls to schools, colleges, universities and to the citizen at large.

Industrial Revolution brought industrial expansion. Models, charts, apparatus and appliances became necessary to teach the students in the technological schools and colleges along with science laboratories for science classes. Naturally, science and technological museum sprang up and these museums set up educational departments.

Around the first quarter of the 20th century the possibilities and responsibilities of the museum as educational centre became more widely realized. It was realized that museum can serve education more than libraries with its collection of three dimensional objects and thus a new standard of values came into being. Different types and categories of museums came into being, such as, Public Museum, Municipal Museum, Art and Archaeological Museum, Science and Technological Museum, Industrial Museum, Natural History Museum, Health Museum, Biographical Museum, War Museum, Doll Museum and many others.

Lastly, International Council of Museums (ICOM) and its journal 'Museum' as an integral part of the United Nations

Organisation has taken up the slogan 'Museum in the service of all' and the cultural authorities of both hemispheres agreed to an 'International campaign for Museums' 1956.

To conclude, it can not be anticipated fully what further stages of evolution are in store for this growing organism — the museum. This reminds me the beautiful quotation, 'Museums tomorrow are what the shrines were yesterday', by German Benin in 'Loom of Arts'. However, the main underlying principle of the museum that has struggled through all the stages of its evolution, is common to all the different forms and will remain as the distinguished feature for all the time to come — is that it is an instrument of universal mass education and it spreads knowledge with the help of actual documents of natural and cultural significance.

Museum and the pursuit of knowledge.

The history of civilisation is as old as the history of mankind. Men, the highest evolved rational animal of the world emerged on this earth some thirty thousand years ago with a rare impulse. This impulse is the insatiable curiosity of mankind which tries to see their future as also to reconstruct the antique story of mankind, to know about their forefathers, their ways of life, their social and material culture. It is a long story — from our prehistoric forefathers with their sticks and clubs to our modern man circling the earth in space-ships. Much of this long struggle will never be known; it is hidden in the mists of time. But much

has been discovered. Indomitable curiosity has led the dedicated explorers to try to reconstruct the half known history of mankind. They have found out chipped flints, bones and horn hooks, harpoons and needles, skeletons and skulls, cave drawings and fossils. They have dug up the ruins of ancient fortified cities, ware and artifacts left by the citizens of yesterday, temples and shrines, monuments and buildings erected by those who left the world for ever.

The museums preserve these objects of antiquity, the beautiful things of the past for the enlightenment of the posterity. They serve as the link between us and our forefathers, their life-style and thought pattern; in museum cabinets are locked up bits of history of nature and man. By permitting us to study the past, the museums help us to understand the present state of things better and foresee our future. Museums not only mean collection of objects which are presented as illustrations of adequately written labels; it is not a book; its main interest lies in the objects, their physical characteristics and dimension on the one hand and psychological understandings that arise from their physical nature on the other. In short, the museum is made up of objects or specimens that expose man's understanding of the physical environment and the human inter-relationship and scientific truths and man's creative imaginations that underlie the world.

Museum : its relation with education and community.

If education means mere instruction i.e., the means by which factual informations are passed on from person to person, then museums act like reference books having factual information contained in the actual documents in vivid and pleasing form. But museum exhibits not only state facts but also show the relationship between things which may not be clear by going through text-books or listening to lectures only. Museum exhibits stimulate power of thinking and encourage clear observation culminating in logical deduction.

The museums have an obligation to the society irrespective of status, cast, sex, age or intellectual capacity. A missionary spirit is working in museums to win over the disinterested persons by their collections, conservation, study and display of different exhibits. These exhibits have many things to communicate and they remain useless unless they are made to speak by the museum education officers to the public. The communication of interest, information and values is the essence of education and if a museum wants to function properly, it can not avoid serving education and in doing so, one can not neglect the museum. So modern museums are closely interrelated with education.

Persons who are conscious about the problems of education and training will readily accept that a better teacher-student communication is the only key to solve the

burning problem of the day and it is possible, if we use training materials or teaching aids which can be seen, touched, handled or otherwise utilised by the students under the proper guidance of their trainer or teachers and we know that such materials are all available in the museums.

Here comes the role of a museum in education. A museum is a centre of education mainly through audiovisual means. It is possible through a modern museum to impart training in a most interesting way the most difficult topic in all the fields of knowledge — art, science or technology — whatever it may be. Museums can help in India's progress by discovering, consolidating and stating the successful methods of audio-visual representations of different specialised knowledge which are the surest and best devices to activate the different sections of Indian masses, as we know that progress without education is logically inconsistent.

Development of museum activities in India.

The earliest museums in modern India were established by the learned societies like the Asiatic Society of Bengal and the Literary Society of Madras. Their aim was to acquire a liberal knowledge, and showed a scholar's interest in the country and in its economic and natural products. The general aim of these learned societies is well revealed in the resolution of the Asiatic Society of Bengal in 1814. According to that resolution the Asiatic Society was determined to establish a museum for the reception of all articles that may tend to

illustrate oriental manner or history or to elucidate the peculiarities of art and nature in the East.

The educational activities of the Indian museums of the late 19th and early 20th centuries and even late periods mainly consisted in the publication of scholarly guide books and catalogues. The net result of the establishment of these museums in India helped in the discovery, systematization and regularized observation of natural aspects of the country, namely geological, zoological and botanical. In addition to these, a great interest in Indian history was shown by the then scholars and knowledge of Indian history expanded to a great extent. Regular publications contained books and articles by scholars like Nelson Write, R.P.Chandra, R.D. Banerjee, N.G.Banerjee and others.

Till early 20th century in India, a museum was rather a curio shop. But this old idea is fast changing. It is no more an 'Ājabghar' or 'Murdā-Ciriā-khānā'. After the Second World War the museums have come forward to show an active interest in performing its social duties. The modern museum in India is not only a centre of pleasure and recreation but also serves the purpose of education and research for the general masses of the country and the serious and interested persons in particular. In addition to exhibition of objects in galleries, regular loan services, guided tours and temporary, circulating and mobile exhibitions have become the chief characteristics of various museums. Education

departments have been established in many of these institutions, and controlled experiments of the museum education techniques are being undertaken by the psychologists and educationists. Museums are, now-a-days, not confined within the four walls of a building. The zoological gardens, botanical gardens, other establishments like aquarium, reserve forests etc. where living objects are presented, the public libraries and public archival institutions having a permanent exhibition hall are also called as museum.

The main responsibilities of modern museums as regular centres of mass education are not fulfilled by Indian museums. For their scholarly trend of development the Indian museums developed more as research stations and seldom served as a modern educational institution. More stress was always laid on the acquisition of numerous museum specimens without proper display arrangements for them. The obvious result was overcrowding, loss of records and defective identification. In the year 1936 the famous Markham and Hargreaves report on museums in India was published but it did not contain any comment regarding the possibility of the role of museum in military studies. Subsequent observations of Central Advisory Board of Museums in India also failed to note the service that museums can provide in this regard.

It is fact that since independence the development of museum activities is passing through a period of diversification and expansion. A good number of Science and

Technological museums have come to light in different parts of the country with their varied activities. The museums run by the Council of Scientific and Industrial Research at Bangalore and Calcutta have opened a new chapter in museum education by application of various museum methods like mobile museum display, mobile and circulating kits, regional museums etc. Another big forward step in museum world is the establishment of a large number of beautiful site museums by Archaeological Survey of India at interesting archaeological sites like Nāgārjunakundā, Śeringapaṭam, Nālandā, Bodhgayā, Sārnāth etc. Further, to foster the movement of children's museum Nehru Bāl Saṇgrahālay at Lucknow and Amreli Children's Museum at Amreli, Gujrat have been established. Moreover, to have a systematic study of India's culture and archaeology large number of museums with rare and valuable collections have also been established in different universities of India like Calcuttā, Vārānasi, Poonā etc. It may be safely said that after independence India possesses museums on diverse subjects like astronomy, palaeobotany, art and archaeology, weapons and armoury, jute technology, marine and sweet water biology, mining and metallurgy, leather technology, forestry, port and harbour engineering, personalia and biography, medical research, philately and even museum on dolls.

India Government also showed a great encouragement and definite interest in museum development of the country. A Museum Expert Survey Committee has been constituted by the Ministry of Education, Government of India and the Central

Advisory Board of Museums (presently, Museum Review Committee) guides and aids in development during the different plan periods. Further, regular Museum Camps and Seminers have opened a new field for transmission of expert opinions and investigation results and exchange of views.

By introducing the Museological course in different universities like Barodā, Calcuttā, Vārānasi, Āligarh and Bhopāl a great interest has developed in the theoretical and practical aspects of museology and museography.

Due to sincere efforts of the Madras Government Museum, the application of museum technique has increased in respect of museological training for school teachers. Similarly the short-term course of museological training organised by the authorities of the National Museum, New Delhi has become very popular within a few years.

The National Museum, the National Archieves, the Archaeological Survey of India, the Botanical Survey of India, the Forest Research Institute, the Zoological Survey of India, the Central National Herbarium etc., have devised various techniques in the field of preservation, up-keep and allied matters of miniature paintings, rare documents and manuscripts, archaeological relics, forest products, botanical and zoological specimens and many others.

Mr. C.Sivaramamurti, Director, National Museum of India, New Delhi, reported in the year 1950 about 174 museums in India. Out of these museums 119 are Art, Archaeological

and Cultural museums, 43 Educational and Science museums and only 12 Industrial and Commercial museums. Mrs. Baxi, Secretary, Museum Association of India, informed the author that at present (1975) there are about 300 museums in India and many of them are not listed till to-day. The author has prepared a list of museums in India having war materials which has been shown in Appendix 'A'.

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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."[1] 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, Caturaṅga, or as in English, four arms. These arms are chariots, elephants, horsemen and foot-soldiers. Collectively these four arms are known as Caturaṅgabala or Caturaṅga-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 Caturaṅga.[2] 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 Caturaṅga, 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."[3] 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."[4] In Jātaka stories and in Hindu epic Mahābhārata we get many references of four-fold divisions of army.[5] In Mahābhārata again occassionally 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).[6] Again in chapter 121 of Śāntiparva 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.[7] Chakravarti too refers workmen, officers, spies, military guides, treasure and machines as limbs of army.[8] But these limbs cann't be accepted as divisions of armed forces. If these are accepted as divisions of armed

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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 kośa or the power of the treasury being added to the original four division' and for this he quoted from 'Kāmandakanītisāra' (Kāmandakanītisāra, Trivandrum Sanskrit Seires, 19.24)[9]. From the same book Dikshitar further quotes, "In another place an eight-fold division is mentioned. Besides the Caturaṅga there is Viṣṭi or commissariat, and transport, navy or admirality, Cara or spies, and Deśika or elders and advisers."[10] 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 Kurukṣhetra 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."[11]

Chakravarti further quotes from Kauṭilya, "the army was supposed to consist of six 'limbs' (sadaṅga), these being the hereditary troops (maulā), mercenaries (bhṛta), guild levies (śreni), soldiers supplied by feudatory chiefs or allies (suhṛdbalam), troops captured or won over from the enemy (dvisadbalam) and forest tribes (aṭavībalam)."[12] 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, Senāmukha, Gulma, Gaṇa, Vāhinī, Pṛtanā, Camū, Anīkinī and Akṣauhiṇī. 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.[13] Dr. Oppert however, describes that a Patti consists of one chariot, one elephant, three horses and five men.[14] Major Sensarma is of same opinion as Dr. Oppert.[15] All of them agree that the Senāmukha, Gulma, Vāhinī, Pṛtanā, Camū and Anīkinī are respectively thrice as big as the corps preceding them and Akṣauhiṇī, which represents

a complete army, is ten times bigger in numerical strength than Anīkinī.

According to Dikshitar an Akṣauhiṇī 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 Nītiprakāśikā after desdribing 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 Nītiprakāśikā 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.

Vāhinī - 81 chariots, 810 elephants, 81000 horses and 8100000 foot-soldiers.

Pṛtanā - 243 chariots, 2430 elephants, 24300 horses and 24300000 foot-soldiers.

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

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

Akṣauhiṇī - 21870 chariots, 218700 elephants, 21870000 horses and 2187000000 foot-soldiers."[16]

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

"NĀGĀ DAŚA RATHASYĀSYA ŚATAM AŚVĀSSAHĀNUGĀḤ
SAHASRAM TU NARĀḤ PROKTĀḤ PARIVĀRĀ NṚPĀJÑAYĀ 6
EKASYAIKASYA NĀGASYA ŚATAM AŚVĀḤ PRAYĀYINAḤ
PADĀTAYAḤ SAHASRAM TU PRATYAṄGEŚVANUYĀYINAḤ 7
EKASYAIKASYA CAŚVASYA SAHASRAM TU PADATAYAḤ
DAŚA CAITĀN PATTĪN YUṄKTVĀ KĀRTSNENA GAṆANĀ TVIYAM 8
EKO RATHO DAŚA GAJAḤ SAHASRAM CATRA VĀJINAḤ
LAKṢASAṄKHYĀ NARĀḤ PATTAVEVAM AGREPI YOJANĀ 9
PRATYAṄGAISTRIGUNAIḤ SARVAIḤ KRAMAT AKHYĀ YATHOTTARAM
ANĪKINĪM DAŚAGUṆĀM AHURAKSAUHIṆIM BUDHAḤ 10
SENĀMUKHE TU GUṆITĀḤ TRAYAŚCAIVA RATHĀ GAJAḤ
TRIMŚAT TRILAKṢAPADATĀḤ TRISAHASRAM HI VĀJINAḤ; etc.... 11
AKṢAUHINYĀM TVEKAVIMŚATSAHASRAṆI JANĀDHIPA
TATHĀ CAṢṬAŚATAM CAIVA SAPTATIM RATHAGĀM VIDUḤ 27

ASṬĀDAŚASAHASRĀṆI DVE LAKṢE CA NAREŚVARA
TATHĀ SAPTAŚATAM CAIVA GAJANAṂ GAṆANĀ TVIYAM 28
DVE KOṬĪ CAIVA LAKṢĀṆĀM AṢṬADAŚA MAHĪPATE
TATHĀ SAPTATISAHASRĀ GANDHARVĀŚŚIGHRAYAYINAḤ 29
DVE CĀRBUDE CA KOṬIŚCAPYAṢṬĀDAŚASAMĪRITAḤ
LAKṢĀṆAM SAPTATIŚCAIVA PADĀTINĀM ITĪYATĪ." 30

In the following lines Dr. Oppert refers to the proportion of different arms to each other as mentioned in Śukranīti.

"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."[17] The relevant ślokas from Śukranīti are quoted below :

"Caturguṇam hi pādātam aśvato dhārayet sadā,
Pancamāṁśānstu vṛṣabhān aṣṭāṁśāṅśca kramelakān;
Caturthāṁśān gajān uṣṭrāt, gajārdhāṅsca rathānstathā
Rathāt tu dviguṇam rājā bṛhannālikam eva ca."

(Śukranīti, Bk.VII.Ślks.20,21)

Again in the Udyogaparva of the Mahābhārata it is mentioned that Senā as an unit consists of 500 chariots, 500 elephants, 1500 horses and 2500 foot-soldiers. Ten such Senās form a Pṛtanā and one Vāhini consists of ten Pṛtanas. In another place the numerical strength of a Patti is stated as 250 men. Three such Pattis form a Senāmukha and thrice the number of a Senāmukha constitute a Gulma. Three Gulmas form

a Gana.[18] Naturally, it cannot be denied that there exists some confusion in the different descriptions given in the Mahābhārata regarding various units of the army and probably the terms Senā, Gulma, Vāhini 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:[19]

Unit	Ratha	Gaja	Ashwa	Padatik	Total
Patti	1	1	3	5	19 (Sec.10)
Senāmukha	3	3	9	15	30 (Platn.30)
Gulma	9	9	27	45	90 (Coy.120) appx.
Gana	27	27	81	135	270 (Bn.1000 ")
Vāhini	81	81	243	405	810 (Brig.4000 ")
Pṛitana	243	243	729	1215	2430 (Dvn.20000 ")
Camū	729	729	2187	3645	7290 (Crops.60000 ")
Anīkini	2187	2187	6561	10935	21870 (Army.180000 ")
Akṣhauhiṇi	21870	21870	65610	109350	218700 (Group of Army)

During the time of Alexander's invasion some Indian States possessed the armed fordes as shown below :[20]

King/State/Race	Infantry	Cavalry	Elephant	Chariots
Massage	38000			
The Assakenoi	30000	20000	30	-
King Porus	30000	4000	200	300
Agrammes, king of Gangaridae and Prasii	200000	20000	3000	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 Harṣabardhana 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.[21]

As reported by Al 'Uthi, king Jaipāl, the Rājā of Bathindā moved against Sultān Māhmud in 1001 A.D., with an armed force consisting of 30,000 foot-soldiers, 12,000 horses and 300 elephants.[22]

According to Firishtā, king Gaṇḍā (995-1025 A.D.) of Cāṇdellā territory possessed the army with total strength of 45,000 foot-soldiers, 36,000 horses and 640 elephants.[23]

In the second battle of Tarain (1192 A.D.) Rāi Pithorā (Pṛthvirāja) had had under his command and control a large army,

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of which the cavalry alone numbered 30,00,000, besides the countless mass of foot-soldiers.[24]

Again in 1443 A.D., it is noted that according to Firishtā the Vijoyanagar army consisted of 62,000 archers, 80,000 horsemen and 20,00,000 foot-soldiers.[25]

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 :[26]

Period	Cavalry	Infantry & matchlock men	Artillery	Authority
Ākbar	12000	12000	1000	Blochman, 1, 246
Ākbar	384758	3877557	-	Āin-i-Ākbari.*
Śhājāhān	200000	40000	-	Bādśhāhnāmāh, ii, 715, Ain, i, 244
Aurangzeb	240000	15000	-	Bernier.
Aurangzeb	300000	600000	-	Catrou.
Mhd. Shāh	200000	800000	-	Tarikh-i-Hind of Rustam 'Āli.

It is peculiar to note that boats or ships are being used in fighting since the epoch of epic; in Kautilya's Arthaśāstra too a special officer to look after the navy is mentioned and history also tells us that during Moghul and Mārāthā 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) Kauṭilya 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-Kushān 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 Mughul 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 artillary 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 can not 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 battle-field 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 Sensarma referred to a chariot as 'the queen of the Kurukshetra.'[27]

In India chariots are being used from very remote days. There are numerous references to war-chariots in the Rg Veda.[28] Dikshitar has translated two hymns addressed to the war-chariot from Rg Veda and Atharva Veda respectively which are quoted below :[29]

"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.47.26)

"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 Aîtareya Brāhmaṇa would seem to indicate that chariot was an important instrument of war in these days. This inference is supported by the Taîttirîya Brāhmaṇa 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 frame-work, fixed on an axle-tree (akṣa) and fastened by cow-hide thongs. The frame-work 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 (iṣā, praüga) 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 tarōman), the yoke and the pole being then tied together."[35]

"The horses were tied by the neck (grīvā) 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 'kakṣyā'."[36]

"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)."[37]

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 īṣā (the pole of the chariot, which lies in the middle lengthwise - this has been compared with the centre line, the prṣthya or the back-bone of a vedī) measures 188 aṅgulis, perpendicular (tiryak) to which (iṣā) are akṣa (hind part of the cart) equal to 164 aṅgulis and yuga (the fore part) equal to 86 aṅgulis; such is the chariot (constructed according to the rules of the guild). These are the measures of the car."[38]

"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 Droṇaparva (83,15), 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 Sānchi 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-īṣā) 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 'chattra' (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 anukarsa (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."[40] 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."[41]

"The number of charioteers, however, depended on the number of horses. When two horses are sufficient, one Sārathi 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, pārsṇisārathi."[42]

"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 Nīḍa (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; Droṇaparva, 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' (Droṇaparva, 191.68)"[43]

"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."[44]

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."[45] 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, Alexandar'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.'[46]

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 Arthaśāstra 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 Sāṁgrāmika (battle chariots), the Parapurābhiyāṇika (chariots used in assaulting the enemy's strongholds) and the Vaigayika (training chariots). According to the Arthaśāstra the best chariot should be ten puruṣas in height and twelve purūṣas in width.[48] (The actual measurement of Purūṣa is not clear, because we get two terms, — Puruṣa and Paurusa. Sk.I, Chp.20 refers 108 angulas = 1 paurūṣa, but the term Puruṣa 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 Junāgaḍh Inscription of Rudradaman (151 or 152 A.D.) but occasionally, too, in the records of a much latter period."[52] In Hiuen Tsiang'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 Harṣavardhan as mentioned by Bānavaṭṭa 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 Harṣavardhana's (c625 A.D.) campaigns. "The Samnad copper-plate grant of Dantidurga or Dantivarma II (also called Khaḍgavolaka), dated A.D.753-4, Saka 675, tells us that this monarch 'overcome the countless army of Karnāṭaka', 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 premediated 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 disappearance 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,'[58] 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 Ṛg Veda probably under the designation of 'mṛga varaṇa'. Roth is of opinion that this compound name is a proof of the newness of the animal to the Vedic Indians.[59] 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 Ṛg 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.'[60] 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 Kurukṣhetra war were well protected with various types of armour (kabacas) and normally an elephant used to carry six men along with a driver called 'aṅkuśadhara' for carrying an 'aṅkuś' or hook to guide the animal. Generally they were used to make the central column of the advancing army. Major Sensarma refers that "at Kurukṣhetra 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."[61]

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."[62]

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 Kauṭilya 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 Kauṭilya 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 — Damya (that can be controlled by training), Sāmnahya (those fit for war), Oupabāhya (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) Saṁyāna — marching in straight, curved circular and cow's urine (gomutrakar) like arrays, (4) Badhā-badha — 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) Sāṁgrāmika — deployment in open warfare.

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

Harṣacarita 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 Sarma referred, "Sultān Māhmud 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 armourclad 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 Haldighatā (1576 A.D.), the deadlock created by the contestant armies of the Moghul Emperor and the Rājput Rānā Pratāp Singh could be cleared by elephants only. The Moghul army could establish victory by killing the driver of Pratap's rank-breaking elephant Rām Prasād."[68]

Again in 1784 A.D. in the battle at Shakar Kherā 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 Ālivardi at the battle of Gheriā (1740 A.D.). ..... In 1756 A.D., Shaukat Jung, the Nawāb of Purneā, fought at Manihāri 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.

Cavalry :

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 Ṛg 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 Kurukṣhetra war we find Dronāchāryya on horse's back to supervise the battle formation of 'Cakraśakaṭa 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 (unmathyābadhān), (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 (maṇḍala), (9) to employ the horses in all types of horse movements (prakīrṇaka), (10) to pierce the enemy after pushing it to some distance (byābrittapriṣṭha), (11) to protect the rear of its own army while returning from the enemy's area (anubaṅśa) and (12) to chase a defeated enemy.[71] 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."[72]

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.[73]

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, Sindh and Persia as mentioned in Bāna's Harṣacarita.[74] 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.'[78] 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 Yudisthira that with handful number of well trained, well disciplined foot-soldiers wonders could be achieved."[79]

While going through the details of Kurukshetra battle we notice that the capabilities of foot-soldiers are very poor in comparison to other arm divisions. They follow the charioted heroes in a battle but at the death of the hero they generally give up the fight and run away from the field. Chakravarti writes : "The epic foot-soldiers seem to have been useful only in order to secure a decorous setting for the display of knightly prowess. They suffered the greatest number of casualties, but contributed little or nothing to the decision of the battles."[80] On this point Sensarma opined that, "Chakravarti's contention does not seem to be accurate. The Samsaptakas gave tough fight to Arjuna, and under the advice of Krshna, Arjuna sped away from them."[81] 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."[82]

Kauṭilya 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.[83]

The Nītiprakāśikā, 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.[84]

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 Ākbar poters, dak-runners, gladiators, wrestlers, palki-bearers and water-carriers, were all classed as infantry.[85] 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.[86]

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 inaccessable spots overgrown with trees and cane bushes are the most suitable for the foot-soldiers.[87] Similarly, Kauṭilya is of opinion that the best ground for an infantry to fight is that where big stones and bolders exist or the place thickly planted with trees dry or alive.[88]

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 (CQB) weapons."[89]

Admirality :

The admirality 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-crystaline 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-crystaline silica having a smooth and more regular concoidal fracture than the quartzites of early Stone Age.[91]

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

(i) Scrappers : 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 Harappān 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 culture[95] 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-dāro 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 traight 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.[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.[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.[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 Śāstri, Campbell and S.C.Roy also discovered some more weapons of this type from Hardoi, Bihar, Bulandshahar and Hyderābād. 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."[104]

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. There average length is 7 inches, width 5 inches, thickness ½ 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.[105]

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.[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 Hyderābād. 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 Gujrāt. 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."[107]

Spear-heads : Gordon mentions that the broad bladed specimens found at Fatehgarh, the 'Elliot Sword' and the blades found at Niorai, Etāwāh 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."[108]

Dirk : Pant mentioned about a hoard of thirteen swords and dirks found at Fatehgarh. Again at Kānpur in the district of Bulandshahar he found a copper dirk, 18½ inches long with a mid-rib along with two other axes.[109] 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 Karṇa Kā Kilā, near Kurukshetra, Haryānā. This is of copper or low-grade bronze."[110]

Axes : From Rānchi, 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.[111] 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."[112]

Multi-purpose weapon : Pant mentioned about the 'anthropomorphic' figures of copper found at Baisauli, Fathehgarh and Seorajpur which have been suggested by Lal as used for relegious or utiliterian 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."[113]

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, Dhanuschandradoyan, Kodanda-mandyana 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 Sanhita, Hareet Sanhita, Atri Sanhita 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 Agnipurana, Bayu Purana and Brahmavaivarta Purana, 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 Nītiprakāśikā 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 bells. The commentator to Kautilya's Arthaśāstra defined it as the weapon provided with edges like a ploughshare.[117]

Bhiṇḍipāla — 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. Kauṭilya regarded it as a kind of spear or javelin.[118]

Drughaṇa — 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.[119]

Tomara — 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.

Śhamśāstri, the Kauṭilya'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).[120]

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.[121]

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, embelished with leaden balls and thrown by three peculiar movements. Agni Purāna 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.[122]

Cakra — 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. Kauṭilya describes it as a movable machine.[123]

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.[124]

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.[125]

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

Vajra — A mythological origin has been attributed to this weapon in the Tīrtha-yātrā portion of the Mahābhārata. Riṣhi 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 Śatapatha Brāḥmana 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.[126]

Īlī — 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.[127]

Paraśu — Nītiprakāśikā 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 Kauṭilya 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.[128]

Gośīrṣa — 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.[129]

Asidhenu — 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]

Āstara — 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 Australian.[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]

Sthūṇa — 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.[135]

Pināka — It is a trident (triśūla) 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.[136]

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.[137]

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. Śaṅkarācharya in his short poem 'Mohomudgaram' compares knowledge to a Mudgara which breaks 'moho' or delusion.[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.[139]

Musala — It is a pestle-like club with both ends well knit together. In Rāma-Rāvana battle, the Rākṣhasas used Musalas of iron embellished with gold to crush enemies.[140]

Paṭṭiśa — Dikshitar 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 Paṭṭiśa (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.[141]

Mauṣṭika — 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]

Śataghni — 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 Gadā, it was therefore like the Gadā 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 — Nistriṁśā, Viśamana, Khaḍga, Tīkṣṇadhāra, Durāsada, Śrīgarbha, Vijaya, 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 'Triśikhā'. 'Pandrara' iron found in the 'Jangala' country, grey coloured iron of Maharastra, 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 Bhisma

narrates that sword was born out of a meteor like lotus which emanated from a sacrifice performed by Brahmā 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 pre-cursor 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 Harappān culture (No.3, Pl.CXIII of Further Excavations at Mohenjodāro, 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 Mohenjodāro 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 Harappān 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 Nistrimśa, Maṇḍalāgra and

Asiyasthi as some varieties of swords. Nistrimśa is sword of crooked handle, Mandalāgra is erect and provided with a disc at the top and Asiyasthi 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 Mahārājā Swāi Mān Singh II Museum), the famous 'Khaṇḍa' of Mān Singh is preserved. The National Museum, New Delhi possesses a sword of Mahārānà Hāmir Singh.

Again the Mārāthàs relied more on swords and their swords were of good temper, straight or curved. The sword of Nānā Rào Peshwā, now at National Museum, New Delhi is slightly curved, single edged at the upper end. During the seige 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 Mārāṭhàs are very good swordsmen. The 'Khaṇḍa' used by the Mārāṭhàs is a peculiar variety of sword. A beautiful specimen of Mārāṭhā Khanda 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. 'Khanḍa' used by the Sikhs is of very broad blade with a knuckle guard at the hilt. 'Khang' 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 'Arapṛṣta' 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 'Tājuśhāhi', with two ribs are called 'Sultānśhāhi', 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

'Teghā', and 'Khanda' swords. Dusman-Khus (enemy-killer), Ālam-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. 'Ālamgir' 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 Hyderābād 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 Abdāli of 1761 A.D., Ṭipu Sultān and Netāji Subhās Chandra Bose are displayed and well preserved.

Ābul Fazal mentions in his famous work 'Āin-I-Ākbari' 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 Nītiprakāśikā and different sanskrit and modern text, most of the weapons belonging to the classes 'Mukta-Amukta' and 'Mantra-Mukta' are various kinds of missiles;[147] 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 Vishārad Bāule' in a Bengali journal,[148] 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 'Dhanurveda' 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.[149] 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 Nītiprakāśikā 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 Kauṭilya'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 Calayantra, the movable machines.

Śhāmśāstri and Basāk, the commentators of Kauṭilya have described the weapons under Sthitayantra and Calayantra respectively as given below:[150]

(A) Sthitayantra —

Sarbatovadra 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 Mahāśarayantra. 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.

Viśwaghāti — 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.

Yāngka — It is a rod or pole mounted on a wheel so as to be thrown against enemies.

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

Parjjanyanka — 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 Viswaghati.

Ardhabāhu or Bāhuyantra — 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 'Urdhabahu'.

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

(B) Calayantra :

Pāñcālika — 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.

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

Muṣalayaṣṭi — It is a pointed rod made of Mimosa catachu (khadira) wood.

Sūkarikā — 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.

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

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

Śataghnī — 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.

Iṣu —It is the arrow and the most important, much used weapon of this group. The Dhanus (bow) and Isu (arrow) are the first composit weapons invented by man. In Vedic period its mastery was considered so important that an elaborate and exhaustive treatise 'Dhanurveda' was dévoted to the science of war. In Ṛg Veda we often get references of bow and arrow. In Yajurveda archery has been given an important place. In Viṣhṇupurāna Dhanurveda 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]

'Nītiprakāśikā' classified this weapon under Mukta group.[152] Chakravarti and Dikshitar did not contradict this but Pandit Iśhwar Chandra Śāstri, commentator on 'Sadāśhiva 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.

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

The term 'Astra' in Śukranītisāra is translated by Dr. Oppert as bow[154] 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, buffallo and the deer. If these are not available then twisted cotton thread and bamboo fibres are the best substitutes.[156]

According to Kauṭilya bows are made of Tāla (Palmyra), Chāpa (a kind of bamboo ?), Dāru (wood) and Śriṅga (horn) and bow-strings are made of Murva (Sanviera roxburghiana), Arka (Calotropis gigentea), Sana (Hibiscus cannabinus), Gavedhu (Coix barbata), Venu (bamboo bark) and Snayu (sinew).[157]

Kodaṇḍamāṇḍana 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. Nīti-prakāśikā prefers a bow to be four cubits in length with three bents but Sadāśhiva-Dhanurveda speaks of a bow of 5½ hastas (1 hasta = 24 anguli) is the best and is known as Dibya Dhanu.[158]

In Dhanurveda we get the references of ten different types of arrowhead such as Bhalla, Karṇik, Kāktunda, Aramukha, Khurapra, Gopuchha, Ardhachandra, Divibhalla, Sūchimukha and Batsadanta.[159]

The arrow-heads made of bone and ivory of Taxila are of four types — (i) 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.,[160] when the Dhanurveda was compiled and Arthaśāstra was written.

According to the physical nature the arrows from Taxilà 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.[161]

Kauṭilya refers to five kinds of arrows such as Veṇu, Śara, Śalākā, Daṇḍāsana and Nārāca. Of these the first three are made of wood, while the remaining two are wholely made of iron. These are used for cutting, rending or piercing.[162]

'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 Zulfiquar Khān on 18th June, 1707.[163] Irvine has referred to 'Pāikar-Kash' an arrow-puller, used to pull out arrow-heads from the body.[164] The Arms Gallery, National Museum, New Delhi has got two such specimens.

In the 18th century, Pāṭhāns 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.[165]

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 Jahān is preserved in the Dogrā 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, gluded 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."[166]

In the Mughal period the arrow is called as 'Tīr', the archer as 'Tīrandāz', the stave as 'Kaman', the string as 'Zih', 'Rodā' or 'Chhillāh', 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 Gujrāt 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.[167] '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.[168] In the National Museum, New Delhi, we shall find many arrows of the 17th and the 18th century.

The Rājputs 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 Ālwār Museum a cross-bow of the Rājputs 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 Rājputs. 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 'Sarvatobhadra' 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 Kauṭilya's Arthaśāstra, besides the mechanised weapons (yantras) mentioned before we also get references of the following kinds of weapons with edges like a ploughshare (halamukhāni) : Śakti, Prāsa, Kunta, Ḥātaka, Bhindipāla, Śūla, Tomara, Barāhakarna, Kaṇaya, Karpaṇa and Trāsika.

Further, razor like weapons such as Paraśu, Kuṭhāra, Paṭṭisa, Khanitra, Kuddala, Cakra and Kāṇdachchedana are mentioned in Kūtilya's Arthaśāstra.

Of these weapons Śakti, Prāsa, Kunta, Bhiṇḍipāla (Bhiṇḍivāla), 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. Barāhakarna is a rod with edges shaped like the ears of a boar. Kanaya 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 javeline to be thrown by the hand and it goes as far as hundred bow's length when thrown by a skilful person. Trāsikā and Kuṭhāra 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. Kuḍḍāla and Kāṇḍachchedana are small and big axes respectively.[169]

Among other weapons of earlier period in India mention may be made of the weapons used by the Rājputs, Mārāṭhās 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 Meena of earliest days down to the latest automatic rifles. Jaipur is famous for its damascending, Sirohi for its blades and Ālwār for its varieties of weapons. The weapons other than sword and bow are as follows :

Bichhwā 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 blades. While the handle of Bichhwā 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 Śukranîti 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 Śukranīti the arka (Calatropis gigantea), the snuhi, snuhī or snuh (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 Śukranīti, 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, vermilion, 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 Hal 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 fuze, 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 Śukranīti, one 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 Nītiprakāśikā, 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 'Nālikā' 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 Śukranīti 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. 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 the Śukranīti 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 Śukranīti we find it stated that the royal watchmen, who are on duty about the palace, carry firearms. The Kāmandakīya, acknowledged as one of the earliest works on Nītiśāstra, 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 Mahābhārata and Rāmāyana are full of the description of wonderful divine firearms, the Āgneyaśtra. 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 fire-works 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 Madurā District lies not far north from Rāmnād (Rāmanāthapura) on the sea the ancient Tirupāllaṇi. It is celebrated throughout India, on account of its famous temple dedicated to Ādijagannātha, ... The erection of this shrine goes back to a far distant period (?). On the outside of an ancient stone maṇḍapa 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 Kumbhaghoṇa (Combaconum) is a temple devoted to Śārangapāṇi, i.e., to Viṣṇu bearing in his hands his bow Śāraṅga ..... 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 Kāñchīpuram (Canjivaram) is a famour maṇḍapa which, as it rests on a hundred columns, is called Śatastambhamaṇḍapa, or Nūṭikālmaṇḍapa 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 Tāṇjore temple are carved in stone on stone pillars opposite the Svarga ekadaśī-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 fire arm as Tāṇjore temple could be dated to the

12th 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 Sabhāmaṇḍapa. 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 Dekhan 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 Nītiprakāśikā 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 oxydizing 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

secret. 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 mystry 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."[171]

Like Rājputs, the Mārāṭhās' military skill has always been a source of inspiration to the students and research workers of Indian Military System. The uniqueness of the Mārāṭhā movement lies in their national character.[172] 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 Mārāṭhā 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 Mahārāṣtra) were proud, spirited and warlike, grateful for favour and revengeful for war."[173]

In Māraṭhā 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 Piṇḍāris in the Māraṭhā 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 Pānipath in the year 1761 A.D., Māraṭhā soldiers used lance and sword against the enemies. As quoted by Pant from T.S.Shejwālkar's writing, 'each Māraṭhā 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.'[174]

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 globuler 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 Bichhwā 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. Barā-Jamdādu is most common type of dagger with a tripronged hilt more or less like a Mughal Khapwā. 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-Daulicānch. 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 tappering 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, "Bāji Rāo had his own foundry in 1739 A.D. I visited the foundry when I saw many cochorn 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 tho 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 wining 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 Barchhās because those are very light, long and pointed.

Sikhs used mostly all dagger-like weapons used by the Rājputs and Mārāthās. The hilt of those weapons are mostly made of bone, ivory or metals. 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 Sādā' and the other consists of serrated outer edge called 'Cakra Kāṭāvdār'. 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. Mahārājā Ranjit Singh had a craze for guns and he should be credited for organising

the Indian artillary 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.[176] The same year he formed two separate departments known as Topkhānā and Topkhānā Khurd meaning heavy guns and light guns respectively.[177] At Amritsar he established another foundry where gunpowder and crude fuses were produced.

By 1808 A.D., Ranjit Singh collected about hundred 'Shutarnals' (swivels) and established another department named Dārogā-i-Zumburkhānā or Superintendent of Swievels. At that time guns were drawn by buffaloes. In 1810 A.D., a new weapon called 'Gubarah' or mortar was produced and horse-artillery started. In 1831 A.D., Mahārājā Ranjit Singh reorganised his artillery as Topkhānā Jinsi (mixed Batteries), Topkhānā-Apsi (horse Batteries) and Zamburkhānā (swievel Batteries). Besides all these a separate Topkhānā, exclusively for Maharaja's use,called Topkhānā-i-Mubārak or Topkhānā-i-Khās was established.[178]

Mahārājā not only produced artillery in the country, he also imported foreign made artillery pieces. His artillery power was at per with that of the East India Company.[179]

Matchlocks and Flintlocks used by the Sikhs were

known as Bandook Torādār and Bandook Caqumuque respectively. The matchlocks consist of a long barrel of wrought iron wrapped with metal bands and attached to a wooden caseing. 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.[180]

Flintlock is a long barrel shaped firearm and is called as Banduk Pāthar or Bandook Caqumaque. 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 (sangin) is attached at the front of the barrel for close-quarter battle.[181] Lord Gough has praised flintlocks and is of the opinion that they are at per with those of the British make.[182]

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.[183]

Bandook Masāldār or Percussion -Cup gun is first used in the Sikh army in 1825 A.D. It is superior to flint-lock 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 barrells. 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.

Tāmānchāh 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, Lilā-aur-Majnu, Jang-i-Bijli etc.

All these weapons described above are manufactured in the State Foundaries at Amritsar, Kashmir, Lāhore 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 cavalry men 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 — Gadā, Shaspar, Piyāzi, Gurj, Dhārā and Garguj are the different varieties of mace used by the Mughals. Gadā is a small steel rod with a round head while Shaspar, the lung-tearer, possesses an oval-shaped head. Piyāji looks like that of an onion but in the Gurj steel spikes are fixed on the globular head of the Piyāji. 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 Dhārā an octagonal steel shaft is attached on the top but those having eight-bladed heads with basket like hilts are known as Garguj.[184]

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.[185] The battle

axe of Nadir Shah is well preserved in the National Museum, New Delhi.

Spear[186] — Nāzā, Barchhā, 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 Barchhā is fully made of very light and slender steel and can be easily thrown. Different kinds of Barchhā 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 Sank. It is also known as Bhala.

Other kinds of spears as referred to by Egerton are Ballam, Pandi-ballam, Panjmukh and Lange. 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 Gujrāt. 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[187] — Kāṭār, Jamadhār, Khanjar, Kaṭarā, Khapwāh, Narsingh Moth and Gupti are the different varieties of daggers prevalent in India during the Mughal regime.

The length of a Kātār 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 rightangles 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. Jamadhār 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. Kaṭarā is like a Jamadhār with long double edged curved blade.

National Museum, New Delhi possesses two Kātārs 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-Ākbarī.

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 Kashghar. Its handle is made of fish-bone called Sher-mahi and is slung from the shoulder belt.

Heavy guns[188] — 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 prēparing matchlocks under his personal direction. The large guns were all identified with different high-sounding names. Some of these large heavy guns are : Gāzi Khān (Lord Champion), Śher Dhan (Tiger-mouth), Dhumdhām (the noisy), Kishwar-Kusha (World-opener), Garh-bhanjan (Fort-demolisher), Fath-i-Lashkar (Army conqueror). Aurangbar (Strength of the throne), Burj Shikan (Bastion breaker), Jāhān Kusha(World-conqueror), Ālam-sitān (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 Mālik-i-maidān (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 4½ inches. It was cast at Ahmadnagar in 1548 A.D., during the reign of Burhan Nizām Shāh, by a Turk named Muhammad, son of Hāssān. It was first described by Moor, who believed it to have been cast by Ālamgir in 1685 A.D., but the copy of the inscription given by him, does not bear this out, for it commemorates the capture of Bijāpur 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 Āgrā'. It is like an immense Howitzer, above 14 feet long and 22½ inches in the bore. Detail measurements are as follows :

Nature - 1500 lbs. brass.
Weight - 1049 cwt. 1 grs. 4 lbs.
Diameter of the Calibre - 22.5 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 Thorn) saw it."

Again in 1803 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, carrondes, gallopers and mortars with 33 tumbrils, at Agra.

At Lahore, there are a few big guns of the Mughal period. The 'Zamzamāh' (The Thunderer), one of the two of this variety, cast by Shāh Nāzir, by order of Shāh Wāli Khān, prime minister of Āhmad Shāh Abdāli (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 Chinab river; and later on this gun was removed by a Sikh leader, Har Singh Bhangi, from a village two miles away from Lahore, where Āhmad Sāha had his arsenal. This gun bears an inscription of twenty-two lines. The last two lines are as follows :

"Bad taslim bą gufta : Top
Paikar-iazhdahae, 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:[189] 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 Steingass 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. Sarkob as mentioned in Ākbarnāmā, 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[190] — Gajnal, Hātnal, Shutarnal, Zamburak, Shahin, Dhamakāh, Ramjānki and Rakhalah are the names of some of the light guns used by the Mughals.

Gajnal and Hāthnal 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[191] — 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 66 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-Frāng 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, sherbāchāh, 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, Hydrabad 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.[193]

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 Sanchi sculptures in general.[195]

Probably Sānchi sculpture is earlier than Bhārut and Mauryan sculpture is earliest in India. But in the opinion of Smith and Dikshitar Bhārut sculptures are so far known

as the earliest sculptures of India,[194] 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 Khātān by Stein.[195] First representation of stirrup in the arts of ancient world appears in Bhārut 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 Orissā. In the relief sculptures of the temples of Bhubaneśhwar 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.[197]

Further we notice a number of tableaux on the upper verandah of the Rāni Gumphā (Queen's monastry) in Khaṇḍagiri 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 Ganesh 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 persuing 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.[198]

Bows of 2nd or 3rd century A.D., can be examined in the Nāgarjunakoṇḍā railings. These bows are long and may be considered as a link between the bows of the Mauryan period and Gupta period in India.[199] A bronze sculpture of 3rd century A.D., belonging to Ikṣhwāku dynasty, now displayed in the Nāgarjunakoṇḍā Museum, Guntur district of Andhra Pradesh depicts a prince standing with a bow in his hand.[200]

On a stone sculpture of c.8th century A.D., now preserved at Batavian Museum, Jāvā, Dharmapāla, the famous king of Pāl dynasty in India, has been depicted holding a bow.[201] That, during the period of Gurjara-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 terecotta plaque from Pāhārpur testifying the use of bow and arrows.[202]

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 facade 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 neckloss, 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 goaring '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 worthmentioning — Cakra, Gadā, Daṇḍa, Kheṭaka, Dhanus, Śara, Ankuśa, Pāśa, Khaḍga, Paraśu, Śula, Śakti, Vajra, Agni, Musala and Khaṭvanga. Rao adds to the above list three more objects, such as Śankha, Ṭaṅka and Hala or Śira. In the true sense of the term Śaṅkha 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. Ṭanka, 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. Ṭaṅka is the particular emblem of Lord Śiva as Hala or Śira is of Samkarsana-Baladeva. 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 Viṣnu along with Śankha mentioned earlier. The mace or Gadā held in the hand of Viṣnu 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 Carma. Dhanus and Śara are a bow and an arrow. Different names are given to the bows held by different gods such as Pināka, Śāranga, Puṣpadhanva 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. Khaḍga 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 Siva. 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-Naṭarāja. It may be depicted as a torch serving the purpose of an incendiary weapon. Muṣala 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. Khaṭvanga is a peculiar type of club made of

humerous 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 Cāmuṇḍā and Bhairava.[203]

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, ḍamaru, bow, arrow, ploughshare, lotus, scad of knowledge, barbed spear, dagger, rudrākṣamālā, khaṭvanga, 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 Vindhya 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 animals body."[204]

The weapons depicted in the Ajantā 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.I, 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."[205]

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."[206]

The illustrated copy of Bābar-Nāmā, a copy of which is lying in the National Museum, New Delhi contains 183 paintings. Bābar-Nāmā 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 Pānipath (1526 A.D.) we find Bābar 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 Ākbar's reign Mahābhārata was translated into Persian by Naquib Khān, Ābdul Qudir Bahaini and Sheikh Sultān and was named as Raznāmā. 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 Ākbar's reign have been illustrated in Āin-i-Ākbari — 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.[107] In a Mughal miniature painting detable 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.[208] During Aurangzeb's reign Mughal paintings declined rapidly and the skilful painters migrated to Āudh, Bengal, Mysore, Hydrābād etc., but Rājasthān paintings continued to flourish and in most of the Rājput paintings weapons and battle scenes can be discerned. A Rājput warrior with his sword, shield and dagger has been portrayed in a painting of Jaipur School, now preserved in the National Museum, New Delhi.[209]

Pant refers to some rare manuscripts depicting battle scenes now in possession of the National Museum, New Delhi. "Yusuf Zulekha written by Maulānā Ābdul Rehman Jani in 9th century A.H., contains battle scenes in which the king is seated on a 'Howdāh' fully equipped and being escorted by his soldiers. ..... Khamsa-i-Nizami of Muhammed Mumim 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 'Lailā Majnu' written by Katib Mustafa. The Shāhnāma 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, Bhāgwat Purāṇa (Devnāgri script), Mahābhārata

(Udyoga Parva, 18th century A.D.), Durgā Saptasati (miniature copy), Kalpasutra (illustrated), Bhāgwat Purāṇa (late 18th. century A.D.) are equally interesting manuscripts for the visual study of warfare in India. The history of Nizāms of Daccan 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 Nāmā containing the paintings of Kashmir School A.D. 1797 is an informative treatise for our study."[210]

Similarly, a careful study of the Deccani, Mārāthā and Sikh Schools of painting is sure to provide us with facinating 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 Vikaṭa 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.[211] 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.[212] 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 Ziolus, Apollo is seen facing right with an arrow holding with both hands and a quiver hanging from his back.[213] 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.[214]

Andhra coins of Vaśiṣṭhipura and of Gautamiputra (c.80-100 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 Kṣhaharata 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.[215]

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.[216]

Spears and javelins — The representation of spear and javelins on ancient Indian coins are numerous. The coins of Aryamitra (c.1st century B.C.) show a male figure in standing position holding a spear in his right hand. The coins of Bhānumitra too depict spears. The Lord Kārtikeya standing with a spear in his right hand has been shown on some Ujjayini coins. Again six-headed Kārtikeya with a leaf-shaped pointed spear has been depicted on the Yaudheya silver coins (variety III).[217]

Many Indo-Greek, Indo-Pārthiān and Indo-Bactriān 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 Eukratides, Dioscuri is seen with a long spear and Nike is seen holding a spear on the copper coins of Antimachos. Again on coins of Heliokles, Zeus is shown with a lance in his left hand. On coins of Azes, 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.[218]

Among the coins of Kusān dynasty we find Kaniṣhka 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.[219]

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.[220]

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 represnted . On a silver coin of Heliokles (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.[221] 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, Kaniṣhka is depicted as offering at an alter 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 Kaniṣhka represents a figure with a helmet with plumes and sword hanging from his left side.[222] On the coins of the subsequent rulers of Kuṣhān dynasty sword is also depicted. On the reverse of a gold coin of Kuviṣhka, the figure of a man seated on snakes with a double edged, broad ended sword in his right hand is nicely depicted.[223]

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 'Chatra 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.[224]

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.[225] 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 Audumbarā coins.[226] On the silver coins of Dharghosa and Vimaki, similar tridents with battle-axes have been depicted.[227] The battle-axe is further shown on copper coins of Jayadaman, son of Chastna (c.120-150 A.D.).[228] 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.[229]

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.[230] On the obverse of a square copper coin of Lysias a mace is shown over the shoulder.[231] Again on the coins of Spalahores and Vononos, Hercules has been portrayed with a club on his left shoulder.[232] Knotted club is depicted on the reverse of the square copper coins of Menander.[233] 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."[234]

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 Kauśambi and of Dhanadeva and Agnimitra (c.100 B.C.) tridents are clearly depicted.[235] It is also seen on Pāndyan coins and on Chola coins associated with bow.[236]

Aṅkuśa — 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, Vishnumitra, Purushadatta, Balabhuti and Rāmadatta of the same dynasty, elephant goads have been depicted.[237]

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.[238] Again, on the coins of Rajuvala (c.40-20 B.C.), Pallas is seen holding Agni (fire) in the left hand and hurling Vajra by his right hand.[239] A Vajra along with a shield has been depicted on the reverse of the silver coins of Menander.[240] Vajra is also found on the coins of Bhumaka (119 A.D.) and Nahpana of Ksaharata family.[241]

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.[242] Flat head-gear is portrayed on the obverse of a silver coin of Antialkidas.[243] 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.[244] Again, on the obverse of silver coins of Menander, helmeted head of Athena can be seen.[245]

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 Agathocle's coins.[246]

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 armourer'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, Katch and Viziānāgrām. 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 turquoises, and garnets."[247]

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 Tanu-trāna.

Indians knew the use of armour since the days of Rg Veda. Lord Varuṇa is mentioned there as wearing a golden mail with lustrous appearance.[248]

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.[249] 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.[250] Sensarma expresses his doubt 'whether the Carmas used at Kurukṣhetra were similar or prototype of the same could not be clearly made out.'[251]

During Mauryan age, in Kauṭilya's Arthaśāstra we get various types of shields — Peṭi, Carma, Hastikarṇa, Tālamula, Kavāṭa, Kiṭikā, Apratihata and Valāha-kāṇṭa. Peṭi 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 later one is like a simple wooden board. Kiṭikā is a light shield made of reed and leather. Apratihata 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 Apratihata but its edges are wrapped with iron fringes.[252]

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 (vartulāni) in shape and the materials to be used for their preparation must be canes, bamboo, wood and hide as already mentioned in Arthaśāstra.[253]

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. Brāhmans who objected to leather had shields made of forty or fifty folds of silk painted red or ornamented.[254]

Tilwāh and Chirwāh are two types of shields carried by the Shāmsherbāz or gladiators, who always remain surrounding emperor Akbar when on the march. The description of these shields are not available. Likewise, Kherāh is a fencing shield but I do not find any figure of it. Irvine presumes it as Girwāh or Garwāh, both meaning a round or circular shield, but not Kherāh, because he too does not find any such word in the dictionaries. Phāri is another kind of shield described by Blochmannas a plain small shield made of cane or bamboo. Māru or Śingauta is constructed of a pair of antelope horns tipped with steel and united at the butt-ends may be classed as parrying shields.[255] A few Mughal shields painted with hunting and fighting scenes are kept in the National Museum, New Delhi.

Rājput shields are famous for their designs, colour schemes, 'gangā-jamuni' and other pattern of welding. The shields bearing the ornamental work of 'gangā-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.

Mārāthā 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."[256]

To a Sikh warrior, shield made of 'Gāiḍā' (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.[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."[258]

Body armours. — Besides the shields mentioned above, there are various other kinds of protective divices 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 shewn on to a tunic and used as a coat of mail.[259] No other evidence of pre-historic armour has been found till date.

The term Varma and Drapi as referred to in the Ṛg 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.[260]

In the epic epoch we find lots of references of body armours such as Kabaca, Śirastrāna, 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 Kurukṣhetra 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 Yudhiṣṭhira, Duryodhana and Aśwathamā were all golden. Similarly, we get references of Śirastrāna for protection

of head, Kanthatrāna for protection of throat and neck region, Hastatrāna for protection of arms and hands and Angulitrāna 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 haubark of inter-linked 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-pāṭṭā 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 Kauṭilya as Śirastrāna to protect the head, Kanṭhatrāna to guard the neck and throat region, Kurpāsa, 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.[265] 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.[266] King Bhoja's Yukti-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 Āslāh) 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 (bagtār 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) Zirih — 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 upto the waist. The Baktar or the Cahar-ainah is worn over the Zirih.

(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 upto 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 upto 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 rob used by the men of higher rank beneath the coat of mail during the battle and on it, extracts from the Qurān are embroidered or sewn.

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

(x) Cadiqi — 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 vizor 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 vizor or a surmounting rod. Separate steel pieces hinged together with chains or long net-work 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 'Ghughi' 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) Jihlam — Irvine is not definite about its nature or form, because the Hindi dictionary meaning of the word is armour or coat of mail or vizor of helmet. However, he suggested the word equivalent to 'vizor of helmet'.[273]

(xix) Kantha-śobhā — 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]

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

(xxii) Dastwānāh — 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 Rājputs too use helmets, body-armours, foot-armours, trousers of mail, hand-armours etc.,

and they are all made of damascened steel with heavy decoration. Rājput helmets are beautified with peacock's plumes. They have not invented any armour for their use. Some Rājput 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 Mārāthā soldiers it is noticed that the officers are better protected with helmet and chain armour 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 portaigreteel(?)"[278] 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 vizor 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 Zirikullāh, 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 Chār-āinā. 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 upto 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-Zira', 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 Kimkhāb padding is worn round the waist and it holds daggers, sword, pouches etc.[281]

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. Kauṭilya 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.[282] The Mānasollāsa, a medieval text speaks of horses 'well-protected by means of body armour' — 'Gātra-trāna surakṣhitāih aśvaih'.[283] During the Muslim rule in India, mounted archery became popular and at that time we get the following names as horse's armour :

(i) Kājim — It is a piece of armour for the back-quarters of a horse and is stiched over a quilted cloth called 'artak-i-kājim'.[284]

(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."[285]

The other articles worn by horses are — Paltah, a headstall; Inan, the reins, Dumachi, the leatherm 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.[286] Pant however described Balatang as ornamental tassels at corners of saddle,[287] 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.[288]

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 Hāudāh "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 man, and that with difficulty." He further adds that when, "covered with a canopy it is called 'Amhari' and is not used in the field."[289] 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 Mahenjodāro 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 inroades 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 Harappā its height is 50 feet above the level of the surrounding plain but at Mahenjo-dāro it rises upto 35/40 feet. At Mahenjo-dāro 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. These 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 Harappā 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-dāro, and interpret the unexcavated remains of the defences there from the discoveries at Harappā.[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 Harappāns were on the defensive."[293]

At Mahenjo-dāro 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 Āli Murād 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 20 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.[295]

At Kohtràs 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 Kohtràs Buthi, take the form of double walls, curved and massive construction and 250 feet apart, cutting off the southern head land of the hill in true promontory-fort manner.[296]

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.[297]

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 ingrediants or by a stone wall.[298] Rg Veda also refers to forts made of stone and iron if "ayas" is to be translated as iron.[299] 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."[300] 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.[301] In another place we get the reference of cities with hundred enclosures or 'Śatabhuji'.[302] Bhaṭṭāchāryya translated it as hundred cities made of stone,[303] 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."[304] In the opinion of Macdonall, the Puras are fortified enclosures cohstructed at the time of danger, without any building within it.[305]

The Kauśiṭaki 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.[306]

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 Nadya Durga (river fort), Parvata Durga (hill fort), Vana Durga (forest fort) and Kṛtrima Durga (artificial fort).

Here, from the descriptions of the cities of Ayodhyā, Kiṣkindhā and Lankā the capitals of Rāma, Sugriva and Rābana respectively we get a clear pen-picture of well

developed fort architecture.

The famous city Ayodhyā was built by Manu near river Saraju. It was twelve 'yajanas' in length and ten 'yajanas' in breadth provided with well planned broad and specious 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 Śataghnis, and well decorated with flags. Numerous artisans, merchants, soldiers and other classes of people used to stay there. All kinds of arms and amunitions 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.[307]

The fortified city of Laṅkā has been beautifully described in the Yudhakāṇḍa of the Rāmāyana. Here Hanumāna 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 Śataghnis 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.[308]

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 Śānti 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 shouldbe protected by inaccessable 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 amunitions. 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 exhudations etc.[309]

In the Ādi Parva, of the Mahābhārata the development of the fortified city Indraprastha, present Delhi, has been nicely described. Being advised by the king Dhritarāṣṭra, the Pāṇḍavas went to Khāndabprastha which was at that time an unreclaimed desert. There the Pāṇḍavas 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, Śataghnis and various other machines were decked on the battlements.[310]

In Mahābhārata we get the reference of a city named Giribraja as the capital of king Jarāsandha. The city was naturally fortified by five hills called 'Vaibhara','Varāha', 'Vriṣhabha', 'Riṣhigiri' and 'Chaitaya'. The gates of the city are closed after sunset for everyone including the king.[311] 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-Baiṭhak' 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 Dwārakāpuri, the capital of Lord Krishna. On request of Yudhisthira, Vāsudeva described that on hearing that the son of Śrutaśravas (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, trampets, tabors, drums, lances, śataghnis, 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.[312]

From the descriptions of forts and fortifications given in the Rāmāyaṇa 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 acquatic 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, Prākāras, 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.[313]

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

Kauṭilya further says that all these four types of forts may be sub-divided 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 aboye the gate and its front should

resemble like a makara (crocodile ?). The apex of the gate will be 8 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 Kaṣhatriya (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 Aparājitā, Apratiḥata, 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.[314]

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 shouldbe 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 these we also get references of Parikhā Durga, Ratha Durga and Miśra 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 Mānasārasilpa-śāstra we get references of a few more types of forts such as Padmaka, Swastikā 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 Swastikā 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.[316]

Kanakasabhai has given the description of the fortified city of Mādurā, 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.[317]

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 choosen for the same. Besides the forts mentioned earlier, here we find mention of Daivata Durga, Ekmukha, Dimukha and Caturmukha Durga, Kurma Durga, Yuddha Durga and Prabhu Durga. In case of Daivata (natural) Durga ramparts like formations are formed by nature. Ekamukha, 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.[318]

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 Rāmchandra Pant, the shrewed Mārāthā 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."[319]

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, Bharkundā, Chitor, Chunār, Basankot, Daulatābād, Dhārwār, Ekdālā, Golcondā,

Gingee, Khājuraho, Māndu, Milwāt, Meerut, Jhansi, Kalinjar, Raisin, Rohtāsgarh, Ranthambhar, Ruhtās etc.

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 heighest 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 Gwālior.

The Gwālior 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 2800 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 Ruhtās.

The Ruhtās fort was constructed by Sher Shāh Sur on a hill — 33° degree latitude and 73°20' longitude — on the road to Khurāsan to guard Kashmir. It was well fortified but Sher Shāh 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 Purānā Quilā of Delhi.

The Purānā 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 appartments 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 Rohtāsgarh.

The geographical location of the fort of Rohtāsgarh 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 Chunār.

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.

Inspite 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 Āgrā, Ājmer, Delhi, Jālor (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, Afgāns, Moghals and Rājputs in India have constructed and maintained many forts all over the country but the Mārāthā king Śivāji 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. Śivāji captured most of his forts by use of bribes, by clever stratagum or by well planned assault. He also constructed new forts for which the hills of Mahārāṣtra offered him suitable sites and Śivāji 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 Tāluk was provided with one or more strongholds and the whole country was secured by a net-work of forts."[320] Śivaji's forts are well defended by stout stone walls and the hill is inaccessable due to natural thorny bush of Opantia cactus that forms the natural feature of the land. Every fort is provided with Dārukhānā (gun-powder 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. Rāigad 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."[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 Gangā, Yamunā and Saraswati.[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 Hanumānji, the great general of the Rāmāyana and inside the ramparts temples and mosques are built. Kinead

observes some skeletons below the foundation of Lohāgad. Probably, their owners were sacrificed with the belief that they would render the fortress invincible.[323]

All the forts of Śivāji are build 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. Tho 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."[324]

Gheriā or Vijoydurga "is the most perfect example of a great costal 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 ghāts."[325]

Songarh or Suvarn-durg is a striking example of Sivaji'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. Śivāji 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 Śivāji 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. Śivāji 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 'Pāndavgarh'; it is said to have contained Śivāji'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..... "[327]

Śivāji 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

Hāvaldār 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 Śhāh. 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 officerwas 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 oponents. 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 Sivaji'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 safe-guard 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, Āzamtārā, 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.[329]

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. These 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.

Daṇḍa (staff like) vyūha — This is an array in which the troops placed in the different divisions are arranged in columns or curved lines. Kauṭilya 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 Daṇḍa-vyūha becomes Pradara-vyūha when its flanks are projected forward.

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

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),

Pratiṣṭha (hold) and Supratiṣṭha vyūhas — When Pradara-vyūha, Dṛdhaka-vyūha, Asahya-vyūha and Syenavyūha are arranged in reverse orders then they become Cāpa, Cāpakuksi, Pratiṣtha Supratiṣtha 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.

Sthulakarṇa-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 Sucimukha-vyūha.

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

Durjaya (invincible) vyūha — It is also like Sucimukha-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 Kauṭilya the main distinctive character of this type of vyuha is that its wings, flanks and front are of unequal depth.

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

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

Śakaṭa-vyūha — 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-vyūha having in its columns a good number of horses, elephants and chariots.

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

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

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

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

Vajra-vyūha — In this vyūha the front is short,

flanks are less extended lines but the rear is made strong with columns.

Ardhachandrikā-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-vyuha 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 vyuha 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 vyuhas such as Godha-vyūha, Udyanaka-vyūha, Kākapadi-vyūha, Karkaṭaśringi-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 Pānipath), 1527 (Babar and Rana Sanga),1556 (second battle of Pānipath), 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 Mārāthās 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 Rājputs when the odds are against them. They are the pioneers of Guerilla-warfare in India. There is a fanciful etymology to the word 'Mārhātā' by saying that it is the short term for 'Mār Ke Hāt Jātā', 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 earlier 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 formations 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 occassion 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 recourses.[330]

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 Himālayas 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.[330a] 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.[331] 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.[332]

The excavation at Lothal near Ahmedābād in Gujrāt 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.[333]

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."[334] 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 'Aświnis' in their hundred-oared ship.[335] 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."[336] 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."[337] However, Dikshitar does not agree with Keith. He says, "this argumentum silentii does not however prove anything."[338]

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 Ādiparva, when Vidura scented danger about the life of five Pāṇḍava 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.[339]

Similarly, in the Digvijoy portion of the Sabhā-parva it is stated that Sahadeva the fifth Pāṇḍava, crossed the ocean and brought under his sway many islands after defeating Nishāda, the Mlecchа king, and other tribal kings ruling there.[340] In Vanaparva it is narrated that the Kalakeya and his associates hide themselves under the sea during day time after killing the Brāḥmanas during the night.[341] 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.[342]

It is mentioned in Rāmāyana that Guha, the Nishāda Raja, ordered thousand Kaivarta youths to keep themselves ready with five-hundred ships to put strong resistance to Bharata.[343] Again, Durmukha, who being angry at the deeds of Hanumāna, offered his service to Rāvaṇa, the king of Lankā, to fight on the sea.[344] These clearly suggest the use of a fleet for the purpose of war without which fighting on sea is impossible.

Further, in Kiṣkindhā Kāṇḍa, Sugriva speaks of sending his men to Sumātrā, Jāvā and even in the land beyond the Red-sea in search of Sitā which proves beyond doubt the existence of a naval force in India during the epic period.[345]

Budhist 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-Jātaka there are references of shipping between India and Babylon. The Samudra-Bānijyya-Jātaka 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]

Kauṭilya's Arthaśāstra (320 B.C.) clearly states that shipping and ship-building were absolutely a state monopoly. Navādhyaka 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. Kauṭilya distinguishes Samudra-Samyānapatha (ocean-routes) from river routes and routes for coastal traffic or Kulapatha.[347] Among the see-going vessels war-ships also figure, bound for enemy's country (amitraviṣyatigah). In Kautilya we get reference of Captain (Niyāmak), steerman (Dātragrāhi 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. Kauṭilya 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.[348]

After Chandragupta, his son and grandson also maintained maritime trade relation with foreign countries by direct and efficient shipping. King Aśoka fought deadly against the Kalingas only to have an access to the sea routes. King Aśoka'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 (Ist 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 'Colandia'. 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 Colondia is similar to the Chinese 'Junks' and Burmese 'Laung-zat'.[349]

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 transgressor of the sea and 'Manu' simply says that such persons should be excluded from participating in sacrifices. Both of them condemn sea voyages but 'Manu' 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

high sea and he had no legal heir. 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.[350]

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 Tāmralipta 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 Jāvā 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 Tāmil kings maintaining an efficient and powerful naval force. The Nilgundā Plates of Vikramāditya VI say that king Mangalisa of the early Western Chālukyas set out a naval expedition against the island of Revati and captured it.[351] The Aihole inscription credits Pulakesin II with the reduction of Puri with a fleet of 100 vessels[352] and the Kendur Plates of Kirtivarman II state that Vinayāditya, the grandson of Pulakesin II, subjugated Ceylon with war boats.[353]

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 oversea expeditions are most remarkable. He conquered Ceylon. Among the other places conquered by him were Pani or Panei on the east coast of Sumātrā, Mālaiyur at the southern end of Malay Peninsula, Ilangasoram in the Mālay Peninsula, Mappappalam, a place in the Talaing country of Lower Burma, Talaittakkolam or modern Takkola in the west of Malay Penninsula, Mudammaligam, 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.[354]

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 Sultān Māhmud 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 Bijāpur Sultāns.[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."[358] Barbose observes that the Moors used to prepare keeled vessels of a thousand and twelve hundred 'bahares' burden, which would be about 224 tons.[359] Similarly, Varthema observes that the ships built at Calicut were generally 200 tons.[360]

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 oarmen's desperate bid for a run.[361]

After Marco Polo, Mahan in the 15th 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."[362]

Muslim history in India also speaks that Bābar after the battle of Pānipath in 1526 A.D., and Khānwā in 1527 A.D., crossed the river Jamunā 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 Ākbar 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 Pāṭnā and Nazipur, armed with several boats. Each boat was equipped with twelve officers headed by a Nakhodā, 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 Sripur, with hundred war vessels and arrested Kedār Rai, who later died of his wounds.

Ākbar's son Jāhāṅgir 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 1662 A.D., Mir Zumlā repulsed the hostile force of Cooch-Bihar with a fleet of 323 ships under his command and control. When Shāistā 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 Pānduā.

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 12th 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 sail 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 Bhāgirathi make it seem as if a series of mountain-tops had

been sunk to build another causeway."[363]

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, Rampāla had marine navy.[364]

Iśhā Khān had a good riverine fleet. Possibly he had the following types of boats in his fleet — Jāliā, Chip and Bajrā. Jāliā 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 Bajrā was a large and heavy boat. It had sails and covered rooms and could carry many men and equipment. Bajrās 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, Bālāsore, Chilmāri, Jessore, Karibāri etc., were the main centres for ship-building and it is during this time Śivāji 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."[366]

By scientific explorations carried out by the Āśutosh 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 Āṭgharā, Tāmralipta, Harinārāyaṇpur, Chandraketugarh etc., show that Bengal not only flourished during Nanda, Maurya, Sunga, Kushān and Gupta periods but also made a regular trade with the Graceo-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.[367]

Chandraketugarh, now known as Debālaya or Berā-cāmpā, 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 bowles 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 teracotta 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 Āṭgharā, Harinārāyaṇpur, Bāhiri, Bachri and Betor. Āṭgharā 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. Harinārāyaṇpur, 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 Rupnārāyaṇ opposite the town Tamluk and Betor, near Mallikāpur, Howrah in the valley of the river Lāvanyavati

are the sites yeilding Northern Black Polished (NBP) 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 Iśānavarman and the Mālāccā 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), Samataṭa (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. Gheriā, Songarh, Ratnagiri and Mālvān are some of the noted naval forts of Sivaji.

The Mārāthā fleet consisted of Ghurābs and Gallivāts. The Gharābs 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.[368]

The Gallivāts are large row boats built like the Ghurāb, 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 Gallivāts are covered with a spar deck made of split bamboo and these carry only patteraroes, 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.[369]

Besides Ghurāb and Gallivāt other types of water vessels used by the Mārāthās 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.[370]

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 Purānic 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 Rg Veda. There it mentions that Asvins safely rescued and conveyed Bhujya by means of a winged ship.[371] 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. Śatapatha Brāhmana however mentions about a vehicle that can move heavenwards.[372]

Chapter 43 of the book Harivaṁśa beautifully describes an animated golden car with four wheels owned by the Asura (demon) Māyà 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 Kṛshṇa, Brahmā and Kārtikeya used to move in air on Garuḍa (eagle), Rājhamsa (swan), and Maiura (peacock) respectively.[373]

If we consider the Rāmāyana 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 Ghaṭatkac fought with Karna, the great hero, from air.[374] Likewise, in the Rāmāyana Rāvana while describing his power to Sitā once referred that he captured the aerial car of Kubera.[375] Again there is a beautiful description of aerial duel between the giant bird Jaṭāyu and Rāvaṇa, the king of Lankā, while Rāvaṇa was fleeing with Sitā in his aerial car.[376] Here mention may be made that Golikere has drawn our attention to a number of instances referred to/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.[377] Further, after rescuing Sitā while returning home, Vibhiṣana offered

Rāma a Bimāna (aeroplane) which was well decorated. That Vimāna flew high with great sound and landed at Kiṣkindhā at the desire of Sitā to take Tārā, Sugrib'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 Sitā.[378] 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 (Nakṣatramaṇḍala) 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.[379] 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 Vimān 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'.[380]

According to the nature of use, musical instruments may be classified as Savya, Grāmya, Bahirdwārika, Māngalika and Sangrāmika. Savya instruments are those which are used in musical conferences or in aristocrat gatherings such as Harmonium, Tablā, Pākhoāj, Sitār, Binā etc. The examples of Grāmya instruments are Ektārā, Dotārā, Khanjani, Dugdugi etc., as because they are mainly used with folk songs. Ṭikārā and Sānāi are the examples of Bahirdwārika 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 Nahavatkhāna. Khol, Ḍhol/Ḍholak, Śaṁkha, Kāmsa etc. come under the class Māngalika as they are used where relegious songs are played. Sangrāmika instruments are those which are used mainly by the armed forces. The best examples are Veri, Turi, Ḍhāk, Dunduvi, Bugle, Rāmsingā etc.[381]

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."[382] 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 mangalika.

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.'[383]

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.[384] 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, Paṭāha,

Puskara, Anaka, Jharjhara, Damaru, Ḍindimā, Ḍhakkā, Upanandaka, Mahānaka, Krakaca, Gobisānika, Śankha, 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 Dhāk-Dhol, Kamsā-ghantā etc. in later Indo-Aryan languages. Among the instruments referred to in the Mahābhārata 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 Mṛdanga, Nanda, Upanandaka and Panaba; all producing sweet soft melodies to greet the soldiers. Govisānikas and Śankhas were probably trumpetting instruments. The Śankhas were again of different kinds and every hero own Śankha, 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. Pānchajanya, Anantavijaya, Panundra, Devadatta, Sughosa and Manipuṣpaka are the Śankhas used by Lord Kṛṣna, Yudhisthira, Bhima, Arjuna, Nakula and Sahadeba respectively.[385] 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 Jātakas in the following verses of 'The Sonanda Jātaka' and 'The Mugapakkha Jātaka' respectively:[386]

"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.[387]

In the Maurya period, Kautilya's Arthaśāstra mentions about trumpet-blowers (turya-karas) and it is written that they used to get double the wage of ordinary musicians (kuśilas).[388] Elsewhere Kautilya says that the trumpet (turya-ghosa), flags and banners are the signals i.e. Nayaka's orders to his troops.[389]

Hiuen Tsiang wrote that king Harsabardhan 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 triumpet and a

drum called 'roar of the sea'.[391] Similarly the Kurram Plates of the Pallava king Parameśvaravarman-I, speaks about the 'thunder-like-sound' of kettle drums and conch-shells, inspiring terror in the battle-field.[392] So also, Paṭāha and Dhakkā are mentioned as war musical instruments in the Kadba Plates of Prabhutavarsa.[393] Nagpur stone inscription of Malava rulers, dated c.1104-5 A.D., mentions about 'Nākārā', 'Jharjhar' and 'Damaru'.[394]

Rājatarangini refers that in Kashmir kettle-drums were beaten between the night watches in a fort or camp,[395] and a surprise attack was often announced by the sound of drums and trumpets. For instance, Sujji announced his sur-prise attack at night on the retreating Kashmiri troops by beating drums.[396]

Dikshitar has mentioned about some South-Indian war musical instruments such as Kodumparāi, Paṇḍil, Neduvayir, Mayirkkan murasu, Nyaya murasu, Tyaya murasu, Karadikai, Valvalai and Varivalai which have references in Tamil literature 'Śilappadikaram' without mentioning any date. He further writes that Paṇḍil 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 'Mayirkkan murasu is the drum covered over with the hairy skin of the dead bull which had vanquished a tiger when attacked.'[397]

Among the Mughals, Rājputs and Sikhs, a bugle-type

musical instrument known as Śingā and Rāmśingā 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 Punjāb and Sind. In a seal found at Mohenjodāro one person carrying a flag fixed in a pole and leading a procession is depicted.[397a]

The use of flags and banners in all wars of ancient India is an old custom. In Vedic literature a flag is termed as Dhwajā and Ketu.[398] It is doubtful whether the two words mean the same thing. Most probably Dhwajā means the banner which is used as a mark of a clan, sect, group of people or class as Dhvajā 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 Ṛg Veda.(VII.83.2; X.103.11)"[399]

Talcherkar too refers, "In the Vedas — 6th Mondal Ṛg 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 :[401]

Droṇācharya : His flag was a representation of a golden 'Kamaṇḍalu' covered with deer-skin.

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

Bhimasena : His flag is known as 'Simhadhwajā' i.e., representing a lion who's eyes set with diamonds.

Nakula : His flag is known as 'Saravadhwajā'. 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 'Hamsadhwajā'.

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 Aswani 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 'Simhalāngūladhwajā'. 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.

Vṛsasena : '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 'Sitādhwajā' 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 Kauṭilya's Arthaśāstra we learn that every battle-formation (vyūha) of the Mauryan army was differentiated by the device of 'dhwajās' and 'patākās'. It is mentioned that the commander should arrange to signal his own men with the help of trumpet, flags and banners (turya, dhwajā and patākā). Kauṭilya's use of the two terms raises again a doubt that 'dhwajā' was different from a 'patākā'. Possibly patākas were festoons used for adornment of an army. These patākās were such an important feature of the army that in latter period an army came to be designated as 'Patākāni' by Kālidasa.[402] Kauṭilya further suggests that the preparation of a certain medicinal mixture which, when besmeared over these dhwajās and patakās, would tend to remove the poison at the very look at these dhwajās and patakās.[403]

Dikshitār referred to a Tamil literature 'Perumtogai' by M.R.Āiyaṅgār 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.[404]

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.[405]

Coming down to the latter period we notice that the Mārāṭhā army possessed two types of banners — the

terracotta coloured Bhagavā Zāndā and the Jaripatākā, but it is doubtful whether both are used for military purposes. Most probably, the honour of carrying Jaripatākā, the golden standard, was conferred on distinguished Maratha generals.[406] Similarly, the safron coloured flags of the Rājput warriors in India are well-known to us. The Mohamadān 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 posteriority. Each of these State Forces has got different units having different flags with emblems. Roughly there were about fifty such Princely States and feaudatory 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.

Section - II

Modern Indian Armed Forces[407]

Armed Forces as an institution of peace :

The peace time duty of an army usually consists of training — individual and collective; research and development, and to aid and help the civil administration in maintaining law and order whenever the competent civil administrative authorities need and request for such help.

The individual training has different facets; e.g., the training of recruits and cadets, the various professional courses, promotion cadres etc., and the collective training ranges from section battle drill to Army manoeuvre, passing through all the intermediate levels, i.e., tactics at platoon, company, unit, brigade, division and corps level. Thus the whole period is consumed only in maintaining the fighting fitness of the soldiery.

With the development of science and technology, new weapons, armaments etc., are being continuously developed in all countries — small or big. Any such new invention has direct and indirect effects on the war machinery. The armed forces have to develop new techniques of offence and defence keeping pace with the scientific and technological advancement. In reality, the human progress

in science and technology is making the war and preparation for the same more complicated and difficult. But as the ever-inquisitive man will never cease to acquire new knowledge and to produce new weapons, the war machinery also shall have to keep pace with the same and remodel its organisation to suit the new demands of the improved technology.

The role of Indian armed forces in peace is significant — it has played a great role both at home and abroad in maintaining law and order.

While the Second World War was in the fifth year, and the Indian Armed Forces were committed to various threats of war on the globe, the soldiers helped to clear locusts from the north-western areas and restore communications after Kāngrā Valley cloud-burst. In the same year they saved hundreds of lives and salvaged huge quantities of materials in Bombay which was rocked by an explosion in the docks.

The work done by the Army and the Air Force during the difficult days following partition of India constitutes an ennobling and inspiring chapter in the effort to consolidate national freedom and is a glowing tribute to loyalty, high sense of duty and patriotism of the Armed Forces. Apart from the saving of thousands of men, women and children from the communal frenzy, the Military Evacuation Organisation escorted long columns of refugees on the move by road and railways to safety. The largest refugee camp at Kurukshetra,

a city of tents providing shelter to nearly a quarter million men, women, and children was laid out and run by the Army.

On innumerable occassions the Indian armed forces, since independence, have stood by the side of the people of India in times of distress and natural calamities; some of which are mentioned below as illustrations.

Partition of the country had left the state of Assam isolated from the rest of the country. The soldiers of Indian Armed Forces worked ceaselessly, ignoring the heavy monsoon and built embankments and river bunds which made it possible for the vital 145 miles link to be constructed. The volume of work done by them measured upto 1,80,00,000 cubit feet.

In 1950, when the state of Bihār was passing through serious calamities, and in parts of the state famine seemed imminent, Army helped to avert the famine by transporting 8000 maunds of food grains within three weeks even to the remotest villages in those areas.

In July, 1952, Air Force 'Dakotas' flew 1187 hours in eight days to supply food to the marooned people in the flood affected areas in West Bengal.

During the 'Operation Rayalaseema' in 1952, Army units deepened 134 wells, in about six weeks time, to produce a perennial water supply in the four districts of Cuddāpāh, Kurnool, Anantpur and Chittoor.

In 1953, Army opened a road which had been blocked

for more than a week owing a landslide near the village Pophli in Mahārāstra.

In the same year, the Air Force conducted a novel experiment of sowing seeds from the air in Rājasthan to check the spreading of the desert; and also undertook an aerial photographic assignment of 22,000 square-miles in the Rājasthan desert in connection with oil-prospecting.

In consonance with the policy of the Government of India, the armed forces of India have played immaculate role in making sure the 'world peace'. Chou-en-lai, Prime-Minister of Chinese People's Democratic Republic, during the course of his second visit to India, in his address to the cadets of the National Defence Academy, Khadakvasla said : There are two kinds of Armed Forces in this world ..... those which oppressed and bullied people and those which protected them from oppression. The defence forces in India and China were armies of the people. They would never be used for oppression or aggression but only for the defence of the mother land.

But the armed forces of India are possibly singularly unique in the history that within a short period of six years of national freedom, they have been called upon to defend international freedom and world peace.

In 1953, units of Indian Army went to Koreā to provide a certain custodian force. Major General (later Lt. General) P.S.P.Thorat was the commandant of the custodian

force. The camping ground of the Indian Armed Forces in Koreā was built by themselves in a record time and was named 'Hind Nagar'. The Hind Nagar became a meeting ground of Korean people and a fountain head of mutual love, affection, tolerance and understanding. It must be mentioned that the custodian force contributed by India was the first group of 'men under colours' to be entrusted with the task to restore and stabilise peace, rather than engage themselves in combat actions.

Again in 1956, Indian Armed Forces went to Egypt as the 'Police Force' of United Nations Organisation (UNO) to help maintain quiet during and after the withdrawal of non-Egyptian troops. Indian soldiers worked there round the clock with only four to six hours respite for the individual soldier. After endearing themselves to every Egyptian and every member of United Nations stationed in Egypt, the Indian contingent returned home in 1957.

Similarly, when the Security Council set up a Control Commission in Indo-Chinā to look after the new regimes in Vietnām, Cambodiā and Lāos, the chairmanship of this Commission was offered to India. Indian troops successfully performed their duties bestowed on them. Similar jobs were undertaken by the Indian troops in Lebānon, Congo and Yeman.

For the humanitarian causes the services performed by the Indian troops in neighbouring countries are also worth

mentioning. In 1956, Army medical supplies rushed to Egypt and Hungary and in 1964 an Army medical team flew to Laos.

With close assistance and advice selected Indian officers set up military academies at Nigeria and Ethiopia.

As a token of friendship our military engineers constructed the long 72 miles Tribhuvan Rājpath in Nepāl and the men of Signal Corps extended their full co-operation in conducting the general election of that country.

In Cyprus also when violent clashes flared up between the Greek Cypriots and Turkis Cypriots, Indian forces went as a contingent of UN Emergency Force to restore peace, normalcy and amity.

Organisation of Modern Armed Forces :

Earlier we have noticed two, four, six and eight fold divisions in organisation of armed forces in India. At present, in India three fold divisions of armed forces exist, i.e., Army, Navy and Air forces; but the ultimate control to use these forces lies with the people and the defence policy is also based on the political and foreign policy of the country.

In the following pages the organisational pattern of these forces is given in a nutshell.

The President of India is the Supreme Commander of all the three armed forces according to our constitution. Though the ultimate control lies with the people of the

country but in practice defence policy is formed by the Central Cabinet through a committee known as 'The Defence Committee of the Cabinet'. The orders or policies of this committee are passed to the Ministry of Defence. As an elected representative of the people and the member of the Central Cabinet the Defence Minister is responsible to the Parliament and the Defence Ministry is responsible for co-ordination of works of the army, navy and air services, to control all the three inter-services organisations and to assist the Minister-in-charge of defence in all legislative, parliamentary and financial matters. Here again the Financial Advisor attached to the Defence Ministry have control over the expenditure and their concurrence is required for any extra expenditure over the budgetary provisions. The three chiefs of staff (army, navy and air) after discussing among themselves about matters of inter-service interest advise the Defence Minister and his committee on matters requiring the consideration of the Central Government. They also prepare defence plans and strategic appreciations for the consideration of the Defence Minister's Committee.

Army : The Chief of the Army Staff acts as the head of Indian Army. He is responsible for the command, control, training and administration of the Indian Army. He functions through the principal Staff Officers' Committee consisted of one Vice-Chief of the Army Staff, four Staff Officers and three other senior officers having special duties. He maintains a central Head Quarter (HQ) having

four main branches but he does not maintain any field army. These branches are divided into various Directorates functioning under senior army officers. These Directorates are again sub-divided into a number of sections working under the command and control of first and second grade staff-officers.

This Head Quarter exercises its command and control through four Command Head Quarters (CHQ). Each Command Head Quarter is responsible for the operation, training, administration of field formations and functioning of Units under its command. This Command HQ acts as a field Army HQ and is responsible for the following functions within its jurisdiction : (a) Internal security, (b) Recruiting centres, (c) Training centres, (d) Military lands and cantonments, (e) Military engineering services works, (f) Administration of all departments and (g) Training and administration of Territorial Army and National Cadet Corps.

Under the Command HQ again there are several Area and Sub-Area Head Quarters having the functions similar to Command HQ and various other jobs are done according to the need and necessity of the country.

Navy : Just like army, the Naval Head Quarter at the centre is headed by the Chief of Naval Staff and his principal Officers' Committee consists of Vice-Chief of Naval Staff, Chief of personnel, Chief of materials, Assistant Chief of Naval Staff and the Naval Secretary. The Chief of Naval

Staff is responsible for all matters relating to Navy and he performs his functions with the help and co-operation of the above mentioned five Principal Staff Officers. Specific duties are allotted to each Principal Staff Officer (PSO).

The Naval HQ administers the Navy through the following four Naval Commands — Southern Naval Command, Eastern Naval Command, Western Naval Command and The Western Fleet.

Under each Command there are several ships and specific duties like training, operation, administration, communication etc., are attached. Each Command is commanded by a Flag Officer-Commanding-in-Chief, and he is responsible for all duties allotted to him within the sea and shore areas allocated to him by the Naval Head Quarter.

Air Force : The Air Force also maintains a Central Head Quarter which is commanded by the Chief of the Air Staff. He is assisted by four Principal Staff Officers. They are Vice-Chief of the Air Staff, Deputy Chief of the Air Staff, Air Officer-in-Charge—Administration and Air Officer-in-Charge —Maintenance. Each Principal Staff Officer is assisted to perform his duties by several Directors under him. There are altogether twenty-four Directors functioning under four Principal Staff Officers.

Under the Air Head Quarter there are five Air Commands namely — Central Air Command, Eastern Air Command,

Western Air Command, Training Command and Maintenance Command. Each Command functions under the command of an Air Marshal.

The Eastern, Western and Central Commands are responsible for operational training and training of the paratroopers. Training Command controls the training schools and colleges whereas the maintenance Command is responsible for maintenance service, equipments and repair depots management and administration. On the whole Indian Air Force performs various types of jobs such as defence, offence, tactical, reconnaissance, transport support, air supply, air-dropping, evacuation of casualties, training, collecting weather information, maintenance etc. All these jobs are done with the help of different types of air-crafts and Indian Air Force possesses about twenty different types of aircrafts.

History of Modern Army : "The Military history is not only different from the political history of a nation, but is also distinguished from the Regimental history or History of the Army. The Military history includes a broad study of the war — its nature and causes, types, stages, the strategy and tactics, principles of war; as also the major tactics of notable commanders. In addition to the actual wars, the military history includes the study of the theories postulated by the great military thinkers.

The study of military history of one's own nation

is essential for the better understanding of military character of the nation with its strong and weak points — which have persisted through ages, in knowing well the types of war and the tactics to which the nation is more suited. The study of military history helps to avoid repetition of the past mistakes and to anticipate the future pattern of war."[408] So to say the need for studying military history is to widen the knowledge about warfare and to learn the lessons of the past for its application in future warfare.

The history of modern Indian Army can be divided into the following three periods :

(1) Army under the East India Company;

(2) Army under the British Government; and

(3) The Post-Independence Army.

(1) The Army under the East India Company : The modern Indian army is the direct descendent of the army raised about 300 years ago by the Britishers on the British pattern but with a few reforms to suit Indian condition.

In the 17th century, those foreigners who came to India felt that here the social and political conditions were too much disturbed and insecure. They tried to strengthen their position with the help of locally recruited sepoys. Probably, the first sepoy corps was raised at Pondichery by Dumas. The Portugese came first to establish business houses at Goā, Diew, Daman and Madrās. After a short stay the Britishers chased them out of trade and local politics.

The Britishers raised the first unit of army in Bombay when this state was granted to king Charles II as a part of dowry. In the year 1668, this troop having the strength of about 200 men and officers were transferred to serve under the East India Company. Again in 1683 two more companies were raised of 100 Rājput soldiers and officers in each and these companies were commanded by their own officers. They may be considered as the fore-runners of the Present Indian Army. Later on in 1702, numerous British trading companies were united and their forces were organised in the Presidencies of Bengal, Bombay and Madras. The chief of each Presidency was appointed as the Commander-in-Chief of his own area. In 1748, each Presidency raised an Artillery company having five officers and 110 other ranks.

In 1748, centralisation of armed forces took place under Major Stringer Lawrence, as the Commander-in-Chief of three Presidency forces but in fact the three armies worked as separate entities due to poor communication system. But during Anglo-French wars Royal troops landed in Madrās in 1755 and then onwards we find in India three types of troops such as — King's troops, Company's European troops and Company's Indian troops. Colonel Clive was the first person to command the Indian troops and organise them into regular battalions under British officers. 'Lāl Pulton' was the first battalion consisting of three British officers, one Sgt. Major, one Adjutant, ten Subedārs, thirty Jamādārs

(now Nāib-Subedār), fifty Hāvilders, forty Nāiks and Seven hundred sepoys (now Jawāns). Only after two years, in 1757, Clive with a small force defeated the Nawāb of Bengal in the mango-grove battle of Palāssey in the district of Murśhidābād. This battle was decided not by the superiority of Company's forces but by the treachery of the Nawāb's army.

In 1759 the post of Indian Subedar Major was abolished and a few more new battalions were raised in Bengal, Bombay and Madrās and the Britishers were given appointment as Battalion Commandants and Company Commanders. Guns manned by Indians were introduced in 1776. Two three-pounder guns were provided to each battalion but it was withdrawn shortly as the Britishers thought to keep the Indians ignorant about the theory and practice of gunnery.

The year 1796 was the year of reorganisation. The regimental system was introduced. Company's forces were organised into eleven regiments and each regiment was commanded by an English officer not below the rank of a Colonel. At first each regiment consisted of two battalions but in 1824 this system was broken and one battalion regiment started and the number of regiments was increased to twenty-three. Here again cavalry was organised on a system (sillādār) in which the soldiers provided their own charger, arms and uniforms.

Then came the year of revolt, the first organised

fight for Indian independence. The Indian forces made the unsuccessful attempt to evict the British from Indian soil. The revolt of 1857 started first in Bengal and then spread out in whole of India. Though it was an unsuccessful attempt yet it lighted the fire that kept burning in all Indian hearts. The revolutionaries showed valour, courage and sacrifices of the highest order for the cause of their mother-land. Britishers however took this revolt as a mutiny and many such mutinies were already on records of East India Company. The sepoys of Bengal Presidency first mutinied for higher pay in 1764 and only a year later British officers too posted in Bengal revolted for higher allowances. A more grave mutiny by the sepoys of Madrās broke out at Vellore in 1806 and they killed most of the British officers within the fort. The main cause was probably the hurt to the religious feelings and customs of those sepoys. Again in 1824, the sepoys of Barrackpore mutinied. They declined to march without proper equipments and necessary essential facilities. As a result, a particular Native Infantry was massacred. Over and above, the Indians were dissatisfied in military service, because this services offered little prospects to them in comparison with the status, respect and privileges enjoyed even by the British non-commissioned officers (NCOs).

The main reasons that led to the revolt of 1857 can be enumerated as follows :

(1) The high caste Hindu sepoys were unwilling to overseas service.

(2) The soldiers of Oudh Army, then in the service of the Company's Indian troops carried their loyalty to the Nawāb of Oudh who was dispossessed in 1856.

(3) Indian sepoys always stood for their religion. There was a feeling of proselytisation because in Madrās army the christians were having a better status and prospect.

(4) British laws like widow remarriage and the abolition of 'Sati' system hurt the religious sentiment of the simple hearted Indian soldiers.

(5) Introduction of new type of cartidge greased with cow and pig fat and whose cap had to be torn off by the sepoys with their teeth before use was the immediate cause of the revolt.

Soldiers of the Bengal Army only joined the revolution, but the Bombay and Madrās armies were loyal to the company. This revolt turned to a war when the garrison at Meerut joined in the revolt and occupied Delhi. The revolutionaries initially gained little success but due to shortage of resources and lack of leadership the revolution failed by June 1858.

The revolution brought many changes in the political and military set up in India. Mughal emperor Bāhādur Shāh was exiled and Queen Victoria took over the rule of India by a proclamation on 1st November, 1858. There was no more

Company Rule and a Viceroy was appointed at Delhi. Except one battalion, the whole of the Bengal Army was disbanded and still to-day there is no Bengal Regiment in Indian Army. The distinction between European troops and Royal troops vanished. Artillery battalions of the three Presidency Armies were disbanded. Company's forces became the forces of the Crown. The British officers got Queen's Commission and the Indian officers were granted Viceroy's Commission.

(2) The army under the British Government : After the mutiny or the revolt, when the forces in India became the forces of the Crown there was a large scale change in the establishment of Indian troops. Indian artillery was totally abolished and the Cavalry was reorganised on 'Sillādār' system. The class company regiments - i.e., each company in a battalion having one class of men only - were introduced and a water-tight compartment policy was enforced in the army to prevent any development of dangerous feelings or identity.

Further reorganisation took place between the periods 1861 and 1865. Indian army now possessed the total strength of 142 Infantry Regiments, 42 Cavalry Regiments, 9 Artillery batteries, 3 Sapers and Engineers units. Over and above a departmental Corps and a Military Accounts Department were there for smooth running and management of the supply, pay and accounts of all the forces of the Crown. A Staff Corps was also established to look after all the three Presidency armies.

In 1878 when Eden Committee was appointed a further reformation came in. As a result four Cavalry Regiments and eighteen Infantry Regiments were reduced but the number of men in these regiments were increased and the Ordnance, Transport and Supply units were unified.

Again in 1895 all the three Presidency armies were abolished and four geographical Commands — Bengal, Bombay, Punjāb and Madrās — were formed and each was placed under direct command and control of a newly appointed Lieutenant General but a few special troops were placed under direct control of the Government of India.

While Lord Kitchen took the charge of Indian army as the Commander-in-Chief in the year 1902, he found that the troops were scattered all over India without any proper plan or organisation into formation. He formed two Commands — the Southern Command and the Northern Command. Each Command was commanded by a General along with its complete staff. Each Command consisted of five Divisions with power of independent actions. Regiments were renumbered on all India basis and they were trained together during peace period in formations they would belong to at the time of war. He further laid down that every unit of the army must gain experience of North-West Frontier state. This plan was in force till the First World War broke out.

During First World War Indian Army suddenly expanded about four times of its size but the soldiers were

very poorly equipped. Still, Indian soldiers fought a heroic fight in all threats of war and kept high their good name at home and abroad. They fought side by side with the troops of the friendly countries in France, Egypt, Turkey, Palestine, Iraq, Persia and Greece and got twenty-one Victoria Crosses as a mark of recognition of their heroic fight.

In 1919 a committee was formed under Lord Esher to rectify the defects in organisation of the Indian Army detected during the First World War. In 1921, Lord Rawlinson took charge as Commander-in-Chief. Assuming the office he started to implement the recommendations of the Esher Committee. At first he firmly established the regimental system and the battalions with similar class composition were grouped together with one of them as training centre and thus nineteen regiments were formed. A few Infantry and Cavalry regiments were Indianised by Indian officers and for that purpose a military academy was established at Dehradun to impart training to the Indian officers. Revival of field artillery after a long period was another big step. He modernised the army and at the same time stationed Royal Air Forces and Royal Tank Corps in India. The Indian Army was given following jobs such as — (a) to guard the frontiers during peace and to work as screen during major operations as covering troops; (b) as a field army ready to fight to war; (c) to help in civil administration and (d) to

guard the vital places like water supply, power houses, railways, communication centres etc., when required. However, the organisation of the Gorkha regiments was not disturbed and they were commanded by British officers.

Till the outbreak of Second World War, Indian army consisted of cavalry, horsed artillery and unmechanised foot soldiers. Except a few motor transport companies, most of the transports were animal transports. In 1938, the Auchinleck Committee submitted a very gloomy report about the standard of Indian army in comparison with the standard of other countries in those days. On the basis of the Auchinleck Committee's report, in September 1939, the Chatfield Committee placed a scheme for modernisation of Indian army and immediate actions were taken to give effect to the scheme because war had already started. During Second World War, Indian Army expanded enormously without making any conscription. Then the army was much mechanised and the cavalry was provided with armour. Indian soldiers fought in Africa, Abyssiniā, Ārākān, Burma, Hongkong, Greece, Jávā, Itāly, Irāq, Mālaya, Somālilands, Syriā and Eritreā and emerged out of the war, as a most formidable fighting force.

During the war, the political leaders of Britain and India were making negotiation about the transfer of power to India and as a result India got its freedom on 15th August, 1947. In the meantime Indian troops were sent

in different parts of the world such as — Greece, Indonesiā, Jāpān, Thāiland and Indo-chinā — to restore law and order.

Then came the partition of India. The partition council divided the Indian Forces from the date of transfer of power so that both Indian Union and Pākistān might have each the share of store and equipment. After partition India possessed 45 regiments of about 250000 men and six regiments of Gorkhās. The remaining Gorkhās were attached to the British army. The British soldiers in India were withdrawn in a planned way and the last British troop that left Indian soil on 28th day of February, 1948 was the 1st Battalion Somerset Light Infantry. A few British officers however remained in technical branches or in advisory capacities for some years more.

(3) Post-Independence Army of India : The army of a country is not merely a collection of men with weapons but a living entity with one body, one soul and one brain. So, naturally with the political division of the country a very delicate problem cropped up in regard to the division of Indian Army. However, this problem was solved without any chaos.

Independence in India brought a few basic changes in Indian army. Firstly, the three arms of Indian Armed Forces — Army, Navy and Air — were placed under three Commanders-in-Chief. Next the recruitment in all the branches was thrown open to all Indian citizen on regional basis and

the State Forces were merged with the Indian Army. Finally, the men holding the rank under Viceroy's Commission were redesignated as Junior Commissioned Officers (J.C.Os).

After the partition of India, while the heat of communal tension was still to die out, Pākistān attacked Kashmir in September - October, 1947. On 22nd October the raiders crossed the Kashmir frontier, captured Uri, Bārāmulā and knocked at the gate of Śrinagar. On 26th October, immediate decision was taken to accept accession of the State in the Indian territory and to provide armed protection. Next morning Indian soldiers were air-lifted to Srinagar. The moral of the civilian and air-force pilots along with the soldiers were so high that they set an example in the history of warfare to fight with no previous planning and with so many handicaps. Bārāmulā was reoccupied on 8th November of the same year and within a week invaders were thrown off beyond Uri. Indian soldiers recaptured Jhangar, Tithwāl, Nausherā and Mendhar in the bitterly cold and inclement weather of February 1948 fighting fiercely and courageously in thick forests at high altitude beyond the snow-line. Indian troops made a miracle by taking seven tanks secretly at the height of 11,500 feet to Zoji Le and captured two difficult position of Dras and Kārgil. At last, India at the instance of United Nations' Commission signed a cease-fire agreement to be in force on the midnight of the New-year's day, 1949 all through the Jammu and Kashmir front.

While Indian troops were engaged in the Kashmir operation, a fanatic religious organisation named as Rāzākārs started subversive activities within the State of Hyderābād. Indian Army entered the state of Hyderābād on 13th September, 1948 and within four days broke the resistance of the Rāzākār and restored law and order of the state. As a result Hyderābād became a part of Indian Union.

The next twelve years, in the military history of India, is a period of establishing new traditions and customs. During this period the National Defence College, Defence Services Staff College and the School of Land and Air Warfare are established. Moreover, the State Forces are absorbed into the Indian Army and Hindi Words of command are introduced.

Again in the year 1962 India is in trouble on the Himālayān border with Chinā. On 20th October, the Chinese soldiers launch a massive attack both in Ladak and in NEFA. Indian soldiers fight hard in spite of many odds. Still the battle of Walong will be remembered for many years more and it is worth mentioning here that the enemy soldiers could not capture the Chusul airfield. As the Chinese attacked suddenly, they declared also suddenly an unilateral ceasefire on 21st November 1962. This Chinese aggression is an eye opener to the India's Defence Department. India starts to reorient its defence efforts. As a result the strength of Indian army is raised considerably, greater stress is imposed on training under actual field conditions, 'commando'

courses are introduced, a good number of training centres are opened and modern weapons and equipments have been designed to increase the fighting efficiency. On the organisational side, a new post of Vice-Chief of Army Staff is created, a new Directorate of Combat Development is established and the number of Command increases from three to four.

The steps taken by the Defence Department of India after the Chinese aggression in respect of planning and preparation is paid back with good dividends when in April,1965 Pakistan launched attacks in Kutch and in Kargil. Though at the initiation of friendly countries a cease-fire agreement is signed between India and Pakistan, the peace is for a short period and only after four months Pakistan again starts a full-fledged naked attack on Indian soil.

History of modern Naval Force : Though the growth and development of the modern Indian Army is very interesting and eventful, yet to get a complete picture of the Indian Armed Forces a thought is to be given to the other two services — the Navy and the Air Force.

On the fall of Maratha power and the rise of the British, Indian shipping again got a great impetus from the East India Company. Naval service, which may be called as the precurser of the present Indian Navy, was formed much earlier than the Company captured the political power in India.

This marine service was formed in 1612 at Surat as a fighting force for the defence of the Company's trade route on Indian waters, only with four ships — Dragon, Hoscander, James and Soloman.

In 1615, when the Company acquired Bombay, whole marine establishment was shifted from Surāt to Bombay in 1686. From 1612 to 1686 the fleet was known as the Honourable East India Company's Marine. Since then until 1830, it was called as the Bombay Marine and from 1830 to 1862 as the Indian Navy. Then again it was called as Bombay Marine till 1877. From 1877 to 1892 its name was His Majesty's Indian Marine and again in 1892 it was renamed as the Royal Indian Marine. Side-by side, with the progress, ship-building developed in India and many changes happened in its constitution from time to time.

This navy had many exploits to its credit and joined in wars both in East upto Chinā and in the West, Persian Gulf, African coast and even in Europe. It is said to have participated in the Napoleonic Wars and Indian built ships also actually fought at Trafalga.

Till early 20th century noting remarkable changes took place in the history of Indian Naval Force. The recent history of the Indian Navy can be dated from 1920 onwards. In this year some efforts were made to build up a regular Naval Force for India and Admiral Lord Jellicoe was given charge to study the problem. However, no action was taken

on his report for reorganisation, except the appointment of a Flag Officer to command the Navy. The next step taken was more unfortunate. On the basis of the Inchcape Committee report in 1923, the three troop-shipswere sold out and the station ships were virtually reduced to lighthouse tenders. Then, failing to get reasonable support from the then government, Rear-Admiral Mawby made a strong protest and resigned from his appointment as Director of the Royal Indian Marine.

This action of Mawby was immediately followed by the appointment of a committee under Lord Rawlison. This committee recommended for complete reorganisation of the Service as a combatant force. As a result of the recommendations of this committee, on 6th February, 1926, the foundation of Indian Navy was laid as the Royal Indian Marine as a combatant force to enable India to take the first step in providing her own Naval Defence in future. Despite all these, it was only in September, 1934, the Royal Indian Navy was officially constituted and it was not till 1938, Lord Chetfield made recommendations for the Defence Service of India. On 8th September, 1934, the Indian Legislature passed the Indian Navy Discipline Act.

Till 1939, this Service possessed only seven small ships and a plan for future expansion. By this time Second World War started. Due to war the tempo of expansion started suddenly and the rate of expansion became very rapid. Large number of Merchant vessels were requisitioned and converted

into man-of-war; orders for new vessels and stoops were placed in England and Australia and the yards in Bombay, Karāchi and Calcutta were crowded with new keels. Indian Navy thus expanded from a force of 2,000 officers and men to a total strength of over 30,000. The Royal Indian Navy undertook convoy duty in the Indian Ocean and the North-Atlantic, assisted in various evacuation operations and acted in support of the Army. After the war some Indian vessels proceeded to Jāpān as part of the occupation force.

By 1945, the Royal Indian Navy was composed of 60% British and 40% Indian officers. Other officers, signalmen, artificers and gunners — all fine sea-men — came from Ratnagiri district, long fed on the high traditions of Maratha naval warfare. Men from other parts of India also joined later on and many of them displayed remarkable bravery and leadership in fierce sea battles.

The Indian Navy, which boastfully files its own ensign to-day was born with India's independence. Before 15th August, 1947, India got a small force of old ships and escort vessels which was merely an adjunct of the Royal Indian Navy. With the partition of India this small force was further reduced, and India faced with a challenging situation. The challenge was accepted. Plans on a large scale were worked out and executed, training and technical schools were established and serious steps were taken to build our own Navy, balanced in all respect.

After independence, in order to adjust to the changed situation of the country certain steps were taken. First of all, in 1948, the Navy came under an independent Commander-in-Chief, directly responsible to the Defence Minister.

On 26th January, 1950, this Service dropped the prefix 'Royal' and became Indian Navy with new Indian Naval ensign.

On May 1951, Dr. Rājendra Prasād, the then President of India, as the Supreme Commander of Indian Armed Forces, presented the President's Colour to the Indian Navy at Bombay.

Since Independence, one of the aims of the Government is to completely 'Indianise' the Navy as early as possible. As a major step towards Indianisation, on April 22, 1958, Vice-Admiral R.D.Kaṭāri took over the command of the Indian Navy as first Admiral from Vice-Admiral Sir Stephen Garlill, the last British Chief of the Naval Staff.

The Defence Plan 1964-69, envisages the maintenance of the Navy at its present strength and replacement of older ships by modern vessels. Since then Indian Navy is flourishing day by day with confidence in all aspects and to-day Indian Naval Force may be considered as a big power in the world.

History of modern Air Force : The Indian Air Force is of recent origin and is the youngest of the three services.

The air-ships to be used in war was not known to the modern world before First World War.

In 1910, the Commander-in-Chief in India received the first official application from an officer of the Indian Army for employment as an airman. His request was not granted and then the flying in India remained in the hands of private enterprise.

In 1912, an officer of the Royal artillery attended army manoeuvres at Rawalpindi (now in Pākistān) with an early type biplane and a French pilot. Both the pilot and the air-ship were imported in India at the officer's personal expenses. Soon it was decided to establish an Indian Flying School at the deserted cantonment of Sitapur, and the staff was provided by the officers of the Indian Army who learnt flying at their own expense in England and successfully completed a course with the Royal Flying Corps at Fornborough. By 1914, the first course of instruction started but at the outbreak of the First Great War the flying school was demolished and its staff and airships were devoted to active service in the field.

The Indian flying unit, which may be considered as the embryo of the Royal Air Force in India, first experienced active service with the Indian Expeditionary Force despatched to Egypt in 1914. In 1915, the first detachment of the Royal Flying Corps reached India at Nowsherā and subsequently at Risālpur.

The period from 1916-18 was one of intensive training

and no major air operation took place but sometimes flights were despatched for operation on the North-West Frontier. The experience thus gained led to the decision of developing India's Air Force. Though very slowly but this progress continued steadily. In 1919, there were only nine Indian Commissioned officers, but the number rose to 91 in 1929.

Just after the First Great War this new organisation had to face great financial stringency and in 1922 the state of the Air Force in India became a subject of special enquiry by a distinguished officer of the Royal Air Force. As a result, though further development was hindered it helped much to attain higher standard of efficiency.

After independence, the utility of the air power was first experienced during the Kashmir campaign. It was felt that a nation deficient in air power can not hope even to defend herself, but then our Air Force was far from being well developed.

As India was conscious of this fact, she started to build a strong air force as quickly as possible. The Chinese aggression of 1962 has further accelerated the development programme. The threats from our two enimical neighbours put great burden on our air defence potential. In the recent Indo-Pak conflict, Indian Air Force has proved their efficiency, won many laurels, and earned the confidence of the nation about their technical skill, ability to preserve the freedom of skies and repulse attacks on our

mother land.

Though young in comparison to other big nations of the world, Indian Air Force, at present, is a very efficient force in the world. Its role in war and in peace are both highly commendable. India's Defence Plan envisages the build up and efficient maintenance of a modern and balanced Air Force consisting of Fighters, Fighter Bombers, Bombers, Strategic and maritime reconnaissance aircrafts, transport aircrafts including helicopters, high powered static radars, tropo-spheric communication system, airborne electronic equipments, high quality ground facilities and above all disciplined, trained, efficient technical and non-technical personnel having courage and high morale.

Lastly, the Reserve and Auxiliary Air Force Act, 1952 provides for the establishment of three different categories of Air Force reserves — Regular Reserves, Air Defence Reserves and Auxiliary Air Force.

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CHAPTER - THREE

MUSEUM AS AN AGENCY OF MILITARY STUDIES

Need for Military Studies and Museum of war materials :

The subject 'Military Studies' is very much a subject based on science. It includes all the branches of major science and technological subjects like — Physics, Chemistry, Biology, Geography, Psychology, Engineering, Medical etc. Besides science subjects, it also includes subjects like History and Law. So one can easily estimate the importance of the subject — Military Studies.

In a free country, whether its people are peace loving or not, the importance of military studies can not be overlooked or underestimated. We the Indians are by nature a peace loving nation and our national policy is not to capture lands of neighbouring foreign countries by aggression. Still, to maintain internal peace and security and to save our country from external aggressions, the knowledge and training in military science are desirable to each and every citizen, specially to the able bodied younger generation, both boys and girls.

In India, there are Art museums, Archaeological museums, Science and technological museums, Natural History museums, Children museums, Biographical museums and even beautiful Doll museums but there is not a single museum which can be called 'Museum of War-materials' in the true sense of

the term. In military academies like Dehrādun, Khadak-waslā etc., there are mini war-museums but those are not for public use. In different Regimental Centres of the Indian Armed Forces, one will find a few galleries having some war materials, mementos and the Regimental history only, which are also closed to the public. There are some galleries having some good specimens of military importance in Red Fort museum, Sālārjung museum, Jaipur Palace museum, Victoria Memorial Hall, Murśhidābād Nawāb Palace museum and various other Archaeological museums distributed all over India, but these museums have no educational activities for the students or the general mass on the particular subject nor these museums project any theme on Military Studies on their collection. Beside these, in different places throughout India objects of military importance like big guns, tanks etc., are scattered even without proper care. For example mention may be made about the 'Tank' just left over in the Brigade Maidan area of Calcutta, captured by our brave Jawāns during the recent war with Pākistān. There is none to explain it to the public where from this tank was collected, when it was captured, which unit did it, how this tank is used and many other queries that may arise in the mind of the interested visitors. Unless proper care is taken to preserve this important object and other such objects, these will be worn out in course of time through natural hazards and the nation will suffer a great loss. Museums are the proper place to these objects

for study, enjoyment and to evoke a sense of national pride among the posterity and also to know Indian History and Culture in proper perspective. A part of the history of mankind is the history of war and feuds, economic growth and political supremacy of different countries and regions or nations and people and is always based on its military prowess and their cultural history is never devoid of military profile of such people.

Military education and galleries of military museum :

In the foregoing discussion the necessity of military education and military museum has been briefly explained. Now the problem is what are the objects to be displayed in galleries of a museum of war materials for the education and enjoyment of the general mass and the interested visitors. The main aim of a museum of war materials is not to produce trained soldiers but to stimulate interest in the defence of the country, to arouse a national feeling, to feel proud about our national heroes and to help to become a disciplined citizen.

A museum of war materials, regional or national, should have well organised different galleries at least for the following : (I) Uniforms, (II) Badges of ranks, (III) Insignia of different Regiments, (IV) Flags, (V) Medals, Decorations and Ribbons, (VI) Armour, (VII) Armaments and vehicles, (VIII) Ships and Aeroplanes, (IX) War musical instruments, (X) Weapons, (XI) Forts, (XII) Battle-formations,

(XIII) Military History, (XIV) Military Geography, (XV) Documents - Treaties, Instruments of surrenders, Important letters etc., (XVI) Instruments used for intercommunication, (XVII) Billets, (XVIII) Hygiene and sanitation, (XIX) Medical, (XX) Materials of Psychological war.

Each of these galleries should be broadly divided into three sections : (a) One section will show the chronological changes in Indian articles starting from Stone Age to the date; (b) the second section should contain the articles actually used by the outstanding soldiers and leaders of forces and (c) the third section should contain the relevant articles of the neighbouring states of India, viz., Afghānistān, Pākistān, Nepāl, Bhutān, Burmā, Bānglādesh, Chinā, Russia and Śri Laṅkā.

The first section will stimulate interest in the defence and defence forces of the country, in all the citizens of India, while the second section will arouse the sense of national pride and make the people conscious about the national heritage in this sphere of life. The third section is equally, if not more, important in defence preparedness of the people, as this section will make them more knowledgable about the soldiers of the neighbouring countries, and will thus minimize the chance of infiltration or sabotage by the soldiers of those countries, if any of them becomes enimical to India. On the other hand, if good neighbourly relation exists, commonfolk of our great country will be in a better stead to the isolated soldiers of the neighbouring countries whenever the need would arise.

(I) Uniforms : Throughout the ages soldiers of all countries have dressed themselves in some specific uniform. The uniform has varied effects upon a soldier. It instils discipline, irons out the individual angularities, brings in the sense of homogenity, develops the sense of belonging, and infuses the required sense of pride as also alertness. The colour, pattern and the design of the uniform reflect the social taste and efficiency in dress technology. Further, for the reasons of tactics the pattern and colour of the uniform change.

The different regiments of the present Indian Armed forces have their specific uniforms. These varieties should be displayed in the galleries to give a comprehensive idea about the variety and usefulness of the uniforms.

Further, the uniforms of the Indian soldiers have also undergone evolutionary changes from time to time. The gradual transformation of the uniforms if exhibited chronologically from the earliest record to date in properly set galleries would give us an insight into the subject.

The particular uniforms worn by the national heroes, e.g., Śher Shāh, Shāh-Jehān, Rāna Pratāp, Aurangzeb, Śhivāji, Netāji Subhās Chandra, Major Saitān Singh and others should form a special gallery. These will unobtrusively develop the sense of national pride in all the visitors, besides enabling them to comprehend about the physical and mental characteristics of these worthy men of the Indian history.

Another important section should be the gallery

containing all the existing types of uniforms of the neighbouring countries — Afgānistān, Pākistān, Russia, Chinā, Bhutān, Nepāl, Burmā, Bāṅglādesh and Ceylon.

Where the exact articles would not be available, those can be substituted by models, charts and photographs etc. Probably, the best way of exhibiting the uniforms would be to prepare life-size models of soldiers of the respective regiments of various ages and countries.

(II) Badges of ranks : In this section the insignia of ranks from the highest officer down to the sepoy of all the arms of defence forces of India should be displayed according to the rungs of the organizational ladder. This section will have additional educative value, if along with the insignias, charts showing the organizational ladder can be exhibited.

As the organizational pattern, ranks and the badges of ranks have also undergone changes in different ages, the evolutionary section can be easily organized, and this section will be quite colourful. Rank-badges of all the ages may not be available; those can be refabricated from the available descriptions and in certain cases authentic paintings and prints may also be used.

These badges of ranks differ from one country to the other. Therefore, to make the section attractive and educationally significant the badges of ranks of the neighbouring countries should be exhibited; if possible with

the chronological development.

(III) Insignia of different Regiments : Each regiment has its own specific insignia, e.g., Cap-badge, Plumage, Special type of head-gear, Lanyard, Shoulder-badge, Ceremonial dress, Durbar-dress, Buttons of the shirts, Necktles, Sticks, Scarfs, Cuff-links, Tie-pins, etc. These have also changed from time to time. All these can be exhibited in scintillating ways.

The badges and other insignias actually used by the national heroes, if exhibited in proper way, will surely arouse the sense of national pride in all Indians irrespective of age, language and religion.

The insignia of the various regiments of the neighbouring countries will easily arouse interest and make the people more knowledgeable about their neighbours.

(IV) Flags : Colourful standards bearing emblems as distinctive symbol of different heroes and of different regiments of India along with brief history in chronological order will be of great educative value to the onlookers. These flags have also changed from time to time to meet historical demands.

Flags are also being used now for various formations, regiments, officers of different ranks, ships, planes etc. Besides decorations some special types of flags are also used for Semaphore messages sent mainly by ships. The Regimental Flags of the neighbouring countries will add additional interest to this gallery.

(V) Medals, Decorations, Ribbons etc.: There are and were various medals and decorations for different stages of bravery, leadership and service for the soldiers of all ranks. In this gallery original, replicas or models of various medals, decorations etc., awarded by the government of India and those of other countries should be kept.

(VI) Armours : The different types of armours like coat of mail, helmet, hand-guard, foot-guard etc., used by Indian soldiers through ages and the armours used by the animals deployed in war can be shown in the museum galleries. It is better to keep the original objects as far as possible, otherwise, lifesize replicas of these armours should be substituted to give an idea to the visitors about the armours of those days. Charts should be used to explain names of different parts, their uses, weights, cost, materials used etc.

(VII) Armaments and Vehicles : In this gallery different types of Tanks, Weapon-carriers, MT Vehicles etc., used in India and other countries may be shown with the help of cut-out models and working models to explain their mechanism. Original objects too can be kept in a separate place.

War-vehicles have also changed through the process of evolution with the advancement in technology. In many cases the original specimens may not be available — particularly of the ancient and medieval ages. Models of those

war-vehicles may be fabricated from the available description in various texts, historical documents, or from sculptures, paintings and archaeological discoveries.

(VIII) Ships and Aeroplanes : Cut-out model and models of different types of boats, men-of-war and aeroplanes including helicopters used in Indian military operations can be precisely demonstrated and their working principles should be explained by the museum personnel to all the visitors. Charts and diagrams would be useful to show the names of different parts of these objects, their gradual evolution due to advancement of science and technology, materials required for their preparation and the fuel used and other interesting information if any.

Gradual evolution and transformation of these would not only be attractive but exciting for soldiers, common folk as also for the technologists and engineers. Proper reconstruction of the ancient and medieval ships and planes with indegenous materials may open new vistas of research.

(IX) Musical instruments : Musical instruments have been used by the soldiers in India since the pre-historic days to arouse the martial spirit in the soldiers, to cause panic in the opponents, to signal some messages, to declare victory and also to rejuvinate the battle-tired soldiers. The instruments were not and are not always sophisticated ones.

The gallery presenting various types of musical instruments used in war through ages in India by various

tribes, clans and regiments is sure to attract the visitors. This gallery will be more lively if records of instrumental and vocal musics of marching songs, regimental songs and some of the important and favourite songs of the soldiers can be played. This will not only be entertaining for the common folk but also stimulate the musicians and music directors. At the same time this will highlight the effectiveness of some crude instruments played by the soldiers.

(X) Weapons : This gallery will necessarily be very big one and will be more attractive. Different types of weapons used in India starting from the Stone Age to the date can be displayed in a chronological order. The weapons should be classified according to prevalent system of the particular period as discussed in the earlier part of this thesis.

In the same section, galleries containing weapons normally used by the armed forces of the neighbouring countries and advanced countries can also be kept. It is better to keep the originals along with the cut-out models of these objects and charts explaining the mechanism, rate and cost of production, place of manufacture, effectiveness and peculiarities if any.

In a National museum of war materials at least one set of weapons used by the Nawābs, Rājās, Emperors and other national heroes should be displayed. If more than one such museum can be organised (in a vast country like India, there

should be many such museums) then each museum should have one set of weapons used by those men of history. In cases where the required number of sets may not be available, photos of the original along with fabricated models should be kept to fill up the gaps.

(XI) Forts : This gallery will contain the replicas and photographs of still existing forts in different parts of the country. Models and charts of different types of forts and fortified cities in India since the pre-historic period can be reconstructed and drawn according to the available records and archaeological findings and can be displayed in this gallery. These models and charts when displayed are sure to arouse interest and inquisitiveness amongst the common visitors, the scholars, the civil engineers and also the architects. Each of these models must be accompanied with short description, blue-print and its history in outline.

(XII) Battle-formations : Models and charts of different battle-formations normally used now and deployed in different operations of historical significance since early days in India will be of great educative value and interest.

Working models showing attacks and defences in different formations are bound to make this gallery popular to all types of visitors.

Besides these, the Vyūhas (battle-formations) described in the Epics, Saṁhitās, Purāṇas, if represented

by models reconstructed from the available descriptions would not only be a perpetual source of interest but might give some insight about the tactical conduct of battles of those by-gone days.

(XIII) Military History : In this gallery important battles and campaigns described in Indian history can be well represented through models, charts and paintings. The educative value of these can not be over-emphasized. Apart from the students of History, those who are interested in Strategy and Tactics would also be immensely benifited from these models, charts, paintings etc.

In addition to these, films of actual battles and other operations may be screened in this section at regular intervals. Films of these nature are available with the government, war-offices and in the archives.

Further, to make this gallery a meaningful centre of educational and research activities, lectures of outstanding soldiers and researchers should be organized at regular intervals. Maps, charts, relief maps and sand-models will also be very helpful to students coming in this gallery.

(XIV) Military Geography : When geography is studied from the military point of view it is called Military Geography. This includes the physical features of the terrain with minor details, methods of communication for military movement, i.e., road, railways, air-routes, water-routes and electrical communication line for telegraphs etc., climatic

peculiarities of a particular place and the human population. People living in urban areas or in developed villages can hardly visualize the difficulties the fighting soldiers have to face in different borders of India. The geographical nature of the various borders of India are widely different. To bring home the actual state of affairs pertaining to the borders of India this gallery would play a vital role. This section will also enable the scientists and technologists to gauge the logistical problems in the borders of India.

This gallery can be well represented with colourful relief models of Indiamborders. Side by side, the military geography of neighbouring countries would enable the people of India to understand and appreciate the problems and advantages of those areas.

Here again, the evolutionary section of this gallery would enable the common visitors and the scholars to understand and estimate the military leadership of the outstanding soldiers of India.

It will also enlighten the people about the factors responsible for Indian military power and the nature of geopolitics of India and its neighbouring countries.

(XV) Documents etc.: Photostat copies, microfilms of important military pacts, treaties and arms and instruments of surrender, manuscripts of war diaries and photos of some important military incidents or personnel may be displayed in this gallery. Microfilmed copies of

such documents may also be collected from various sources and preserved in museum of war-materials.

Documents and materials actually used in some noteworthy espionage operations should also find their place in this gallery. This gallery may be less popular to the common people but will be a valuable source of knowledge to the students of military law, International Law, International relations and Political science.

(XVI) Instruments used for communications : In this gallery the visitors will find the various types of small and large machines and materials used by the military engineers and signallers. They are to send messages, and construct roads, bridges etc., to facilitate army movement.

Here different types of radio sets, telephones, telegraphs, and models of different types of small and long bridges etc., could be shown to the visitors. This gallery would become lively if actual demonstrations of different machines and instruments are shown to the visitors. The semaphore communication system used before the invention of telecommunication will be an interesting attraction to the visitors.

(XVII) Billets : Different types of living accommodations, cook-houses, dining-halls, stores, information-cum-recreation rooms etc., of the soldiers during peace time and in field areas, along with their plans for lay-out through charts, diagrams, photos and models with descriptions

can be shown in this gallery.

(XVIII) Hygiene and sanitation : The knowledge of personal and public health and hygiene along with healthy surroundings come within the scope of the subject Hygiene and Sanitation.

Soldiers while living in barracks or in camps or while on move or in operation areas always obey the orders regarding hygiene and sanitation.

Physical fitness is a must for all the soldiers to remain battle-worthy; at the same time they are to spend the most part of their life in semi-urban areas, jungles, mountains etc., where even the minimum amenities of the urbanized areas are not available. Thus the responsibility of keeping the soldiers fit devolves on themselves. The soldiers discharge their duties in this job like all other duties quite efficiently. The steps usually taken by the soldiers can be exhibited through models, charts and other audio-visual means. This job includes the following : (a) personal hygiene which consists in cleanliness of body, skin, teeth, nails, hairs, clothes, drinking and eating utensils and rest of body and mind. (b) Sanitation regarding dwelling places, cook-houses, dining places and canteen; (c) Supply of pure and filtered water; (d) Storage of dry and green foods; (e) Soakage and refuge pits; (f) Latrine and urinals; (g) Anti-malarial precautions and precautions against Cholera, Typhoid, Pox and other important problems of

hygiene and sanitation. (h) Precaution against insect bite and irritant flora and fauna contact could also be of general educative value.

(XIX) Medical : In the gallery for medical education, the museum educator can give thorough ideas to the visitors about various first-aid treatments like — use of different kinds of bandages; carrying of injured soldiers by various ways and methods of evacuating the wounded soldiers and casualties from the operational areas; treatment of different kinds of haemorrhage, shock, and fractures; precaution against and treatment for snake bite, bites from venomous insects and rabid animals, frost-bite, heat-stroke, blisters, burns etc.; methods of supplying artificial respiration for asphyxia due to various reasons, with the help of charts, photographs, models and by actual demonstrations. Photos or models of some improvised operation theatres (OTs) in the fields of operation can also be shown to highlight the role of doctors and nurses in war.

(XX) Materials of Psychological warfare : The subject psychology as a branch of military studies has a great importance and it plays a major role in war since time immemorial.

The aim of the psychological war is two-fold — (1) to boost the morale of own soldiers and countrymen, and (2) to brake the same of the enemy. To achieve these, multi-pronged propaganda is launched through news and entertainment

media, cartoon pictures, posters, pamphlets etc. The designs and the effectiveness of these propaganda materials indicate the genius and the psychological traits of the nations on which the propaganda is launched. Some of these publicity materials also become very popular for more than one reasons — to quote an example from recent history the 'CHARAMA PATRA' a feature of Bānglādesh Radio (1971) may be referred to.

In this gallery the above mentioned materials, i.e., posters, pamphlets, tapes etc., should be chronologically exhibited. These will make aware the general public of such effective media and will attract the people connected in various capacities with the discipline of public relations and different publicity media, commercial advertising agencies etc. They will derive much benefit from this section.

In addition to the above mentioned galleries, a National Museum of War Materials should have the following galleries too : (a) Personal affects of outstanding soldiers, (b) War-animals, (c) Flora and Fauna available at different seasons in the borders of India and neighbouring countries.

(a) Personal affects of outstanding soldiers : In the foregoing discussions it has been suggested that the weapons, uniforms and other items used by the outstanding soldiers should be kept in the respective sections. It is now being suggested that in addition to those a separate gallery may be organised for each individual outstanding soldier in the manner of biographical museums — where all the

items both military and non-military e.g., books, pens, civil clothes, beds, articles of personal hobby etc., should be preserved to project as idea about the total personality of the great heroes. This is not the duplication, but an essential medium to make an in-depth personality study. It is needless to mention that this gallery will remain attractive to people of all categories.

(b) War-animals : Different kinds of animals are good friends of the soldiers and they are being used in war since pre-historic days. These animals are monkeys, dogs, horses, mules, camels, elephants, crocodiles, iguana etc. In this gallery models or staffed specimens of these animals, their types, duties, amount of load they can carry, distance they can march and many other informations about them and references about their uses in different wars or operations can be presented to the visitors. As for example, Shivaji used to tame and train the iguanas, a kind of big mountain lizard (in Marathi it is called 'Ghorpād') and send them to climb up the most difficult hill sides or ramparts with a rope round its body. These animals used to drive their nails in convenient places, steadfastly clung and enabled the soldiers to climb up the rope that hung loosely down.

(c) Flora and Fauna : Modern war is a total war. Soldiers are to fight and stay long periods in different natural zones like deserts, forests etc., and occasions may arise when supplies of food and medical aid may be cut-off,

or a soldier may be lost in deep forests. So the knowledge and identification of various kinds of beneficial and harmful botanical and zoological specimens are essential for every soldier, so that they can depend on these flora and fauna for food and medicine in emergency. At the same time our soldiers should know the plants and animals of the neighbouring countries so that they can take care of them. It will not be out of place to mention here that modern 'Commando' soldiers are actually trained to face like situations.

In this gallery, useful animals, edible plants and medicinal plants of different regions of India are preserved and displayed for identification and study, and their mode of uses are explained.

Over and above the galleries mentioned so far, a museum of war materials having educational activities must possess a gallery presenting the war mementos, a gallery on War-Actions, a library and sufficient space for performing museum games.

In the 'War mementos' gallery, original objects captured by Indian soldiers in different operations at various wars should be displayed with a brief account, relating to those objects and the unit or regiment that captured those objects.

In the 'War Action' gallery actual fighting, especially important portions of any operation i.e., live

war may be exhibited with the help of various audio-visual means.

A library is a must for the use of interested students and research scholars. This library need not be a big one but should provide sufficient space, preferably separate cubicles for research scholars. It should be located near the main administrative building and should have separate entrance which can be used when the gallery or museum administrative office is closed. Besides, the books and journals on 'Military Studies', collections of photographs, films, records of lectures of great military heroes and on war musics should be maintained with proper system of cataloguing to facilitate easy reference when required. For playing records and tapes a sound-proof cubicle be provided with; but to project a film the museum auditorium should be used. However, provision of slide-viewer may be made in such library.

If the museum possesses its own photographic laboratory then the catalogue of the negatives must be kept separate from its general collection of photos. This catalogue should provide a space to mount a positive copy of the subject indicating the negative for easy identification by the research scholars asking for an extra copy.

The museum game is a game played within the museum, and meant especially for the children. Different games are held for making the children better acquainted with the

objects displayed in the museum. It is a play-way method of learning.

Museum games are such types of educational activities as based on the idea of interpreting and understanding of the museum objects through interesting question-sheets, puzzles, date-boards, location-boards and similar economically cheap but educationally fruitful devices. There are some simple games, which serve as a recapitulating medium. Sporting games are played on a sheet in which the different portions of a particular object are arranged in an erratic or disjointed manner. The young visitors participating in the game will be encouraged to reconstruct the whole. Similarly, a date-board with a combination of pictures, dates and other relevant datas showing historical events is much helpful for chronological understanding of sequence of events or cultures. Puzzles and blank question sheet require filling in the blank spaces either with words or drawings, also clarify and correct many misconceptions. Sometimes, cut-out models placed in special boxes are supplied to the young visitors and they are asked to reconstruct the specimen as displayed in the museum gallery. In another form of activity they are asked to draw or paint certain objects which correspond to the figures drawn on a chart supplied to them. For instance, a big sheet is supplied to every participant with figures of soldiers of different chronological and ethnological groups. Then the participants are asked to draw in the blank

squares against each figure the particular dress, weapons, etc., corresponding to the figures. This game will result in developing a complete all round intimate knowledge of different historical periods and racial groups; and simultaneously provides the participants with pleasure and endeavour. Likewise, in another sheet the figures of flags of different regiments may be provided and the participating visitors are asked to write down the names of the regiments corresponding the figures.

The museum games are usually used to arouse keen interest among the young visitors of the museum. The games will be such that they will sharpen the visitors' power of observation, concentration of mind, successful and articulate expression of the objective world. Constant experiments about the museum games should be made and they have to be pragmatically evaluated before being introduced as a popular museum programme. The fundamental advantage of organising the museum games is that it lays stress on derived topics and may be utilised for particular ends in view.

To sum up, the number of galleries, sections and the list of articles to be shown can be made longer and that too can be shown in various ways which depend upon the imagination, experience, interest and the talent of the museum education officer.

<u>The growth and development of museum of war materials in India</u>:

The origin of a museum of war materials in India is

obscure. But, when the historical development of museums in different countries is traced we are amazed to note that the first museum in the world is a notable collection of war materials. Alexander the Great is known to have presented his respected teacher — Aristotle — a good collection of materials that fell into his hands in the course of his conquest. The ancient Romans too took pride in keeping the war trophies they gathered from Greece and Magna Graceia, Asia and Africa. With the Renaissance and the Reformation in the 15th century, the intellectual curiosity burst all bounds. Kings and nobles eagerly paid for excavations to dig out treasures burried deep in the earth.

In India, the Asiatic Society first intended to establish a museum in 1796 A.D., and for this purpose requested its members to present curio goods to the Society. But, due to want of a permanent space and for other unknown reasons the idea of establishing the museum was considered premature. In 1809 A.D., the Society got its permanent house at Park Street, Calcutta. In 1814 A.D., Dr. Nathinel Wallich, the renowned botanist requested the Society to establish a museum and promised to contribute his own collections and to work as a honorary curator of that museum. At last, to honour the request of Dr. Wallich, in 1814 A.D., the first museum in India was founded by the Asiatic Society in Calcutta. This museum was not a museum of war materials, but there was an archaeological section in it. Though the

actual date of establishment of a museum of war materials in India is not known to us, still it can be said that probably museums of war materials in India were born and reared in the houses of rich men like the kings, nawabs and big zamindars of mid-nineteenth century A.D., but these collections were closed to the public. The owners of these collections feel proud of their collections by showing them to their friends and visiting high dignitaries.

By the close of 19th century large number of Art and Archaeological museums developed throughout India. These museums possess many old arms, weapons and various kinds of war materials of different ages. These objects are acquired either through collection, donation or excavation in different parts of the country. These museums have no educational activities on military studies.

It is only during the mid-twentieth century a few museums of war materials have been established at different military academies in India for instance Khadakwaslā, Mahārāstra or Mhow, M.P., for the purpose of their own students' and cadets' education and these museums are strictly closed to the general public.

After independence of India in 1947 and merger of State Forces with the Indian Armed Forces the private collections of war materials of the ex-kings and nawabs were thrown open to the public and the Indian War Memorial Museum at Red Fort, Delhi was established.

Thus we find that after thirty years of independence, still to-day in India there is not a single National or Regional museum of war materials, in the true sense of the term, for the use and benefit of the general mass of the country. Some of our ancient war materials are displayed in the galleries of archaeological museums; a few stored within the protected place of military academies and regimental centres; some are locked in the houses of ex-kings and big zamindars of India and the rest are still scattered all over the country uncared and unnoticed.

Survey and review of the collections of war materials in different museums in India :

Archaeological Museum — Bijāpur, Mysore[1]

This museum was founded on 19th July, 1912. Its collection consists of antiquities of historical and archaeological interest of India in general and of Bijāpur in particular. The collection comprises sculptures, paintings, coins, inscribed slabs, sanads and farmāns, bidriware, wood-carvings, china-ware, pictures and photographs, manuscripts, maps, arms and armours.

Various types of war materials were found while levelling the ground near the Ārk Quilā or citadel of Bijāpur. War materials of this museum are mainly acquired by excavations, purchase from private parties, treasure trove, donation and exchange of duplicate materials with other museums on

mutual basis. At present there is no printed catalogue of the objects though in 1928 a catalogue was prepared by Dr. V.S.Suttankar.

Some of the important and remarkable war materials of this museum are as follows :

(i) A small mortar cast in gun metal with a calibre larger in proportion to its length; it is popularly known as 'Kāchchā Bāchchā'.

(ii) A cannon of cast iron with names of twelve Imāms in Persian script engraved on the plain face of the muzzle.

(iii) A large cannon measuring 16 feet 3 inches with a bore of 1'2$\frac{3}{4}$" made by fagotting iron bars together, over which square section rings were passed and welded together. The cannon bears the name 'Pānjmani Ādil Śhāhi'. This name is understood to have reference to the quantity of gun-powder (five maunds) with which it used to be charged and the famous Sultān of Bijāpur, Ādil Śhāh.

(iv) A double edged sword of about 3 feet 4$\frac{1}{4}$ inches long.

(v) A steel elephant goad of two feet nine inches length, carved along the whole length of the handle with a series of texts from the Holy Qurān. On the flat projecting knife edge is engraved the name of Pādśhāhi Śhāh-i-Āli (Āli Ādilśhā-II).

(vi) An iron helmet with a movable guard for nose and mouth.

(vii) A coat of mail revitted with iron rings.

Apart from these the museum possesses varieties of swords, arrows, guns, cannon balls which are of great interest regarding the military history of the Ādil Śhāhis from 1500 to 1700 A.D.

Maratha History Museum[2]

Deccan College Post-Graduate Research Institute, Pune-6.

This historical museum is concerned mainly with Maratha history and is the legacy of Late Rāi Bāhādur D.B.Parasnis of Sātārā. He collected varied historical materials from different quarters. In 1925 he opened this museum at Sātārā and was known as Parasni's Museum. This private museum was purchased by the then British Government of Bombay and was transferred to the Deccan College in 1939.

This museum at present possesses a separate Archival section containing important military and historical records of 17th, 18th and 19th centuries. The main bulk of collection of this museum pertains to the period 1720 - 1818 A.D.

In 1958, this museum acquired a good collection of art objects, armoury and coins from the Rājā of Jamkhindhi State.

The war materials of this museum can be classified under following heads :

(A) Records in the Archival section—

A good number of Mārāṭhi papers in this section give exhaustive details of some of the battles connected with the

Marathas, the Nizām and the British in the 18th century. Among them, the Battle of Khardā and the First Anglo-Maratha war are most important and worth mentioning.

The Mārāṭhi Rumāls connected with Chatrapati Pratāp Sinha of Sātārā contain military plans with details of different modes of warfare in ancient, medieval and modern India. They are very useful and of great military importance in studying the evolution of the mode of Maratha warfare in the 17th, 18th and 19th conturies.

(B) Military maps and plans —

Again in the Archival section there are three military maps and five battle-plans. The first one is a map of Southern India by Assistant Surgeon Lorimer. It shows the military divisions of the Madrās Presidency and the places of the out-break of cholera among the native troops from the year 1820 to 1844. The second map shows the disposition of the Bengal Army. The third one is drawn by John Walker but the content is not clear.

The Battle-plans include those of Palāsy (1757), Talegao (1778-79), Khardā (1795), Śhriangapaṭam and Waterloo. The battle-plans of Talegāo and Khardā are drawn by the Marathas and they are in Modi script; but the other battle-plans are drawn by the Englishmen. Besides these military maps and plans, there are four paintings. Two of them depicts different views of the battle of Sitārdi at Nagpur in 1817 between the British and the Bhonsles of Nagpur and the other

two represent the views of the battles between the British and Tipu Sultān at Bangalore (1793) and Śhrirangapaṭam (1799).

(C) Pictures — This museum possesses twentytwo very important and rare coloured pictures showing the evolution in the military uniforms of the Indian infantry and cavalry under European powers in India from 1750 to 1900 A.D.

(D) Arms and weapons — The collection from the Rājā of Jamkhindi has a sizable armoury consisting of different types of arms and weapons. There are about 72 swords in this collection of 18th and early 19th centuries. Most of them are Maratha swords and the others are French, British and Mughal swords. These swords are of again different varieties like Khaṇḍas, serpentine swords, swords with straight and curved blades etc. Apart from swords, there are various types of daggers, Katyars, guptis, spears, shields, helmets, armours, guns and rifles. These guns and rifles are belonging to the 16th, 17th, 18th and 20th centuries. The total number of these arms and armours will be about one hundred twenty-five.

(E) Stone age implements — The museum has a good collection of tools and implements of various stone ages. The Stone Age room displays comparative materials obtained by exchange from Africa, Australia, America, Europe and Palestine. The main collection of these tools was excavated by the Institute at Gujrāt, the Deccan, Karnāṭak, Andhra and

Madhya Pradesh since 1941 A.D.

Kutch Museum Bhuj[3]

The Kutch Museum at Bhuj located in a fine red stone building situated on the bank of Lake Hāmirsar, initially formed part of the School of Art established by Mahārāo Khengarji III in 1877 A.D. It is the oldest museum in Gujrat State.

At the time of Rāo Khengarji's marriage in February, 1884 an exhibition of Kutch arts and crafts was organised in which 5897 items were exhibited. Of these, exhibits of Rs 3300/- worth of that time, were handed over to the museum at the termination of the exhibition. These exhibits required the construction of a new building.

Accordingly, on 14th November, 1884, the foundation stone of the present museum building was laid by the then Governor of Bombay, Sir James Fargusson. This building was designed by Mr. McLelland and the cost of construction was Rs 32000/-. Then the museum was named after Mr. Fargusson by the Maharao. Till the independence of India this museum was a private one and only the guests of Mahārāo were allowed to visit it. The public was shown the museum only on important religious occasions.

After independence, this museum was thrown open to the public and through usage came to be known as Kutch Museum.

This museum is mainly regional and so it is of great interest to tourists who want to know about Kutch. In

other words it serves as a guide to this district.

The exhibits consist of silver-ware, embroideries, enamel-ware,all pertaining to Kutch, special arms peculiar to the region, the minerals of the State, sculptures, coins and various other articles of historical importance relating to Kutch.

This museum is divided into nine sections. The arms and ammunition section displays swords, shields, spears, guptis, daggers, pistols and bayonets and locally made knives. A few of the interesting war materials housed in this museum are as follows :

(i) A brass cannon, bearing inscription in Arabic which says that the cannon belongs to Hyder Āli, which was presented to Kutch Army Commander Jamādār Fateh Mohmmad by Ṭipu Sultān. This gift was given because Ṭipu Sultān wanted to fight against East India Company forces and wanted to get support of powerful princes of India. This proves that the Kutch Army was quite powerful as to draw the attention of Tipu Sultān. The cannon was manufactured at Śringapaṭam now in Karnatak and weighs 700 lbs. Its size is about 90 x 33 cms and it was made by Āsad Hāssān.

(ii) Another cannon dated 1622 and bearing an inscription and an emblem of the Portuguese over it is also of great interest. Its size is 117 x 48 cms. Probably it was brought to Kutch by sea route. There is a legend that a Katchi warrior had shown the sea route to Vasco-de-Gama to India in 1498 A.D.

(iii) Yet another cannon of 100 x 43 cms, size is also noteworthy. This cannon is bell shaped. Huge hollow balls filled with small pieces of stone, glass and iron used to be fired from this cannon. The balls used to burst into two and its splinters would injure the enemies. Probably this cannon is not made in India. A similar cannon can be seen lying on the ground of the Teen Murti Bhavan in New-Delhi.

(iv) Two in one weapon is a peculiar weapon. This weapon has a dagger over which a passage is provided for cardige. So, this may be called as a revolver-cum-dagger. It is inscribed as 'Kutch Bhuj' probably meaning that Bhuj had an armament industry just a century ago.

(v) A sword with saw like edge. This is possibly meant to draw out the intestine of the opponent and probably it is made at Bhuj.

(vi) The museum possesses a complete armour made of iron but its origin and history could not be traced.

(vii) Two small machine guns used in First World War are displayed. These are named as Spandau. Probably they are made in Germany and named after that town in West Germany.

(viii) Numerous locally made knives and Chhurās, Jamaiyās are displayed in the arms gallery. The knives and nut-crackers of Kutch are famous even to-day.

(ix) A big bomb dropped by Pākistāni air-force during the 1971 war is of special interest. The bomb is of

American make and its fire power is 700 lbs.

National Defence Academy Museum. Khadakwaslā, Pune[4]

The National Defence Academy (NDA) at Khadakwaslā, Pune was established in 1955. In fact, this academy was shifted at Pune from Dehrā Dun to train potential officer cadre for Army, Navy and Air Force, the three Services of the Indian Armed Forces. The NDA is indeed a unique institution of its kind in the world due to its Inter-Service in nature and composition.

The museum is an integral part of the NDA. The scope for study and research in military studies is vast but this museum has not yet been able to collect exhibits covering all aspects of this vast field of knowledge. The museum is still in its infancy and in the process of development. The exhibits collected at present are only representative in many aspects and in certain spheres it still requires exhibits to fill up gaps and new areas. The main aim of this museum is to familiarise the officer cadets with the evolution of Arms and Weapons used in war, and their development to suit the needs of the Indian Armed Forces and at the same time to preserve the military traditions of India for instructional values as well as the inspirational values for the cadets only.

The construction of the museum building was completed by the end of 1957. In the initial stages, there were three model rooms, one for each Service, viz., Army, Navy and

Air Forces. Efforts were made through the three Services headquarters, former Indian Rulers and other institutions to find out ways and means to establish a museum, but unfortunately the museum did not develop in a satisfactory manner due to paucity of suitable exhibits, staff and funds. So, at one stage, the NDA recommended to drop the idea of establishing the museum.

However, in October, 1965, the first recurring Grant of Rs 12000/- was sanctioned for the museum by the Government of India. Subsequently in 1966, a Museum Advisory Board, consisting of three eminent museologists, was constituted by the Ministry of Defence to advise NDA regarding the setting up and expansion of the NDA museum on sound and scientific lines. In September, 1967, a Local Museum Committee was also formed to deal with the maintenance and progress of museum. So far (till August, 1976), both the Committee have met thrice and have laid down the aim and scope of this museum. A comprehensive scheme for the re-organisation and expansion of the NDA museum was drawn by the Local Museum Committee, and the same was subsequently approved by the Museum Advisory Committee in its Second and Third meeting convened on 19/20th October, 1967 and 30th January, 1969, respectively at the NDA. Ultimately the NDA museum has been organised into the following galleries :

(A) NDA Gallery — This gallery aims at depicting the origin and growth of the National Defence Academy through

the media of photographic illustrations and albums pertaining to the multifarious activities of the institution, besides displaying gifts, presentations and models of the various NDA buildings.

(B) Services gallery — This gallery is devoted to the Indian Navy and Air Forces and aims at depicting the history and development of these two wings of the Indian Armed Forces.

(C) Arms gallery — This gallery depicts the chronological evolution of arms and weapons through the ages, with special reference to our country. This gallery possesses arms and weapons starting from the Stone Age upto the early 19th century East India Company weapons and has a separate section pertaining to the Rifle and Pistols of First World War, Second World War and tribal weapons, beside Naga weapons. Further, these arms and weapons have been supplemented by suitable maps, charts, battle-plans, photographs and a dioramised scene of the Stone Age.

(D) Army gallery — The Army gallery has been planned and is being developed on the following pattern :

(i) Medals, Badges, Ribbons and Decorations of Status of the Indian Army including that of the Native State Forces.

(ii) Statuettes and dress/uniforms of soldiers through the ages.

(iii) Busts or photographs of the prominent War Heroes since World War II with special emphasis on the

roll of Honour of ex-NDA cadets.

(iv) History of the various Regiments of the Indian Army and their Regimental Colours.

(v) Models of tanks, armoured cars, armoured personnel and other army equipment since World War II.

(vi) Exhibits connected with the gradual development of small arms and other infantry weapons.

(vii) Gradual development of Machine-guns, Revolvers and Rifles from the 19th century to World War II.

(viii) Weapons captured by Indian soldiers in different operations.

(ix) Badges of Ranks of the Indian Army.

The following are some of the interesting and important exhibits of military significance possessed by the National Defence Academy Museum :

(1) Weapons and implements of the Stone Age, Copper Age and photographs of weapons and dresses used by the soldiers of the Gupta period in India.

(2) Swords, Daggers, Shields, Maces, Khandas, Guptis, Fire-arms associated with Rājput, Mughal and Mārāṭhā periods of Indian history. A few bows and arrows belonging to Rājput period are also displayed.

(3) Rifles, Guns, Bayonets, Cannons, Pistols, Light Machine-guns, Bombs of the 18th century belonging to Hyderabad State and British India during First and Second World War, and of Japanese, Italian, German, Belgian , Iranian, American and Spanish origins.

(4) Service Medals, Decorations, Badges and Ribbons since 1842 onwards including Imperial and Indian Badges and Ribbons of Post Independence India.

(5) A few Regimental Colours are on display, such as Deccan Infantry, Brāhmiṇs, Punjābis and Mārāṭhās.

(6) Nine busts of Victoria Cross holders of Pre-Independence period.

(7) 157 photographs of Param Vir Chakra (PVC), Mahāvir Chakra (MVC), and Vir Chakra (VC) holders of Indian Armed Forces.

(8) Flags captured during Goā Operation of 1961, Daman Operations of 1964, Indo-Pāk war of 1971 (Hāzipir Pāss operation).

(9) Models of Aircrafts, Ships, Tanks and other equipments used by Indian Armed Forces.

(10) Some captured weapons and a Patton Tank of 1965 Indo-Pāk war.

(11) Portraits of prominent Rājput, Mughal and many other Indian Rulers.

(12) A few battle scenes, viz., Haldighāṭi, Fall of Chittorgaṛh, siege of Golkuṇḍā and Udaipur, Fall of Śriranga-paṭnam and Battle of Talikota.

(13) Original Ghat, Toofani and Mystere aircrafts are on display.

(14) A few Regimental uniforms of British period.

(15) Armour of Rājput, Mughal and British period.

(16) Tribal weapons mainly consisting of Bows and arrows, Dāos, Balasimhas of various types associated with Khāsis, Bāstārs and Nāgā tribes.

(17) Photostat copy of Dacca Surrender document of 1971 Indo-Pak war.

The Mahārājā Sawāi Mān Singh II Museum, Jaipur[5]

The most important landmark in the historic city of Jaipur is the Chandra Mohal. This was the residence of the Mahārājā of Jaipur State for more than 200 years. This Chandra Mohal consists of Pothikhānā and the Silehkhānā. Amidst the Royal palace quarters lies the palace museum. It was long shut off from the common museum goers and was not very well known even to the residents of Jaipur, the Pink City of India. The Mahārājās loved to show their proud possessions and interesting collections to friends and visiting dignitories.

This private museum was reconstituted and converted into a public museum in 1959 under a Trust, now known as the Mahārājā Sawāi Mān Singh II Museum Trust. This private museum in the City Palace is now called as The Mahārājā Swāi Man Singh II Museum after the name of its founder. The museum consists of three main galleries : The Textile and Costume gallery, The Arms and Weapons gallery and the Art gallery.

The Arms and Weapons gallery — The Silehkhānā of the museum is situated on the south of Pritam Nivās. It contains one of the largest and finest collections of edged

weapons and antique handguns in India. Some of the important and noteworthy exhibits of this gallery are as follows :

(a) Swords — Single edged curved Persian 'Unnas', slightly curved Mughal Shāmshers and Talwārs and double-edged Khaṇḍas. There are two swords - a Talwār and a Khaṇḍa - inscribed with the name of emperor Shāh Jāhān and a few with the names of Persian Emperors and Mughal Generals and many swords of Mahārājā Rām Singh and Mādho Singh II. Swords of European type and workmanship received as presents from the Viceroys in the 19th century and some exotic types including the huge broad sword used by Rājā Mān Singh - I are displayed in this gallery.

(b) Shields — Shields made of tough crocodile hide or rhinoceros, antler and buffalo hide embossed, lacquered or painted and set with bosses of chiselled steel gilt or set with gem stones are really good collections.

(c) Other weapons — Among other weapons mention may be made of numerous pointed Guptis, broad Jamdhārs, curved Jamkhāks, long and narrow Kāṭārs, hiltless Jhambwās and Chhuris, Lances, Axes, Knives, Aṅkuśas, and arrows of various shapes and sizes. The handles and scabbards of some of the weapons provide the visitors with some idea about the finest Mughal and Jaipuri gold, enamel or jewellery works as many of these are delicately engraved, enamelled or chiselled and set with diamonds, rubies, emeralds and pearls. The knives have hilts of ivory, walrus ivory, silver, gold ,

crystal, jade etc., carved in the form of heads of ram, horse, elephant, nilgau etc.

(d) Gun-powder flasks — This museum has a fine collection of beautiful gun-powder flasks made of horn, leather and sea-shell, inlaid with delicately carved ivory on mother of perl or decorated with emboirdered motifs.

(e) Firearms — A good number of Pistols, Match-locks and Handguns of different sizes with inlaid or chiselled stocks and barrels preserved in this museum are also equally interesting and important for study.

Among other war materials mention may be made about a few open Howdāhs used by the Mahārājās while moving on elephants' back and a few uniforms of the members of the Royal family.

Assam State Museum, Gauhāti[6]

It was on the 7th April, 1912, a Research Society named Kāmarupa Anusandhān Samiti or Assam Research Society was established at Gauhāti, to carry on research in matters relating to history and archaeology. Due to the devotion and untiring efforts of some selfless workers, the society made a rapid progress in collecting historical and archaeological objects within a short time and formed the nucleus of a museum. These collections were transferred to the new building of the Assam State Museum of which Rāi Bāhādur K.L.Baruah, C.I.E., an eminent historian was the founder

president. This museum is thus the offspring of the Kāmarupa Anusandhān Samiti. The museum was formally inaugurated on 21st April, 1940 by Sir Robert Neil Reid, the then Governor of Assam, and in March, 1953 it was taken over by the Government.

This museum has a good collection of war materials belonging particularly to the late medieval and the British periods in India. Most interesting objects of the Arms gallery are as follows :

(a) War materials of late medieval period —

In the gallery various types of swords, shields, armour and guns are displayed. Typical swords of Ahom kings called Hengdan are objects to note here.

(b) Cannons of Ahom period —

Twenty-six iron and brass cannons, inscribed either with Assamese or Persian scripts are displayed on the porch and in the Arms gallery. On these cannons are generally inscribed the names of the maker, the date in Saka or Hijri and a short account of wars of the Ahom kings with the Mughals. It is reported that some deciphered inscribed cannons have references in the reports of E.A.Gait and Late Hem Chandra Goswami. A good number of iron and stone cannon balls are also on display.

(c) Japanese weapons of World War II —

Here in this museum there are several bombs, Bren-guns, Sten-guns, Hand-guns and bullets displayed for the visitors. A diving outfit of Japanese origin is of special

interest in this section.

(d) Tribal weapons —

The Nāgā and Kuki Dāos of various types and Nāgā spears collected from different parts of Nāgā Hill region by Dr. J.H.Hutton are the interesting war materials used by the tribal people of this area and are displayed in this section. A rhino-hide shield of over 215 years old of the Thaddoe Kuki tribe of Manipur is of special interest.

(e) Musical instrument — The most interesting war musical instrument in this museum is a long copper bugle, locally known as Bheri, collected from Darang district of Assam.

Central Museum, Nagpur[7]

On 27th October, 1862, a committee was formed by the then Chief Commissioner at Nagpur, Sir Richard Temple. The main purpose of the committee was to consider a plan for establishing a museum and public library. In the beginning the museum occupied only a wing of the Museum Library and a public room. As the collection increased the entire building was made available for the museum.

The collections of the museum are mainly provincial, though specimens obtained from other States in India are also displayed. The museum mainly deals with Art and Industry, Archaeology, Ethnology, Economic products, Geology and Natural History.

The war materials mostly belong to both Ethnological

and Archaeological galleries, which are used by the aboriginals of the State and confiscated by the State Government. This museum is not at all organised. Regarding the collection of war materials the Curator writes, "To start with there was no specific plan or programme for collection of objects of this type (war materials). Actually this should be described as a collection just for the shake of collection. The result is that collection at present in this Museum is just an incomplete collection. Many weapons are yet to be acquired. For this no cronological order can be arranged as at present." (Curator's letter No.CMN/1012/vii, dated 18th Sept., 1976)

However in the section named 'Marvellous and Rare' one will find varieties of Swords, Daggers, Knives, Lances, Spears, Battle-axes, Farshis, Bows and arrows, Helmets, Chain-shirts, Breast-plates (locally known as Chilkhat) made of brass and steel, Shields of different shapes and materials, Pistols, Guns and Rifles. Most of these materials are of common types having no particular interest. The only exhibit that creates a little interest is called as 'Weapon of War'. As reported it is made of the bony parts of fishes, and used by a tribal king as a symbolic weapon of war.

Dr.Bhau Daji Lad Museum. Bombay[8]

On 30th March, 1973, the Municipal Corporation of Greater Bombay resolved to rename the museum so long named

as Victoria and Albert Museum as Dr. Bhau Daji Lad Museum under their resolution.

The museum at present is a two-storeyed building and is of general nature having twelve sections, viz. Agriculture and Village Life (Ground-floor East), Armoury (near the entrance of the building and first-floor South), Cottage Industries (ground-floor and first-floor, West), Ethnology (first-floor, East), Fine Arts (ground-floor and first-floor, West and South-West rooms), Fossils (first-floor, East, near railings), Indian Coins (first-floor, West, near railings), Minerals (first-floor, East, near railings), Miscellaneous collection (ground-floor, first-floor and near the building), Pre-history and Geology (first-floor, near railings), Religion and Mythology (first-floor, South).

Though the museum has a separate section (Sec.II) for the war materials but the details as regard the origin and development of these collection are not recorded. However, it is learnt that majority of the specimens are supplied by the Mahārājā of Baroda and the War Trophies of the first World War are supplied by the Government of India in the year 1924 and 1973.

Among varieties of war materials, the following objects of this museum are important and interesting from museological point of view :

(i) The models of Indian Cavalry and soldiers of other regiments during the British period along with uniforms and weapons used by them.

(ii) The show-case for Historical figures gives the details of dresses and arms pertaining to the Mārāṭhā and Mughal periods.

(iii) A suit of armour weighing about 19 Kgs fitted on the model of a Rājput warrior of 19th century is worth seeing.

(iv) The model of a German Destroyer of 1916.

(v) War trophies of First World War and Indo-Pākistān war of 1971.

(vi) War medals from 1799 to 1918 A.D.

(vii) A Dutch cannon of brass found at Kurkhumb in Pune district bearing the date 1640 A.D. and the name of Shri Udāji Powār.

(viii) Another big cannon found near Chandanwāḍi.

(ix) The steering wheel of a Turkish gun-boat.

(x) Relief map of old Bombay (Heptanesia) showing seven islands ceded to the king of England in the year 1662 A.D. by the king of Portugal.

(xi) Models of Dredgers named Kuphus, Pholas and Teredeo, the barge Mudlark and the tug Princess.

(xii) Model of the yacht named Subani built by Nawāb of Janjirā.

(xiii) Model of S.S.Siam.

(xiv) Models of boats, the native crafts of Bombay harbour.

The Government Museum-Puḍukkoṭṭāi. Tāmil Nāḍu[9]

The Government Museum, Puḍukkoṭṭāi was established and thrown open for the public in the year 1910, by the then Toṇḍāimān Rulers of erstwhile Puḍukkoṭṭāi State. This is a multipurpose regional museum, comprising of various sections like — Arts and Industry, Archaeology, Epigraphy, Numismatics, Anthropology, Economic Botany, and Natural History.

The collection of war materials of this museum is though not very rich but still the Arms and Armour gallery exhibits some objects, among various other specimens, which are very important and at the same time interesting from museological view point. They are as follows :

(a) Swords — There are in all 28 swords of different shapes and sizes and all belong to 18th century A.D. Among these swords, a sword-cane, two rapiers used as thursting weapon and a pair of Surul Kāṭhi are worth-mentioning. The rapier is long narrow sword and the Surul Kāṭhi is a coild sword. The blade of Surul Kāṭhi is kept coiled like a watch-spring and is really interesting to look at.

(b) Daggers — The daggers with short butts and straight blades are referred to here as Jametads. Some Bangalore Jametads have inscriptions in Telegu and they all belong to 18th century A.D.

(c) Bichuvās — The daggers with curved blades are called here as Bichuvās. The handles of these Bichuvās are either made of bone or ivory.

(d) Battle-axes — Among the Battle-axes a crescent shaped battle-axe draws the attention of the visitors much.

(e) Spears — The museum possesses total 22 spears. Typologically they all belong to c.17/18th century A.D. The blades of these spears are of different shape and size. They are all finely and artistically worked. The blades of two spears are curved and they are used in hunting wild-boars. Five other spears have got bolt like projections, one on each side below the blades. The collection of these spears have come from the Pudukkottāi Palace Armoury.

(f) Goad — In the collection the museum has only one goad, the sharp pointed instrument used for controlling and diving beasts like elephants. This goad is an interesting exhibit of this museum because it has two blades, one straight and the other curved to a side and the handle is beautifully decorated with glass pieces.

(g) Magudu — There are only two pairs of Magudus displayed in the gallery. This is an interesting weapon made of two horns of antelope, mounted together side by side and their points are in opposite directions.

(h) Bayonets — There are a few bayonets that can be fixed by their handles to maskets. This collection includes

a Japanese and an Italian bayonet and all these are presented by the Ordnance Department, Allahabad.

(i) Military locks — A small group of exhibits that illustrate iron locks of letter-lock pattern and their parts are very interesting to the visitors. These locks were used by the armed forces at Thirumayam Fort (Puḍukkottāi) during the 80s of 17th century (c.1687 A.D.)

(j) Boomerangs — Boomerangs, both returning and non-returning types are displayed in this museum. These weapons were used even in the recent past by the Kallars, Maravars and Valayars of Trichirāpalli, Mādurāi, Puḍukkottāi and Rāmnād districts. These were made of iron or hand grained wood. Single specimen of wooden returning boomerang of Aurstalian origin is also exhibited here. Some of the boomerangs are found along with other iron implements that were excavated from the Megalithic burrial sites of Puḍukkottāi and the rest are collected from the armoury in the old palace at Puḍukkottāi.

(k) Armours — A pair of gauntlets. These are meant for the protection of arms and used as gloves. The gauntlets are made of steel and decorated with koft-work of floral designs demascened in silver.

There are two wooden manikins clothed in mail armour (chain-dress). This armour is to protect a swordman in by-gone days from head to ankle region.

A leather shield is also on display in this museum.

The helmets in this museum present an interesting range of exhibits. There are chain helmets and steel helmets. Among the steel helmets, the Jāvānese helmet depicts brass decorations consisting of lion's head and creepers on the sides. At the front lies the emblem or the crest of the warrior. A plume at the top of the helmet gives a resemblance of a Greek design in brass. From the top edge of this plume hangs a rose coloured fez. On the whole the helmet appears to belong to a warring monarch who does not enter into the thick of fray, but only puts on a grand show to inspire confidence in his men. Other helmets to mention are the funnel shaped Chinese helmet, the German helmets of 1914-18 A.D., and the East India Company helmets of 17/18th centuries.

(l) Bows and arrows — Various types of Bows and Arrows of 18th century are good collection of this museum.

(m) Stone-sling — It is an instrument for throwing stones and consists of a small cup-like closely wooven rope-net with two long ropes attached to it one on each side. The net and ropes are prepared from the fibres of hemp or cotton thread. The rope from one side of the net has a noose and that from the other side a knot at ends. The noose is held by the thumb and the end of the rope is firmly held by the hand. A spherical stone is placed in the net and the sling is whirled round and round in the air with great

force. Finally, a jerk is given and the stone darts straight towards the target with a tremendous force and whistling sound. Experts can hit the target with this stone from a distance more than 100 yards. This instrument was once the chief weapon of Kallars and Maravars, the two Ethnic castes of Tāmil Nāḍu in the past, but its use at present is fast disappearing. It was also used in the battles of 18th century in India.

(n) Fire-arms — Among the fire-arms following are worth-mentioning :

(1) Ten cannons and cannon-balls (both exploded and unused) are displayed.

(2) Eleven different types of guns, both breach-loading and muzzle loading, are also exhibited. Among them a gun in the shape of a walking stick and a flint musket are interesting from museological stand point. These guns are all of 17th century A.D.

(3) Muzzle-loading and flint locking types of pistols are also interesting objects. One of the flint-locking type pistol has a bayonet fixed to it, which is a rare exhibit.

(o) Besides all these, models of aircrafts and tanks used in the Second World War exhibited in this museum draw the attention of the visitors.

The State Museum - Hyderābād. Andhra Pradesh[10]

The Hyderābād State Museum was established in 1930 A.D. (1349 H.) by H.E.H. the Nizām. The principal collections of this museum are Sculptures, Inscriptions, Coins, Indian Miniatures, Copies of Ajantā paintings, Bidri-ware, Metal-ware, Old China-ware, Pre-historic antiquities, Arms and armours, Textiles, Arabic and Persian manuscripts, Modern Arts and Miscellaneous.

As regards the collection of Arms and armours the museum is highly remarkable both for its high quality and huge quantity. Besides the selected objects displayed in the galleries a large number of war materials are stored at three places. The main storage of arms and fire-arms lies within the museum building itself. A good number of swords and daggers are stored in the office building of the Department of Archaeology and Museum, Government of Andhra Pradesh, Hyderābād. The third store, consisting of bows, arrows, swords, armours, broken parts of guns and many miscellaneous objects, is in a building, known as 'Shāmsheer Kothā', which was probably meant for the storage of war materials during the Kutubshāhi period.

The collection mainly represents the arms of the Deccan, but no doubt, the war materials of the other parts of India and also the foreign countries, viz., Persian, Nepalese, Dutch, French and English objects are also on display. The weapons of Deccani origin must have been

manufactured in the famous arms-producing centres, like Vizianagram, Seringapatam, Jagdeopur, Hyderabad and Warangal. Close examination of these swords will reveal that it was customary during the medieval period to import sword-blades from Persia and other European countries and get them mounted with the Indian hilts in the local workshops. So, we find a large number of swords and daggers in the museum are provided with imported blades but the hilts and its craftmanship of those exhibits are typically Indian.

The collection of each category of war material is represented through numerous varieties which will provide us with some idea on innumerable traits and forms which the arsenals in Southern India had evolved.

There are a large variety of arms of the late medieval period which in fact stood for the hunting, pastime as well as the different religious ceremonies and as gifts in official functions or the Durbars.

The important war materials having museological interests displayed in this museum are enumerated below :

(1) Bows and Arrows — Among the bows displayed two are made of steel and the rest are wooden. Steel bows are with recurved ends and a few wooden bows are polished and painted with human figures and floral patterns. One wooden bow is 125 cm in length and the rest are between 60-65 cm.

There are more than 370 arrows collected in twelve

lots. Some of these arrows possess steel arrow heads of various shape and size.

(2) Swords — The museum collected different types of swords having different names, such as, Teghā, Sailabā, Pātā, Khanda, Kirāch etc. These swords are mostly of 17th, 18th and 19th centuries and their total number is more than 170. The only Sailabā of late 19th century A.D. (1294 H.), in the museum shows chiselled workmanship on the hilt and the blade is watered and bears inscriptions from the Qurān. As mentioned earlier, most of the hilts are fixed later. All the swords of the collection are important and interesting from museological and historical point of views for their nature, shape, artistic works and legends associated with them. In some cases the name of the makers are also inscribed. Some of these swords are briefly described below :

(a) Curved swords — (i) A curved sword with Indo-Muslim hilt bearing Koftgari in gold. Its blade is watered and incised with the Royal insignia of parasol and cartouches bearing inscription of date 1017 H. and the name of Bādsāha Jehāngir. The hilt is latter than the blade. The length of the hilt is 18 cm. and that of the blade is 84 cm. (Museum No.1774).

(ii) A curved sword with the hilt having saucer shaped pommel, grip and guards. The floral pattern in koft-workmanship is on the hilt. The blade is watered

and chiselled at the root. The maker's name is mentioned as Āsād of Ispāhān. The measurement is same as above (Museum No.2590).

(iii) A curved sword with pistol-shaped hilt having ivory plates on both sides. The blade is grooved in the centre. The maker's name is given as Mohammad Yousuf Misri. The measurement of the hilt is 15 cm, and that of the blade is 81 cm. (Museum No.4041).

(iv) A curved sword, Zulf-i-Khār, with enamelled hilt and the blade dented and forked at the apical portion. The mystic symbol 'Bedouh' is on the blade and the maker's name Āmalā Mohammad Misiri is curved on the blade. The measurement of the hilt is 18 cm., and that of the blade is 86 cm. (Museum No.9794).

(v) A curved sabre with pistol-shaped hilt covered with ivory plates. The hilt has long straight quillons and ecusson which is lozenge shaped. The blade is crescent shaped and watered. The scabbard has 'Bādāmchā' and 'Kothi' made of steel. The hilt measures 18 cm. and the blade is 82 cm., long (museum No.1768).

(vi) A curved sword with hilt having saucer-shaped pommel, rolled grip and knuckle guard. The hilt is carved with figures of Hindu gods and goddesses and Sanskrit ślokas in gold. The blade is made of fine steel and the 'Bedouh' is carved on the blade. The maker's name Āmalā Mohammad Misri is also inscribed. The hilt measures 19 cm., and the

blade is 76 cm. (Museum No. P260).

(vii) A curved sword with hilt having creeper designs in gold inlay. The knuckle guard is shaped as peacock. The blade exhibits fine chiselling with figures of animals. The measurement of the hilt is 19 cm., and that of the blade is 84 cm. (Museum No.1785).

(viii) A curved sword, Zulf-i-Khār with the basket hilt and spike. The blade is dented and forked. The measurement of the blade is 61 cm., and that of the hilt is 20 cm. (Museum No.1222).

(ix) A curved sword with pistol shaped hilt of steel with ivory plates. The blade is chiselled with floral designs on the upper edge and having inscription of the owner's name, Sirājuddaulā Bāhādur. The blade measures 80 cm. and the hilt is 16 cm. (Museum No.1286).

(x) A curved sword with hilt decorated with red and green enamel and studded with flat diamonds. The inscription gives the owner's name as Nizām, the ruler of Hyderabad State. The measurement of the hilt is 23 cm., and that of the blade is 76 cm. (Museum No.8760).

(b) Teghā — (i) A Teghā with steel hilt consisting of broad saucer shaped pommel, rolled grip and knuckle guard. The blade is grooved and wider at the tip. Seating on the upper edge of the blade is improvised with a view to strengthen the blade. The measurement of the hilt is 19 cm., and the blade is 67 cm. long (Museum No.1221).

(ii) The Teghā bearing the inscription in Arabic in praise of God, the name of the owner, Nizāmuddaulā Bāhādur and the date 1220 H. The hilt measures 19 cm., and the blade is 81 cm. long (Museum No.1225).

(c) Sailabā — (i) A Sailabā with hilt decorated with floral designs in gold. The root of this forward-curved blade is also decorated with gold inlay. The blade is inscribed with Qurānic verses and bears the date 1028 H. Measurements : Hilt - 19 cm., Blade - 65 cm. (Museum No.2563).

(ii) A Sailabā with Indo-Muslim hilt which has chiselled workmanship. The blade, watered, has inscriptions in Arabic all along the upper edge. The blade is decked with gold inlay at the root. Qurānic verses are also inscribed on the blade. Measurement : Hilt- 19 cm., Blade- 69 cm. (Museum No.3953).

(iii) Sailabā, a special sword of Hyderabad with forward-curved blade and inscriptions all over the blade. The blade bears the name Sāheb Āli and the date 1194 H. Measurements : Hilt - 17 cm., Blade- 65 cm. (Museum No.1686).

(d) Pāṭā — (i) A Pāṭā with guantlet hilt is carved with figures of birds and floral designs. The blade is straight, tapering and double edged. It is inscribed with Qurānic verses and the parasol insignia in gold. The hilt measures 35 cm., and the blade is 99 cm. (Museum No.7019).

(ii) A Pāṭā with gauntlet hilt which is inlaid with gold and has velvet padding inside. The blade is long,

double edged and pointed at the end. It has seating arrangement too. Measurement : Hilt- 31 cm., Blade- 97 cm. (Museum No. 2351).

(e) Khanda — (i) A Khanda with basket hilt with Ricasso work at the base of the blade. The blade is grooved and bears inscription in gold. The owner's name inscribed as Chin-Klich Khān Bāhādur dated 1116 H. Measurements : Hilt- 18 cm., Blade- 103 cm. (Museum No.1737).

(ii) A Khanda with basket hilt. The hilt and the re-inforcement are decorated with gold inlay. The hilt has a spike above and velvet padding inside. The blade is straight and tongue-shaped. Measurements : Hilt- 21 cm., Blade- 84 cm. (Museum No. P299).

(iii) A Khanda with ordinary Indo-Muslim hilt and the straight spoon shaped blade. The blade is improvised with the seating to the half of its length. The blade is 80 cm long and the hilt is 18 cm. (Museum No.1776).

(iv) A Khanda with hilt having bulb-shaped pommel, rolled grip and straight quillons. The blade has fine damascening work and bears inscriptions in cartouches. The royal insignia and crescent in gold are represented on the blade. The inscription gives the name of the Mughal Emperor, 'Shāhjehān'. The hilt measures 16 cm and the blade is 78 cm. (Museum No. P 762).

(v) A straight sword, Dhā, with the hilt having crown-shaped pommel and pierced workmanship. The blade is

straight and edged on one side only. An inscription in Devnagri reads, 'Gyadi Samadup Danadyu'. The measurement of the blade is 68 cm., and that of the hilt is 16 cm. (Museum No.P 4560/A).

(f) Kirāch — (i) A Kirāch with pistol shaped hilt covered with ivory-plates. The blade is of European origin and bears crown insignia with geometrical designs. Measurement: Hilt- 14 cm., Blade- 81 cm. (Museum No.P3110).

(ii) A Kirāch with pistol-shaped hilt covered with ivory plates. The blade bears the crown of Nizam and coat of Arms. An inscription on the blade reads, 'J.R.Gaunt & Sons Ltd. London'. Measurement: Hilt- 13 cm., Blade- 74 cm. (Museum No.4560).

(3) Daggers : The daggers displayed in this museum are of various shapes, sizes and designs. According to the nature of the weapons, they are called by different names, such as, Kāṭār, Pesh-kabz, Qumā, Jambiā, Khanjara, Chhurā, Cāqu, Bānk, Kukari, Bichhawā and Māru. Some of them are described below.

(a) Kāṭār - This is a kind of dagger with 'H' shaped handle and fluted blade. The museum possesses 108 Katars.

(i) A Kāṭār with forked blade and the hilt is 'H' shaped. The blade is grooved in the centre and chiselled at the root. The date is inscribed on the blade as 912 H. Measurement: Hilt- 19 cm., Blade- 19 cm. (Museum No. 3954).

(ii) A Kātār with fluted blade and waved edges and chiselling in praise of God. Inscriptions invoking God for blessings, the name of the owner 'Mohammad Sāh' and the date 1013 H., are seen on the body. Measurement : Hilt- 26 cm., and the blade- 27 cm. (Museum No.2348).

(iii) A Kātār on the hilt of which the names of God are chiselled and the owner's name is inscribed as 'Āminuddin Āli'. Measurement: Hilt- 21 cm., Blade- 33 cm. (Museum No. 3581).

(iv) A Kātār with broad ribbed blade. Measurement: Blade- 19 cm., Hilt- 18 cm. (Museum No.1763).

(v) A Kātār with hilt bearing Sanskrit ślokas in Devanagri script. Measurement : Hilt- 16 cm., Blade- 19 cm. (Museum No.1716).

(b) Peshkabz — It is a dagger with pointed, one edged blade with thick back. The museum got 31 Peshkabzs.

(i) A Peshkabz with hilt pistol-shaped and chiselled. The pointed one edgedand the broad blade has straight back to which the edge gradually slopes. The date is inscribed as 773 H., on the blade. Measurement: Hilt- 13 cm., Blade- 48 cm. (Museum No. P3896).

(ii) A Peshkabz with hilt of Jade is encrusted with eight red stones. The blade is watered and inlaid with gold. Measurement : Hilt- 15 cm., Blade- 33 cm. (Museum No.1762).

(iii) A Peshkabz with hilt made of fish-bone and Koftgari on the blade. Measurement : Hilt- 10 cm., Blade- 26 cm. (Museum No. 3940).

(c) Qumā — It is a kind of hunting knife with double edged sloping blade. The museum got about 18 Qumas.

(i) A Qumā with hilt of horn and the blade is finely watered, double-edged and tapering to the point. The inscription on the blade gives the name of the manufacturing place 'Daghistān' and the date 1004 H. Measurement: Hilt- 11 cm., Blade- 36 cm. (Museum No. 8961)

(ii) Another Qumā with horn hilt and blade with deep channel down the centre and gradually tapering to the lower end and gold inlay at the tip of the blade. Inscriptions in cartouches carved on the blade gives the name of the maker, Āmale Hussain and the place of manufacture, Daghistān. Measurement : Hilt- 14 cm., Blade- 31 cm. (Museum No.1533).

(d) Jambiā — It is a dagger with curved blade having mid-rib. The museum possesses more than 25 Jambiās.

(i) A Jambiā having 12 cm., hilt chiselled with scenes of Śikārgarh. The 20 cm., blade is curved and inscribed. The inscription reads 'Sāh Āli Bādshāh' (Museum No. 1213).

(ii) Another Jambiā, hilt covered with ivory plates and the blade chiselled at the root with inscription of the name 'Hyder Sāheb'. Its hilt is 12 cm., long and the blade is 24 cm.(Museum No. 1155).

(iii) A similar Jambiā with hilt chiselled with floral pattern and the blade ribbed and inscribed in cartouches.

Inscription gives the date 'Rajab 1202 H.'. The length of the hilt is 12 cm., and that of the blade is 22 cm. (Museum No.2512).

(e) Khanjarā — It is a kind of dagger. Its blade may be curved or doubly curved. The museum possesses about 50 Khanjarās and some of them are really interesting.

(i) A Khanjarā with parrot-shaped hilt and chiselled to show birds and floral patterns. The blade is watered and inscribed in praise of God. Its blade is 45 cm., long and the hilt is 15 cm. (Museum No.1170).

(ii) Another important Khanjarā with jade-hilt encrusted with precious stones. Its blade is pierced, watered and inscribed with Persian couplets. Its blade measures 20 cm., and the hilt is only 12 cm. (Museum No. 8759).

(iii) The Khanjarā with metal hilt chiselled and inscribed. The blade is curved. The inscription shows the owner's name 'Hāider'. The hilt measures 11 cm., and the blade is 21 cm., long (Museum No.P2375).

(iv) This Khanjarā's hilt is covered with ivory plate and the blade is doubly curved. Its measurement is same as above (Museum No.1565).

(v) This is a simple Khanjarā but its hilt is made of fish-bone which measures 12 cm. Its blade is about 23 cm. (Museum No.4010).

(f) Chhurā — It is a bigger knife with sharp cutting edge. The museum got 18 Chhurās. The important varieties are—

(i) The Chhurā with pistol-shaped hilt and covered with ivory plates. Its blade is fine damasc with broad straight back. The cutting edge slopes gradually towards the back. The length of the blade is 55 cm., and that of the hilt is 12 cm. (Museum No. 1220).

(ii) This Chhurā's hilt is carved and seems heavier. The blade is chiselled at the root and measures 56 cm., and the hilt is only 14 cm., long (Museum No. 8694).

(iii) The hilt of this Chhurā is made of fish-bone and the blade is inlaid with gold. The blade measures 35 cm. and the hilt is 13 cm. long (Museum No. 3513).

(g) Cāqu — Cāqus are ordinary knives. The museum possesses 32 Caqus. The hilt of these Caqus are mostly made of ivory, horn, agate, jade or iron. A few of them are described below :

(i) The handle of this Cāqu is of jade and shaped like a goat's head and provided with silver bands. The blade is watered and measures only 12 cm. The hilt is only 9 cm. (Museum No.1630).

(ii) This Cāqu's hilt is of ivory plates. The blade has Jauhar (the inherent quality of steel which comes out after even heating and burnishing) on one side and the other side is plain. The blade measures 24 cm., and the hilt is only 10 cm. (Museum No.8998).

(iii) Its blade is watered and inscribed. The inscription reads the name 'Maulvi Muhammad Ābdul Zabbar Khān

Āsafiā Nizanai' and the date 1331 H. The hilt is covered with ivory plates. The hilt is only 11 cm., in length and the blade measures double the hilt (Museum No.1647).

(h) Bānk — It is the dagger with crescent-shaped curved blade. In the museum only two Bānks are displayed. The hilt of the first one is of ivory with knuckle guard and measures 10 cm. Its blade is 18 cm. long. The measurement of the second one is 27 cm., including 16 cm., blade. The blade of both the Bānks are recurved (Museum No.2422,1172).

(i) Kukri — A Nepali dagger is known as Kukri. In this museum there are only three Kukris and all are interesting specimens.

The first one possesses hilt made of agate and mother of pearls. The hilt measures 11 cm., and the blade is 28 cm., long. The second one possesses hilt with knuckle guard. Its blade is forward curved and inlaid with hunting scene. The blade measures 36 cm., and the hilt is about 15 cm. The third Kukri is a simple one with 41 cm., long forward-curved blade. Its hilt is 12 cm. (Museum No.2254,1333,427).

(j) Bichhawā — It is a small double-edged dagger that can be concealed in the sleeves. The only Bichhawā in the museum is peculiar due to its 20 cm. long forked blade and 19 cm. hilt. (Museum No.4051)

(k) Māru — The Māru that this museum possesses has two pronged blade on either side and handle in the middle. Its total length is 69 cm., and the quillons are downward. (Museum No.439).

(4) Paraśu — It is a kind of battle-axe. The museum possesses five Paraśus of which the following two are worth mentioning.

(i) The blade and the handle of the first one are made of steel. The blade is pierced and the handle possesses a Gupti inside. Its total length is 68 cm., and it is inscribed. The inscription reads 'Rustam-i-Dauran'. (Museum No. 2528)

(ii) The second one is a double-faced battle-axe with a disc above. The cutting edges of both the blades are crescent shaped. Its total length is 88 cm. (Museum No. 434).

(5) Tabar — It is also a kind of axe. Among the five Tabars in this museum the following two are interesting to note.

(i) The first Tabar is with blade pierced and a spike attached above it. The steel handle contains a Gupti concealed inside. Its total length is 52 cm. (Museum No. 435)

(ii) The handle of the second Tabar also contains a Gupti inside and the blade is inlaid with silver in floral pattern. Its length is 57 cm.(Museum No.4022)

(6) Gurz or Gurgaz — Both are maces. The Gurz possesses steel gobular head while the Gurgaz has six or eight bladed steel head. The two Gurzs in the museum are made of steel and their total length is 58 cm., and 65 cm., respectively.

The only Gurgaz in the museum possesses basket hilt with spike and multibladed head. Its length is 78 cm. (Museum No. 442, 430, P884)

(7) Jaghnal — It is a kind of axe with crow-bill type blade. The museum possesses only two Jaghnals. The blades of both of them are crow-bill type and their lengths are 70 cm., and 71 cm., respectively. The handle of the larger one has a Gupti inside. (Museum No.437, 4040)

(8) Aṅkuśh — It is the Goad to control and drive animals like elephants. The interesting specimen of the Goad in this museum possesses a pistol attached to its handle. The length of this Ankush is 69 cm. (Museum No.441)

(9) Binout — It is an interesting weapon. The specimen possesses a round metallic ball attached to a metallic whip of about 81 cm. length. (Museum No.430)

(10) Spear, lance etc. — The museum possesses a good number of different types of spears and lances. Their blades are made of steel but the handles are either metallic or non-metallic. The total length of these specimens varies. One spear with steel handle is 200 cm. long. (Museum No.7009)

(11) Armours — The body armours of this museum consist of coat of mail (Zirāh-Bakhtār), arm-guards (Dastāna), helmet (Tope) etc. The interesting specimens are described below :

(i) A coat of mail composed of unriveted links of steel and brass. This is of 17th century A.D. (Museum No.P188)

(ii) A cuirass (Chār-āinā) composed of six plates of damascus steel which are lined with cotton to cover chest, back and sides. (Museum No.1559)

(iii) Another suit of armour of 17th century A.D. consisting of coat of chain mail, helmet and arm-guards. (Museum No.432)

(iv) A helmet of steel inlaid with gold. Its shape is semi-spherical, surmounted by a quadrangular arrow-head and the nose-guard. The linked chain falling in points on the shoulders. The height of the helmet is 24 cm. (Museum No.1554)

(v) A few steel helmets with chiselled workmanship or Koftgari (inlay of gold-leaf or wire). The diameter of these helmets vary from 20 cm. to 28 cm.

(vi) Arm-guards with chiselled workmanship or Koftgari and lined with velvet. Their lengths vary between 32 cm. and 33 cm., and all belongs to 17th century A.D. (Museum No.1151)

(12) Shields — There are about twenty-five shields of different shapes, sizes and materials. Some of them are described here below.

(i) A circular shield of 46 cm. diameter. It is made of steel with fine chiselled workmanship depicting hunting scene. It possesses inscriptions in Kufi script and it is of pre-Mughal period. (Museum No.1148)

(ii) Another circular steel shield of 31 cm.,diameter

with inscription in cartouches mentioning the son of Jāhāngir, Shājehān, dated 1037 H. (Museum No. P289)

(iii) A wooden shield (Fari) of 25 cm. diameter used for parrying. (Museum No.2591)

(iv) A basket-shaped shield with metallic rim alround. (Museum No. P135)

(v) A circular steel made shield having 33 cm., diameter. Four metallic bosses are rivetted on its top with gold inlay of very fine quality and velvet padding inside. (Museum No. 3906)

(vi) A leather shield of 60 cm. diameter with four metallic bosses on the top and cotton padding inside.(Museum No.1629)

(vii) Another leather shield of 52 cm. diameter with a crescent and four bosses of copper on its top.(Museum No.1619)

(13) Fire-arms — The fire-arms possessed by this museum are mainly different types of Matchlocks, Flintlocks, Blunderbusses, Pistols and Cannons of the periods between 17th to 20th centuries A.D. The notable specimens are described below.

(a) Matchlocks — The matchlocks are country made guns. There are a good number of matchlocks displayed in the museum. The matchlock with wooden butt and long barrel attached to the stock by numerous broad bands of brass is really interesting. Its barrel is 153 cm. with inscription, 'Āsaf Jāh'. The inscription is very faint now. The total length is 200 cm. (Museum No.8927)

The second matchlock is heavier than the first one with wooden butt and long barrel attached to it. The barrel is 162 cm. long with the inscription, 'Sarkar Nizam Āli Khān Bāhādur', 1193 H. The total length is 213 cm. (museum No. 8928)

The third matchlock is 104 cm. long and the barrel is shaped as a tiger's mouth. The length of the barrel is 66 cm. (Museum No.1748)

(b) Flintlocks — The flintlocks are commonly called as 'Banduq'. Most of the flintlocks of this museum are of 19th century A.D. One flint lock with gold-work on the barrel and ivory inlay on the butt is an interesting specimen. Its total length is 98 cm, while the barrel is 67 cm. only. (Museum No. 1404)

(c) Guns — Among the guns mention may be made of the muzzle-loading gun, double-barrel gun and modern gun. One muzzle-loading gun in this museum is 138 cm. long. Its barrel is 95 cm. in length and is damascend and inlaid with gold. The barrel also depicts a lion insignia and inscription. The inscription reads the name, 'Shānsāh Dārā Nāzir'. The date inscribed is illegible. (Museum No. 4058)

Another gun of historical importance is about 121 cm long. Its 80 cm. long barrel is chiselled and inscribed. The inscription reads, 'Āhade-Aurangzeb'. Though the inscription mentions the gun to be the contemporary to Aurangzeb yet it seems to be of much latter period. (Museum No. 4107)

(d) Blunderbusses — All the blunderbusses in the museum may be called as flint-lock carbines. There are about twelve blunderbusses and most of them are similar in shape but sizes vary. Only three of them have got bell-shaped mouth. A few of them got gold-work and inscriptions on the barrel. The largest blunderbuss is 108 cm. long including 67 cm. long barrel. (Museum No.P 1703)

(e) Pistols (Tāmānchā) — The museum got only eleven pistols. One of them is fitted with an umbrella. Its length is 84 cm. (No.4116). Another pistol possesses a lion insignia. Its length is 39 cm. including 29 cm. long barrel (No.1090). There is another pistol which may be called as pistol-shaped flint-lock and it contains gold-workmanship. Its total length is 32 cm. including 17 cm. long barrel.(No.2519)

(f) Gun-powder flasks (Tumbi) — There are only two gunpowder flasks in the museum and both of them belong to 18th century A.D. The first one is made of ivory and carved with figures. Its length is 22 cm. only (No.424). The second one is peculiar in shape. It is more or less a fish-shaped and its length is only 23 cm. (No.3959).

(9) Cannons — The museum possesses a good number of big and mini cannons. They are either made of iron and steel or of brass. Almost all of them are inscribed. A few important cannons are described below.

(i) A long cannon of early 17th century A.D., is really an interesting object. Its length is 212 cm. and the

size of the bore is 6 cm. The inscriptions on its body depicts the name of Adil Shah and the date as 997 H.

(ii) A huge cannon of brass with the inscription 'Sarkār Navāb Mir Nizām Āli Khān Bāhādur'. It also depicts the names of Fouzder Khān and the maker Mai Faraile dated 1207 H. Its length is 320 cm and bore 25 cm.

There are six more similar brass guns of different size and bore with similar inscription but the date differs. All these guns are important for museological interest.

(iii) One cannon is mounted on wheels. The monogram RV is inscribed on it and it bears the crown insignia. Its length is 187 cm. and bore 8 cm.

(iv) One mini cannon of 46 cm. length and 5 cm. bore is an important object of this museum. It is chiselled and inscribed. The inscription reads the name, 'Aurangzeb'. (No. P 1725).

(v) Another mini-cannon of 53 cm. length and 7 cm. bore with the head of a bull, Nandi, carved on it is also worth mentioning. (No.4169).

The museum also possesses a few small cannon balls.

Victoria Memorial Hall Museum, Calcutta[11]

The Victoria Memorial Hall Museum owes its origin to Lord Curzon, the then Viceroy of India. This charming marbel edifice was constructed with the liberal contribution of the princes and the people of India as a memorial to Queen

Victoria. The museum was thrown open to the public by the Prince of Wales on 28th December, 1921.

The exhibits displayed here unfold the panorama of Indian history from the Mughal period down to the recent times. The collections comprise paintings, engravings, lithographs, records, manuscripts, arms and armours, medals, coins, models, personal relics, trophies, maps, plans, musical instruments, uniforms, sculptures etc., depicting different phases of British Indian History.

Among the war materials possessed by this museum, arms and armours used in medieval and comparatively modern warfare and historical documents relating to British period in India are noteworthy. Some of these important exhibits are described below.

(1) Daggers and Knives — There are ten different types of daggers and knives such as - Kātār, Dakṣhni-Kātār, Peskabja, Khanjarā, Kamā (Qamā), Jambiā, Bichhwā, Kurauli, Pholadi, Jāfar-tākiā. Kāṭār is the double edged sharp dagger and the blade is triangular in shape. Dakṣhni-Kātārs are just like the Kātārs in shape but their blades are much longer. The blades of Peskabjas are narrow and pointed. Their cutting edges are sharp and straight but the other sides of the blades are stout and strong. There lies a great difference in holding the handle between a Kātār and a Peskabja. The blades of the Khanjars are curved. The difference in shape and size of the blades are made for special uses, as for

example, the broad blade of a Kātār can not cut or pierce the body armours while it can be easily done with the help of a narrow pointed blade of a Peskabja.

(2) Swords — Dhop, Khaṇḍa, Tegā, Ṣalvā, Sayef, Nimcā, Tāmācā, Nārāju, Śhirohi, Torap, Lokai, Shāmser, Julfikār, Sasanpatta, Langarkat, Katti, Pāṭṭā are the swords of different shapes and sizes displayed here. The curved-blade swords are more strong and powerful to hit than the straight swords. Marathas always preferred swords having curved blades and this shape they accepted from the Portugeese, commonly known as Firingi and so the Maratha curved sword is known as Farāng. The proportionately longer swords were probably used by the cavalry men. But, the long sword Dhop was not for the use of cavalry. It was used by the nobles as a walking stick, and it was a symbol of aristocracy. The Dhops were never hanged from the waist-belt and were always carried by hand. The handles and blades of some of these swords are well decorated. The scabbards too are highly ornamented with artistic works of Jāli, Minākari, Koftgari, etc., and with precious stones. On some blades of different types of swords we find tigers, lions running after deer and war scenes are beautifully carved.

(3) Spears of Barchhā — Different types of spears and similar weapons are displayed in this museum. According to the shape and size these spears are called as Pesro-ballam, Ballam, Saṅg, Saṅgin, Nagin, Valla etc. Some of these weapons

were used in actual warfare while others were used for ceremonial purposes only. The designs of these spears are worth-seeing. Some of the blades of these spears are leaf like, some are triangular and another historic spears of Murshidabad's Nawāb has a trident shaped blade, but its three blades are not sharp and pointed and the middle blade is proportionately longer than the other two. On one side of the central blade the figure of 'Garuda' and on the other side the figure of Lord Viṣhṇu are carved. On another spear having a broad triangular blade the figure of a tiger is faintly carved on the blade.

(4) Armours — Among the armours mention may be made of some metallic and leather shields, iron helmets and metallic body armour. The metallic shields are known as 'Sipār' and the shields made of buffalo and rhinoceros hide are called as 'Dhāl'. The 'Topes' are the metallic helmets and 'Jirā-bakhtār' is the metallic body armour. The designs and engravings on the Sipārs and Topes are really beautiful and charming.

(5) Firearms — Among the firearms, most of them are of Mughal period and of later ages. Different types of flint-lock and match-lock guns of the Mughal period are interesting from museological point of view. Most of these guns are either made in India or at Persia. European guns or guns made in India according to European design are also displayed here. The butt end of these guns are triangular in shape.

'Chounāli', a peculiar type of gun in this gallery consists of four chambers to load gun-powder. After once loading this gun can be fired four times consecutively. A few heavy and big guns in this museum will surely attract the attention of the visitors. These guns are known as 'Jhājhāwal'. Probably these were used for firing from fort-walls and hill tops. Due to heavy weight the barrel of the Jhājhāwal is supported by a short 'Y' shaped stand. In this connection mention must be made of a Turkish gun in this museum presented by the Nizām of Hyderabad. This gun is basically a flint-lock but it can also be used as a match-lock if required.

(6) Special weapons — Siṅgārā-Āshani, a peculiar weapon presented by the Nizām of Hyderabad is displayed in this museum gallery. The weapon is made of iron and its shape is the simplest form of water chest-nut (B. Pāniphal). It has four sharp pointed, big needle shaped structures arising from the centre of the main body. These needles are so arranged that when it is thrown on the ground, at least one needle will always remain facing upward. Siṅgārā-Āshanis are placed scattered surrounding the forts during the Mughal period to check the advance movement of the enemies.

(7) Bāṇ is another awe inspiring weapon of the Mughal period. It is like our modern fire-work 'Hāwoi', used during different ceremonial functions in India. There are two Bāṇs in this museum brought from Golkonda Fort. These

were manufactured when emperor Aurangzob invaded Golkonda Fort. A Bāṇ can be described as a cylindrical iron case filled with gun-powder and tied at one end of a bamboo stick with the help of ropes made of leather or sniews. The soldiers who are specialist in throwing this weapon are known as Bāndār or Bān-Āndāj. It is reported that in the army of Haidar Ali and Ṭipu Sultān there were five thousand Bāndārs. In the 'Hastings Gallery' of this museum a painting of James Hunter depicting the Bāndārs of Ṭipu Sultān is displayed.

(8) Documents — The collection of documents relating to the British period of Indian history are a distinctive feature of this museum. The treaties, engagements and Sanads and official minutes, despatches and letters which this museum preserves are the original sources for the study of military history of late medieval and modern India. Among the huge number of documents a few are mentioned below.

(a) Treaties and letters between the East India Company and Mirjāfar, Nijāmudaullā, Saifudullā, Mubārkudaullā, the Nawābs of the then Bengal, that narrates the fact how these independent powerful Nawābs became powerless rulers.

(b) The political map of India changed thoroughly during the 18th and 19th centuries A.D. This gallery presents a few factual stories of these changes such as — the stories about the ill-fate of the Nawābs of Oudh; the historical facts about the fights between the Englishmen and Hyder Āli, the king of Mysore and Ṭipu Sultān.

(c) The agreement (1773 A.D.) between the Englishmen and Nawāb Sujāuddaullā of Oudh relating to the transfer of Allahabad and Kada provinces.

(d) The treaty (1784 A.D.) between Tipu Sultān and the Englishmen after Second Mysore War.

(e) The agreement between the Englishmen and the Marathas along with the Nijām of Hyderabad of 1790 A.D., to overpower Tipu Sultān.

(f) Letters written by Jhon Malkom to Lord Wellesley, 6th February, 1804 and Resident Marsar to Lord Lake dated, 14th December, 1805.

(g) Minutes dated 3rd April, 1814 written by Lord Mayra about the Pindāries.

(h) Agreement dated 5th February, 1817, between Daulat Rao Sindhiā and the Englishmen.

(i) Several other agreements between the East India Company and Sarvoji, the king of Tānjore (1799 A.D.), Nawāb Walajar of Karnatak (1801 A.D.) and Mahārājā Balaram Burma of Trivancore (1805 A.D.) respectively.

(j) Among the documents relating to the Sepoy Mutiny of 1857 A.D., the first independence movement of India, the description written by Lord Canning is worth mentioning. The description mentions about the 19th Infantry Battalion Sepoys' revolt on 26th February 1857 at Berhampur (Murśhidābād) and recapture of Lucknow and Delhi by the Englishmen.

(k) After the Sepoy Mutiny of 1857, Queen Victoria

took herself the charge to rule India. The proclamation of the then Governor General of India to this effect is also displayed in this gallery.

(9) Guns — At the centre of the Statue gallery is placed a big gun made of brass. Over its body it is engraved that the gun was constructed for Mahārājā Krishna Chandra by Sri Brojokiśhore Das Dey Karmakār.

On either side of this gun is placed two more guns facing each-other. These two guns are made in France and it is reported that these two guns were used at Palassey battle field by the gunners of Nawāb Sirājuddaullā.

(10) Miscellaneous — Among other important objects of military studies mention may be made of the following :

(a) Numerous paintings and photographs relating to military activities in India during the Mughal and British rule.

(b) The Royal Chair of Murshidābād's Nawāb. This Royal seat is made of a single piece black stone measuring two meters in diameter and having sixteen sides. From the engravings on its sides in Persian language it is learnt that this seat was prepared under the supervision of Khājā Nājar Bokhāri at Munger (Bihar) in the year 1641 A.D. (1052 H) when Sāhājāhān's son Sujā was the Subedar of Bengal, Bihar and Orissa.

(c) The Āchkan (long coat like private dress) and a lock of hairs of Tantiā Topi, the famous national hero of

Sepoy Mutiny of 1857, along with copies of letters and photographs of many Indian heroes and politicians connected with Indian freedom movement are displayed in the 'National Leaders' gallery of this museum.

(d) In the North-East balcony of the museum one will find a few lithograph picture by Captain Green and Lieutenant Micham depicting many events of Sepoy Mutiny occurred at different places of Lucknow and Kanpur.

(e) The North-East verandah of the museum is attractive to the visitors due to display of some printed photos of British war-ships and merchant vessels of 18th and 19th centuries A.D. Over and above there are many pictures showing the cantonment areas of Berhampore and Dacca towns.

(f) In the North-West balcony of the museum about thirty water-colour pictures drawn by Samuel Davis depicting the Udhuānālā bridge and the forts of Munger, Chunārgarh and Benaras will surely add additional attraction of the visitors and remind them many military events of those days.

(g) In the Calcutta gallery the visitors will get an idea of the old Fort William which was situated at the present site of Calcutta General Post Office during 18th century A.D., while looking round the pictures drawn by Vyandergust, Vanrhine, Daniel and Hiki and the wooden model of the same.

(h) The 'Hastings' gallery presents a good number

of pictures depicting different events of First, Second, Third and Fourth Anglo-Mysore wars, Tipu's surrender, Tipu's death, Tipu's army and march of Hyder Beg on elephant's back towards Calcutta.

(i) This museum possesses a few rare books depicting the uniforms of soldiers during medieval and British periods in India. If models can be prepared wearing the replicas of these uniforms then it will be of great interest to study the evolution and gradual development of uniforms of Indian soldiers. The names of the books are as follows : (i) Uniforms of French Troops in India (coloured sketches) c.1410 - 13 A.D. (ii) Military Costumes of India by Captain James, (iii) Costumes of the Indian Army by Harris, (iv) Costumes of the Madras Army by W. Husnsley, (v) Costumes of the Bengal Army, and (vi) Tipu's soldiers (c.1333-1341).

(j) Flags — The museum got the colour presented to the Second Bengal European Regiment at Hāzāribāgh in October, 1839 A.D.

Central Sikh Museum, Amritsar[12]

The Central Sikh Museum is earnestly and laudibly doing its works in the cause of the country as a whole and particularly of the Sikh community in India. Earlier efforts were made by a few renowned Sikh ruling families, the Gurdwara Committees and some individuals to collect and preserve relics and paintings relating to Sikh history. Most of the collections

of Mahārājā Ranjit Singh were taken away by the then British rulers in India and the remaining objects still exist in the Lahore Fort and is known as Sikh Museum.

It is only very recently in the year 1958, the Shiromani Gurdwarā Parbandhak Committee decided to establish the Central Sikh Museum. This museum started on 11th July, 1958, above the Northern Deodhi of the famous Golden temple, Amritsar with a small collection of objects procured from the Sikh Reference Library and from various other sources. At present the number of objects counts beyond one thousand and all these objects relate to Sikh history, religion and culture.

The Sikhs in India are recognised as a martial race and so their history and culture depict full of military activities. From the stand point of Military Studies the exhibits of this museum are not only important but interesting too.

The articles of the Central Sikh Museum can be classified into the following groups and important items are only mentioned below.

(i) Oil-paintings — There are more than 125 big size oil-paintings drawn by artists named Sobhā Singh, Gurdit Singh, Kirpāl Singh, Hasmat Singh, Sohān Singh and Thākar Singh. This important collection of paintings, widely portraying the trials and tribulations through which the Sikh leaders had gone. A pilgrimage to this gallery of the museum will keep a

life long impression about the historical events of the Sikhism and reminds us about the brave heroes who sacrificed everything to protect their religion and freedom.

(2) Other paintings and drawings — Among other pictures mention may be made about 16 water colour paintings (Kangra Art) and a few sketches and etchings, all depicting the figures of heroes and leaders who created the Sikh history and inspire us to learn a lesson of sacrifice for the sake of country and the faith.

(3) Photos and prints — There are about fifty photographs and prints of different battle scenes and ex-rulers of native states of Punjab.

(4) Arms — In the arms gallery of this museum following objects are worth mentioning :

(a) One gun barrel and forty lead bullets of the time of Guru Gobinda Singh Ji. (b) Two wall-guns of the 18th century A.D. (c) One pistol of the time of Mahārājā Ranjit Singh. (d) One bow of 18th century and fifteen arrows of 18th or early 19th century A.D. (e) One armour (date not known). (f) Five spears of 18th or early 19th century A.D. (g) Seven swords of 18th century A.D. (h) Three shields of 18th century. (i) One big German cannon. (j) Three cannon balls of 19th century. (k) Bomb shells used during the Indo-Pak wars, 1965 and 1971. (l) The sword of Maharaja Ranjit Singh. Its hilt is studded with precious stones. (m) One double-edged sword (Khaṇḍa) with which 30,000 people were baptised in the year 1941 at Aligarh, U.P.

(5) Hukum Nāmās — There are about ten Hukum Nāmās of which the Hukum Nāmā of Guru Gobinda Singh Ji is the original one and the rest are the photographs of the Hukum Namas (secred letters of the Holy Gurus) of Guru Tegh Bāhādur Ji, Mātā Gujri Ji, Mātā Sundri Ji, Mātā Sahib Kaur Ji and others.

(6) Miscellaneous — Among various articles used by the Sikh heroes the following are worth mentioning :

(a) Belt and strap of Guru Gobinda Singh Ji's sword. (b) Glass ball of Guru Gobinda Singh Ji's seat. (c) A few musical instruments such as Mardang, Śārāngi, Rabāb, Dilrubā and Sitār. We do not know who are the heroes played on these instruments.

Trichur Museum, Trichur[13]

As reported by the Director of the museum, this museum is under the supervision of the Director of Museums and Zoological Gardens, Trivandram. Its archaeological section was thrown open to the public in the month of March, 1947 and it possesses historical objects of archaeological interest. The principal exhibits are: (a) antiquities from Mohenjo-daro and Harappā sites, (b) antiquities from Taxilā, (c) types of megalithic monuments in Cochin and mid-Kerala regions, (d) microliths representing flakes of polished milky quartz found associated with the megalithic sites of Cochin, (e) Reproduction of about hundred panels of mural paintings from the wall of the Mattancheri Palace, Cochin and Vadakkunathan temple, Trichur (c.16th to 18th century) and (f) a few war materials.

The war materials displayed in this museum are only ten in number; some were presented by the Military adviser, Southern India Circle through the Commandant, State Forces, Cochin and some other were transferred from the Police Department. The objects are as follows :

(i) A good number of 65 mm Munji-type Rifles.
(ii) A few 8 mm Type 'A' Rifles with bayonets.
(iii) A few 8 mm Type 'B' Rifles with bayonets.
(iv) A few 10.35 mm Rifles with bayonets.
(v) 6.5 mm and 8 mm Type 'A' Carbines.
(vi) A few Turkish Rifles.
(vii) Turkish helmets.
(viii) A few machine-guns.
(ix) Different varieties of swords and axes.
(x) Some models of war equipments.

As reported, items 'i' to 'v' are war trophies captured by the Cochin State Forces and others are war trophies captured during 2nd World War.

Bangiya Sāhitya Parisad Museum, Calcutta[14]

The Bangiya Sāhitya Parisad was established on 29th April, 1894. The first six years of its life passed in the house of Rājā Benoy Krishna Deb at Śovābāzār, Calcutta and then for about a period of seven years it was housed in a small building in Cornwallis Street (present Bidhan Sarani) and finally shifted to its present building on 6th December, 1908. The total cost of the building at that time

was ₨ 38070/- only and this amount was collected from public as subscription and donation from big zaminders.

To perpetuate the memory of Sir Ramesh Chandra Dutta, the first President of the Parisad it was proposed to establish a Literary and Historical Museum. The Bhagalpur session of the Bengal Literary Conference held in February, 1910 accepted the proposal and a General Committee was formed with Śri Sāradā Charan Mitra, the then President of the Parisad, as the Chairman of the Committee and representatives from all the provinces of India were taken in the Committee.

The museum called as 'Rameśh Bhawan' was constructed in stages with the money donated by Mahārājà of Baroda (₨ 5000/-) and subscriptions from the public on the adjoining land (7 Cottahs) donated by the Mahārāja of Cossimbazar.

The ground floor of the museum was completed in 1924 and the first floor was constructed in 1938. After the completion of the ground floor the Rameśh Bhawan Committee vested all responsibilities of its management with the Executive Committee of the Bangiya Sāhitya Parisad in 1931.

The collection of this museum can be classified under following heads : (a) Manuscripts of eminent literary men of Bengal and also the Sanskrit, Oriya, Assamese, Tibetan and Persian treatise. Their total number is about 6000. (b) A good library including the personal libraries of some eminent scholars. (c) Rabindra collections. (d) Old pictures and paintings, statues and photographs. (e) Letters and documents. (f) Ācharya Prafulla Chandra collection.

(g) Copper-plate Grants. (h) Mementoes of Literary men. (i) Sculptures. (j) Metal images. (k) Coins and (l) Weapons of war.

Among the objects the following are most interesting to the visitors interested in Military history of India and particularly in Military studies.

(1) One iron cannon ball from Palāssey, used in the battle of Palāssey. It is presented by Aksaya Kumar Mitra.

(2) Three stone cannon balls used by Pratāpāditya of Bengal in his wars with the Mughals. These are presented by Sris Chandra Adhikari.

(3) A conical copper helmet consists of three concentric bulbous sections decreasing in diameter (minor axis - $6\frac{1}{8}$ inches, Major axis - $6\frac{7}{8}$ inches) as they rise and surmounted by a final representation of Vajra. The second section is engraved with four rosettes fixed on it. The bottom section is ornamented with a flat band showing a knot in the centre on the reverse. The bottom of the peaked portion in front shows a representation of three cords tied in the centre by three rosettes and terminating at the ends in two circular decorative devices; higher up are found two creepers springing from three rosettes corresponding to those below and terminating lotuses on two sides of the central figure of Buddha in Dharmachakra Vyakhyana mudrā. The back of the helmet is inscribed. This object is presented by

Mahāmohopādhyāya Haraprasad Sastri. It is dated Nepali Sambat 707 i.e., 1587 A.D.

(4) Another iron cannon ball from Bishnupur (Bankura), presented by Atul Chandra Singh.

(5) A portion of a chain-mail probably a part of a surcoat. It is also from Bishnupur and presented by Atul Chandra Singh.

(6) A very heavy sword. Nothing is known about its find-spot, user and doner.

(7) An iron gun presented by Dr. Sarasi Lal Sarkar.

(8) There are six copper-plate Grants in this museum. Two of them are of Lakshman Sena, one each of Viswarupa Sena, Vijaya Sena, Mahipāla-I and Vigrahapāla III. These Grants may be described as landmarks in the pre-Muhamedan history of Bengal. These Grants have helped much in supplying valuable informations to fill in some lacunae in the connecting links in the history of Bengal and corrected many conjectures that served as history at earlier periods before they were discovered.

(9) The picture of a soldier on camel's back drawn on mica is really an interesting object of this museum.

(10) The collection of metal images in this museum consists of beautifully made figures of different Hindu deities in various postures and holding weapons such as Vajra, Gadā, Cakra, Triśula and Agni.

K.R.C.M. Government Museum — Kittur, Karnātaka[15]

The Kittur Rāni Chānnāmmā Memorial Museum was founded to commemorate the famous queen Chānnāmmā, who fought bravely with the British Government. The museum was established due to the keen interest of Mr. S.R.Kanti, the then education minister of the State. This museum is situated within the ancient fort of Kittur, a few yards away from the ruins of Kittur Palace. This museum was thrown open to the public on 10th January, 1967, by Sm. Indira Gandhi, the then Prime Minister of India.

The collection of this museum includes stone sculptures, coins, inscriptions, arms and armours, wood-carvings costumes of the 19th century A.D., leather puppets and paintings depicting the Kittur history.

Among the important items of war materials in this museum a few swords, steel maces, steel axes, a peculiar bayonet type sword that can be used both as sword and shield, a few shields made of elephant's skin and wood, an armour used by the commander Gurusiddappā of Rāni Chānnāmmā, two cannons and a few cannon balls made of iron and stone are sure to draw the attention of the visitors. The museum got no catalogue or detail records of the war materials.

Hāzārduāri Palace Museum. Murśhidābād, West Bengal[16]

The foundation stone of the Hāzārduāri Palace was laid on 29th August, 1829, by Nawāb Nāzim Humāunjāh Bāhādur in presence of British inhabitants and elites of Murśhidābād

town. The building plan was prepared by Colonel Dunkan Mackloid of Bengal Engineering Regiment. The construction was done by local masons and labourers under the direct supervision of Colonel Dunkan Macloid. After nine years the construction was completed in the month of December, 1837, and at that time Rs 18,oo,ooo/- were spent for the construction. The Palace is three-storeyed and its dimension is 425 feet long, 200 feet broad and 100 feet high (425' x 200' x 100'). The technique of this construction is influenced with the Italian architect.

The attractions of the Palace are the paintings of Raphel, Marshal, Titian, Vandyke etc., the old master painters; the library which is enriched with rare books and valuable scripts and documents in Urdu and Persian language; the original manuscript of Āin-i-Ākbari by Ābul Fazal and the armoury containing huge number of valuable and rare war materials that were mainly used in the battle of Palāssey. The Palace is at present under the control and management of a Trust Body. It is painful to mention that this historical site along with its materials housed there is not at all well maintained. From museological point of view the rich armoury situated on the ground floor of the Palace is fully neglected and it is reported by the local people that many valuable and rare objects have been shifted from this armoury to different places. With much endeavour I failed to get authentic information about this

armoury from the managing authority of the Palace. However, as reported by the guide of the Palace and unofficial information received from the Special Officer on duty there, the following objects seem to me worth mentioning among many other war materials displayed in this armoury.

(1) A straight sword used by Nawab Sirājuddaullāh.

(2) A sword with forked anterior portion used by Nawāb Ālibardi Khān.

(3) Four medium sized cannons used during the reign of Nawāb Murśhid Kuli Khān (1706-1725 A.D.), the founder of the city of Murśhidābād.

(4) One small size six-barrel cannon.

(5) One eight-barrel gun of Nawāb Sirājuddaullāh.

(6) The historic cannon used in Palassey battle, which caused the accidental death of Mirmadan while charging it.

(7) One trident-shaped spear of Vikramāditya of Bengal (?).

(8) The shield, iron chain armour and the spear of Nadir Shah.

(9) The iron helmet of General Rustam.

(10) A good number of small (18" inches) brass boat-guns. The effective range of these guns as reported is about 300 yards.

Besides the above mentioned objects innumerable swords, daggers, knives, battle-axes, spears and lances, etc. of different shapes and sizes; shields made of hide and iron

with bosses and engravings, a large number of guns, muskets, cannons; the standard used by the army of Sirājuddaullāh at Palāssey Battle and many other war materials are stored here and all these materials are interesting to the visitors, specially to the students and research scholars.

In this connection two big cannons, though not housed in this armoury draw special attention of the visitors at Murshidabad, are described below.

The first cannon is known as 'Jāhānkosā' (the destroyer of the world). It is situatēd at the eastern side of the city Murshidabad near Katrā Mosque. The cannon is 18 feet long with a circumference of five feet on the bore and twenty inches at the mouth. It weighs nine tons and about twenty-five Kilograms gun-powder requires for one shot only. At present there are six inscribed brass plates (previously there were nine plates as reported) fitted on the body and the inscriptions are in Persian script but now they became illegible. As reported, the inscriptions read, 'this cannon was constructed during the reign of Mughal Emperor Shāhjāhān, by Janārdan Karmakār of Jāhāngir Nagar (present Dacca) under the supervision of Haraballav Das, a sub-ordinate staff of Dārogā Sher Mohammad, on 11th day of Jamadiassani month in the year 1047 Hizri'.

The second one is left neglected near the Imāmbārā close to Hāzārduari Palace. No record is available about this cannon. As reported by the guide there, Nawāb Nājim Humāunjāh discovered this cannon from the bed of river Ganges.

It is of three barrel system and requires about fifteen Kilograms of gun-powder for one shot only. Before discharging any shot the people residing within the area of ten square miles are warned before hand. There is a hearsay that once with the discharge of a shot from this cannon a few pregnant women were aborted and since then this cannon is called as ''Bāchchawāli Tope'.

Border Security Force Museum, Indore, M.P.[17]

The Border Security Force (B.S.F.) museum of Indore is a good store-house of war materials. It is situated on a small hillock away from the city near the Indore Air-port. It is a three-storeyed old residency of the Holkar family of Madhya Pradesh. No catalogue or official records about the history of the museum and its materials is available. The war materials housed here are mainly of British period in India and a few tribal. The museum is strictly closed to the general public. This museum may be helpful for studying the evolution of modern arms if it is organised and displayed in a scientific way. It is learnt that the present authority is planning to organise this store-house of weapons into a museum of war materials in the true sense of the term.

Some of the important objects housed here are as follows :

(1) A good number of bows and arrows. Probably some of them belong to the medieval period and some are of tribal origin.

(2) An Ardhacandra Bān.

(3) One reverse curved sword.

(4) A mace and a double faced battle-axe.

(5) A trident either made of Brass or mixed metal.

(6) A leather sling.

(7) A set of Assamese Paraśu, Spike and Sickle-axe.

(8) One rifle collected from a Pakistani para-trooper at Punjab during 1965 war. This is presented by Sri Aswini Kumar.

(9) Two Light Machine-gun and two Pistols presented by Sri G.K.Mazumdar, Inspector General, B.S.F.(W.B.), as war trophies.

(10) A wrist-watch and a pistol with case (Italian), presented by General J.N.Choudhuri as war trophies.

(11) A few Tāṅgi and Dāo of NEFA area.

(12) A set of Nāgā cane shield, big Dāo, Spikes, bows and arrows.

(13) Three .410 walking stick type guns.

(14) A set of fourteen revolvers of different bore (.38, .45, .55)

(15) A model of Vietnamees observation-post to lead enemy to booby-trap for certain death.

(16) Another set of Pistols of various sizes (4 inches to 18 inches), shapes and makes.

(17), An Assamese bamboo model of B.S.F. Bāshā i.e. outpost.

(18) A few documents appreciating B.S.F. soldiers' performances in peace and war at different sectors.

(19) Photographs of operations conducted mainly by B.S.F. Jawans in different sectors during 1965 and 1971 Indo-Pak wars.

Various other war materials stored here are — Percussion guns, Match-locks, Flint-locks, Javelins, .30 Browning Machine-gun (USA, 1918), .303 Bren LMG (Britain), 7.62 mm LMG (Checoslovakia), 7.7 mm LMG (Japanese, 1939), 6.5 mm LMG Japanese (Nambu, 1922), Cannon-Locks of 1343 (make not known), Rocket-luncher, 57 mm Recoilless Rifle (USA), Two inches Mortar Shells, High Explosive Bombs, Hand Granèds and huge quantity of ammunition, a few statues of outstanding B.S.F. Heroes.

Allāhābād Museum. Allāhābād,U.P.[18]

The Allahabad Museum was established in the year 1931, under the supervision of Sri B.M.Vyas, Executive Officer, Allāhābād Municipal Board. In the year 1943, Dr. Satish Chandra Kala took the charge of this museum as the first curator. Since July 1958, Dr. R.R.Tripathi is the curator of this museum and Dr. Kala is working as the Chief Advisor. The museum embraces objects of art, archaeology, teracottas, historical documents, zoological specimens and the objects donated by Sri Jaharlal Nehru, the ex-Prime Minister of India. The museum has no printed catalogue or detail accounts of the objects.

The notable war materials of this museum are as follows :

(1) A few paintings on ivory (20th century) depicting different forts of India and the figures of the members of the Nawāb families of the Medieval period in India.

(2) A few miniature paintings of 18th century depicting the uniforms of Mughal soldiers.

(3) "King busy in smoking", a painting (Bundi Style, 18th century A.D.) depicting a straight sword, hat-shaped shield and a Jamadhār (dagger) with 'H' shaped hilt at the waist.

(4) "Conversation", a Mewār style painting of 18th century A.D., depicting a short-bow and arrows.

(5) "King's Court", a Mughal painting of 18th century depicting swords and daggers of various shape and size and big pistols.

(6) "Prithvirāja", a Kotā type painting in sitting posture depicting sword, bows, quiver and arrows. (19th century)

(7) A Rājasthāni painting of 19th century depicting an elephant yoked in a four-wheeled chariot.

(8) A hunting scene of Mewār style (19th century) depicting straight sword and round shield.

(9) A procession scene (18th century Rājasthāni painting) depicting men carrying swords, shields, spears,

flags. Aṅkuśa is also visible in the hand of the Māhuta on the elephant's back.

(10) "Ākbar and his courtiers", a Rājasthāni painting of 18th century depicting swords and daggers.

(11) "Rānā presenting a sword", is a beautiful Mewar style painting of 18th century.

(12) A Kotā style painting of 19th century depicting two elephants fighting.

(13) "The King", a Basohli type painting of 18th century depicting a man with a sword in slope-arm position on the left shoulder and holding a Gupti in the right hand and a dagger kept at the waist.

(14) "Battle Scene", a Rajasthani painting of 19th century depicting elephantry, cavalry and foot-soldiers.

(15) "Protection of Ajamil", a copper plate depicting sword, bow and arrows, mace and cakra.

(16) Five medium size round metallic shields, each studded with four metallic bosses and highly decorated. (c.18th/19th century A.D.)

(17) One small round hat-shaped hide shield.

(18) A pair of metallic hand-guard.

(19) A curved sword on which the figures of Hindu gods are curved.

(20) Another curved sword of which one side is serrated and the other side is dented with minute spikes between the teeths.

(21) A slightly curved broad sword with knob like hilt and hilt-guard.

(22) Two daggers with 'H' shaped hilt and fully decorated.

(23) An iron chain body armour consisting of a helmet with neck-guard, nose-guard and a spike at the top, probably to attach plumes and a coat of mail with four ways (pocket like) probably to keep different weapons.

(24) A few Copper Age weapons of c.1200 B.C., from Bisauli, Budaun, Rewā and Kanpur. The weapons are :

(a) A sword with two antennae of about 15 inches long, (b) eight copper celts and (c) a copper Anthropomorphic figure like weapon.

(25) A teracotta chariot palaque of c.2nd century B.C., (Kauśambi) showing four horses, two spiked wheels, an umbrella, a flag mast and the charioteer.

(26) Two teracotta figures from Kauśambi of c.2nd century to 1st century B.C., showing a mace and a man with quiver full of arrows.

(27) A few copper coins of Dhruvamitra from Ahichchatra (c.1st century B.C.) depicting a boat with sail and some showing a chariot.

(28) A few Punch mark silver coins (c.800 to 200 B.C.) depicting different weapons.

(29) A few copper objects from Kauśambi depicting Ankusa, arrow-heads and Singa (war musical instrument).

(30) A letter by king Wājid Āli Sāha of Oudh, dated H.1275, to his queen Mālikā Afsar Unnisā Begam who could not accompany him to Maṭyā-Burj i.e. Meṭiā Buruz in Calcutta.

(31) A good number of Formāns (contents not known).

(32) Ten medium and one small cannons are displayed at the gate and in the precinct of the museum building. All of them are of late medieval age or of early modern period. No record about these guns is available.

Madrās Government Museum-Egmore, Madrās[19]

The Government Museum, Madrās has celebrated its centenary in the year 1951. In the year 1851, the museum started with Dr. Balfour as its organiser. He was then the Chairman of the committee of the Madras Literary Society and also the Secretary of the Central Committee of the 1851 Exhibition. The museum started its life in the college of Fort St. George and Balfour did not limit the scope of the museum and articles of great value and interest were received from liberal donors. The notification regarding the opening of the Museum to the public first appeared in the Fort St. George Gazette, dated April 29, 1851.

By August, 1853, the museum had a total collection of 19, 830 specimens and the rooms allotted for the museum in the college building were so overcrowded that the Government was requested for a separate building. It was then decided to move the museum to the Pantheon, in December, 1854,

which was then occupied as the office of the Collector of Madras. This Pantheon then consisted of two long halls, two small wings and two outhouses. At present, very little of this old structure remains except the plinth, and a part of the ornamental floor of the two rooms where foreign animals are now exhibited.

The collection of war materials of this museum is very rich. Some of the important and interesting war materials are described below :

(a) Medals — There are about 250 medals and most of them are exhibition medals. The rare pieces are the Mysore Medals. These medals were awarded by the East India Company for services during the Mysore Wars. On the obverse of the rare Mysore Medal of 1791-92, the figure of an English soldier is seen holding the British standard, half unfurled, with a distant view of the fortifications of Śeringapaṭam and the following Persian inscription which reads as 'Struck in the year 1791-92 (corresponding with the Mohamedan era 1202 H)', a memento of the self-sacrificing devotion of the British Government in Mysore.

The Śeringapaṭam medal of 1799 is another piece of important object. This medal was distributed to the officers and soldiers — both European and native. One side of this medal represents the storming of the breach of Śeriṅgapaṭam from an actual drawing on the spot with the meridian sun denoting the time of the storming of the city and the Persian

inscription which reads, "The Fort of Śeringapaṭam, the gift of God the 4th May 1799". On the other side of this medal is the British lion, subduing a tiger, the emblem of Tipu Sultān with the date of the conquest. Another Bronze medal depicting Lord Cornwallis on one side and the scene of the surrender of Ṭipu's sons as hostage is the most interesting and rare piece in the Mysore Medal series.

(b) Charters, Documents etc. — Original charters, documents and treaties mostly relating to the history of the East India Company in the 17th and 18th century A.D., were handed over by Madras Record Office on a permanent loan basis to this museum.

Documents in Indian languages, letters written by famous persons like Lord Clive and General Lally are some of the interesting specimens. Further, the collection in this museum includes a fascimile of the Great Charter of England, the Magna Carta of 1215 A.D., believed to be the only copy in India.

(c) Arms — The prehistoric tools and implements of the Stone and Iron Ages are displayed on the ground floor in the right wing of the front building while on the left wing are housed the arms of the historic period. At the entrance of these wings is a very long row of spears from the Tānjāvur armoury arranged against the wall. There also are displayed two huge bronze bells from China, brought as trophies of the notorious opium war.

At the entrance of the Arms gallery is seen a varied assortment of helberds, pikes, spears and a set of Spanish plate armour from Manilla. The arms collections are displayed in two rooms only while a good number of huge cannons are displayed around the front building. All the cannons were collected as trophies from Manilla, Mysore and Tarangambadi.

In the first arms room following objects will draw the attention of the visitors :

(1) Early matchlocks, musketoons, huge guns, blunder-busses, riflew and pistols either used by the men of East India Company or captured by them as war trophies.

(2) A set of artistically engraved powder flasks.

(3) A series of battle-axes, arrows and chain shot fixed to the wall.

(4) Two guns richly inlaid with gold presented by the East India Company to Sarfoji Mahārājā of Tānjāvur.

(5) A few Chinese helmets and some stone shots.

(6) Some cannons, mortars, wall pieces and grape-shots. Of these a large breach loading cannon is an uniqae exhibit and some miniature models of mortars and cannons are also interesting.

(7) A few coats of mail armour are also displayed.

The other room contains a varied collection of lethal and ceremonial weapons received from the Tānjāvur armoury. The exhibits include swords, maces, daggers, choppers, knives, spears, elephant goads, bows and arrows.

Some of these objects are exquisitely designed with carved designs of yalis, makaras and parrots on them. Among the cannons displayed in this room, two are very old (date not known) which represent the earliest method of cannon manufacture. Here we find longitudinal strips of irons are arranged inside a series of circular iron rings and the whole structure is welded together. Other interesting objects are the reversible steel bows, the signed arrows of the Mahārājā of Tānjāvur and the Bāg-Nakh (tiger-claw), the typical weapon which could be concealed in the palm and which was used by Sivaji against Āfzal Khān.

The Infantry School Museum, Mhow (M.P.)[20]

Mhow is an important cantonment town near Indore (M.P.). During British rule in India, the Military Head Quarter of Weapons (MHOW) was situated here. In the year 1965, the then Commandant, The Infantry School, proposed to establish a museum of war materials within the campus of the school with an idea to give a progressive picture of the evolution of different war materials and to make the museum really colourful, interesting, educative and purposeful to the cadets and trainees.

For this purpose, a three-men Committee was formed to make detail study and to submit its report. In February, 1966 the Committee submitted the report with the following recommendations :

(1) The museum should contain weapons, equipments,

clothings, badges, insignia and other items of historical interest of India since early period.

(2) The sections should be divided as follows : (a) Early period (4000 B.C. - 1000 A.D.), (b) Muslim period (1001 A.D. - 1700 A.D.), (c) British period (1757 A.D. - 1946) (d) Modern period (1947 - to date).

(3) The museum should have a foreign section to cover the development of arms and equipments in all foreign countries.

(4) The important battles of each period will have to be studied and attempt should be made to cover the development of arms and equipments used in these battles.

(5) For acquiring exhibits following sources are to be tapped: (a) Houses of the erstwhile ruling princes be approached for loan/gift. (b) Archaeological departments are to be contacted for loan/gift. (c) To contact Government of India archives for documents.

(6) The education officer should be made responsible for progressing the case and maintaining the museum.

(7) The building should cover: (a) separate sections for the periods as enumerated above, (b) a central library-cum-office, (c) a waiting room, (d) a toilet room.

(8) The building design should cater for large possible expansion for the future acquisition of exhibits.

(9) The arrangement should meet all the facets of a military museum including aspects of tactics, organisation

and logistics, pertaining to each battle and the periods as a whole to have the necessary value in terms of military education.

However, still to-day the recommendations of the committee have not been fulfilled. The present museum is a small one containing only modern unclassified infantry weapons under the charge of a staff-officer, as there is no curator or education officer for the museum. The museum is mainly used by the cadets or trainees of the school and the military personnel. Visitors are allowed with permission of the Defence Department, Government of India. A good number of objects displayed here can also be seen at War Memorial Museum, Red-Fort, and Border Security Force museum, Indore.

If this museum ever be constructed according to the plan and recommendations of the committee, then it may be a good museum of war materials but how far it will serve the purpose of mass education is doubtful.

Note : The author visited the museum in the month of September, 1977. He submitted the informations collected there for pre-security clearance and also requested for other informations to the Commandant of the school. Still to-day the author did not receive the pre-security clearance certificate from the Army Headquarter though he got the intimation that it has been issued. So, further detail about this museum could not be added here.

REFERENCES

(1) Data supplied by the curator. (Ref. Curator's letter No. BJ/76/1-325 dated, 28.7.1976)

(2) Data supplied by the curator. (Ref. letter No.3210 dated 30/31.7.76)

(3) Data supplied by the curator. (Ref. letter No.KM/Misc/76-326) Hand-out of the museum.

(4) Data supplied by Rear Admiral M.P.Awati, Vr.C.Commandant NDA.

(5) Personal visit and data supplied by the Director of the Museum.

(6) Data supplied by the Director. (Ref. letter No.ASM, 26/76/588 dated 16.9.76)

(7) Personal visit and data supplied by the curator.

(8) Data supplied by the curator. (Ref. letter No.CM/469 dated 8.8.76) The guide book of the museum.

(9) Data supplied by the curator. (Letter No. 597/76-B dated, 13.8.76) The guide book of the museum.

(10) Sri Nigam : Arms and Armour in the State Museum, Hyderabad, A.P. (Andhra Pradesh State Museum Series No.13. Hyderabad, 1975)

(11) Personal visit and data supplied by the curator. (Ref. Letter No.VM.1086/76 dated 16.12.76); Guide book.

(12) Guide book of the museum.

(13) Data supplied by the Director. (Ref. letter No.L.Dis. 4324/76 dated nil)

(14) Personal visit.

(15) Data supplied by the Assistant curator. (Ref. letter No.141/MES/76-77 dated, 17.1.77)

(16) Personal visit.

(17) Personal visit.

(18) Personal visit and guide book.

(19) Hand book of the Madras Govt. Museum by S.T.Satyamurti.

(20) Personal visit.

CHAPTER FOUR

MUSEOLOGICAL PROBLEMS PERTAINING TO A MUSEUM OF WAR MATERIALS

To do any noble work is easy to say but difficult to perform. So, a museologist faces lots of problems to start with a museum of war materials. The main problems that crop up before a museologist regarding the museum of war materials are generally as follows :

ACCOMMODATION :[1]

To keep, maintain and display the collected war materials a suitable accommodation is the prime necessity. As there is no prescribed formula or a blue-print for a museum of war materials, so before constructing such a museum the architect must consult with the museum curator to know about the physical and structural nature of the collections of war materials and the purpose. The structure of the building, its external and internal technical features will surely vary according to the purpose of the museum. As because it is a growing institution, the architect must think twice before he prepares a plan for a museum of war materials with the galleries mentioned in the earlier chapter and provide from the very outset suitable possibilities for future extension. Otherwise, when expansion will be required it will be too costly. The main building will be considered

as the nucleus of a cell having the capacity to multiply itself according to the plan of future expansion and this expansion must be horizontal to enable galleries to be kept on one level and for easy over head lighting; though it will be more expensive than vertical expansion. A museum of war materials having its own characteristics and requirements need a proper assessment by the museologist-in-charge and he is to guide the architect to reach the desired aim and to fulfil the purpose.

To start with a museum of war materials, instead of constructing a new building, it is suggested to utilise for this purpose the palaces of erstwhile Native States or/and old forts existing in different parts of India at the initial stage. For instance, the Red Fort or the Gwalior Fort can be converted into a museum of war materials but not in the true sense of the term. Here again the size and the height of the rooms, their nature of lighting, design of show-cases, type of floor, number of doors and windows, all depend upon the materials collected, the idea and experience of the curator-in-charge of the museum. But from security point of view forts and palaces are preferred.

Further, in addition to the exhibition galleries including a hall for holding exhibitions on special occasions which normally occupy one-third of the total floor space, a museum of war materials should have storing space, more or less equal to the display area and a lecture room cum audio-torium with projection arrangement, a room for holding seminars,

a store room, a laboratory for preservation and conservation and a room for model preparation, a workshop, garages, a room for conducting museum service for the children and the juniors such as museum games, model and mechano club, quiz test etc., open space for demonstrating field-crafts and map-reading on military topics, one photographic section, a library with documentation service and research facilities, one publication section, one cloak room, one refreshment room or canteen, separate toilets for men and women, a public telephone booth and above all normal office accommodation including technical and security installations.

If possible, we can also get an idea about the plan and lay-out of different military museums existing in developed countries like U.K.,U.S.A., U.S.S.R. etc., but their building plan will not be ideal to suit Indian climatic condition. In India, fluctuations of heat, humidity and sunlight vary considerably in different seasons, but in western countries these problems are minor and there the artificial light is always preferred in a museum building.

On the basis of the above considerations it is not much difficult to prepare a general plan and lay-out for a museum of war materials.

When forts or old palaces are used as a museum of war materials, the main problem arises about the roof, the rational arrangement of collections and the itinerary the visitors are to follow. To overcome these, some features

of the building must be altered either by demolition or construction or by taking some precautionary measures to suit the purpose of the museum.

In any case, whether new or old, the building must be situated, as far as practicable, at the centre of the city or town or at in an area which is easily accessible with all types of conveyances of the city. It must be protected from vibration, damp rising from the ground, danger of fire spreading from neighbouring areas, extremes of temperature and humidity, direct sunlight, noise from outside and sound disturbing the attention caused due to walking to and fro by the visitors. No particular method or system can be suggested to overcome these problems because now-a-days various scientific measures are being adopted to counter these problems and so the measures to be adopted depend upon the building engineer, the curator and the availability of funds.

Regarding the lay-out and distribution of floor space for different services within the museum a suggested general sketch of a building for a museum of war materials is annexed.(Pl.XCVI)

STAFF :

In a museum of war materials, objects of different ages are stored, displayed and visited by students, research scholars and those specially interested in the subject. The

museum personnel are only the go-between the objects and the visitors; they are the connecting link between the men and the materials.

These museum personnel in a museum of war materials can be broadly classified under the following categories and their number varies according to the size and nature of the museum and the services they render. Here the discussion is based on a medium sized museum having 20-25 sections or galleries with research facilities and educational activities.

(a) Curatorial staff

Of all the factors that can make or mar the usefulness or the success of any museum is the curatorial staff. The curator is the main pivot in a museum; he is the fountain head of power for betterment of the museum and his subordinate members of the staff are his agents whom he trains, directs and supervises, and so, they are also equally responsible for the well-being of the museum and its smooth running.

So, in a museum of war materials the minimum qualification of a curator or assistant curator should be as follows:

Essential qualifications — (1) A graduate or Master degree holder in science or engineering or technology or history and archaeology. (2) Five years teaching experiences in any Secondary school or college. (3) Experience in handling lethal weapons and other war materials. (4) Two years diploma or degree in Museology of any University.

Desirable qualifications — (1) Degree in Military Studies from any university. (2) Person employed in Military Educational Core or NCC officer not below the rank of a Captain. (3) Degree in Law. (4) Ability to conduct research work. (5) Capacity to organise exhibitions on military topics. (6) Administrative and Research experience.

(b) Office staff

To run any organisation or an institution it is always necessary to maintain an office manned by experienced office staff. This staff is required to keep its own records and registers, to maintain proper accounts, to attend correspondences, to type necessary papers and to attend outdoor works. The number of this staff should justify the volume of work in the museum but maximum use should be made of labour saving and space saving office furniture and equipments. The minimum qualification of the office staff should be graduate in Arts or Commerce with knowledge of correct typewriting, except the helpers or office peons, whose minimum qualification must be class VIII standard of any secondary school.

(c) Technical staff

Behind the scene, for smooth running of a museum of war materials, the importance of work-room and its technical staff can not be overlooked. The technical persons required in a museum of war materials are carpenter, blacksmith, electrician, modeller, framer, painter, armouror, tailor-cum-

-darner, driver, photographer, museum chemist, operators of different kinds of war machines and audio-visual machines.

Except the museum chemist, who must have a good museological training and sound knowledge in organic and inorganic chemistry, all other technical persons may be recruited from the respective branches of Indian Military Services namely, EME, ASC, MES, Ordnance etc., because they are more disciplined and experienced in their respective field of work; and they would have love and pride for the war materials of the museum.

(d) Guards and watchmen —

The security of war materials is also a major problem; so the services of the guards and watchmen are very important in a museum of war materials. They are mainly required for the security of the collections and to maintain order within the museum and its precinct, particularly during the hours when visitors are allowed inside the museum. Their number varies according to the nature of collections and the number of blind areas present inside the rooms created due to screens, movable partition walls, high object cases and intermingling of big and small objects. The selection and appointment of these security men must be done with great care. Reliable, obedient and well disciplined smart men with sound physique, good turn-out, pleasing personality and well trained to deal firmly but politely with the public

are suitable for this job. In a museum of war materials this responsible job can be safely entrusted with men belonging to different Security Forces and Armed Forces such as, Police, BSF, DSC, ISC persons and NCOs of Indian Army. There shall be one Security officer not below the rank and power of a Superintendent of Police. Though these security men are responsible to fight against any sudden fire in the museum, yet all employees of the museum must be trained to use fire-fighting equipments and must know the positions of various switches and control valves within the museum and act promptly when emergency arises. Fire-fighting equipments shall be placed in different places of the museum as ordered by the Security officer.

(e) Educational staff

The modern museum authorities have a far wider responsibility than mere acquisition, conservation and display. They are to translate the meaning of their exhibits and communicate their values to the visitors of all grades. It has already been pointed out that education can not afford to be neglected in a museum, because of their close inter-relationship. In a museum of war materials there shall be an Education officer to plan and organise the different aspects of museum education including publications. He will act in close co-operation with the curator and will be assisted by guide-lecturers, demonstrators and the library staff.

The detailed functions and the problems of the education department of a museum of war materials have been discussed subsequently. Now it will be appropriate to consider here the staff pattern or the administrative set up of a medium-sized museum. The minimum number of persons required including leave reserve are as follows :

(i) Curator — The curator is the over all incharge of the museum assisted by assistant curators, office superintendent, education officer and the security officer.

(ii) Assistant curators — There shall be two assistant curators. One of them will handle the exhibition and related works and the other assistant curator will be responsible for documentation and other technical works.

(iii) Museum chemist — One chemist and one assistant chemist or technical assistant will look after the conservation and preservation problems of the museum collections.

(iv) Other technical staff — The other technical staff necessary are, two cataloguers for accessioning and cataloguing of objects, one artist-cum-photographer, one modeller, two electricians, one armouror, one blacksmith-cum-latheman, one painter, one carpenter, two drivers and four operators of various war machines and audio-visual equipments. All these persons will remain responsible for their respective fields of work. If the services of other artisans like masons, plumber etc., are required, they will be appointed temporarily for the particular job.

(v) Security staff — To maintain security and all round order in the museum the security officer will be assisted by sufficient number of security persons, as necessary. The distribution of these persons including the darwans and night-guards will carry out the order of the security officer. He is to prepare weekly duty roster of these persons.

(vi) Educational staff — The educational staff includes one education officer, required number of lecturers and demonstrators, one librarian, one assistant librarian and one library assistant. The education officer will be incharge of educational and research activities of the museum.

(vii) Peons — The peons, packers, helpers etc., are included as one category of staff. The number of these persons will vary according to the requirement but normally they will be posted to work according to following order : One for the curator's office, two for two assistant curators' offices, one for security officer's office, one for education officer's office, one for the library, two for museum administrative office, one for the store, two for the technical sections, one for the sale counter, one for children's work programme centre and three more persons will remain as reserve at the disposal of the curator to meet emergency requirements and for relief.

(viii) Sweepers — About four sweepers and cleaners including one supervisor to be called as 'zamadar' will remain responsible for cleaning the area, latrines, offices, floors

etc., including dusting of show cases, furniture, book shelves and other collections. The 'zamadar' will allot duties to these men daily and also supervise the works.

From the above discussion, it is gathered that for a museum of war materials as described, the minimum number of manpower required is roughly about eighty. This number may and will vary according to the growth and necessity of the museum.

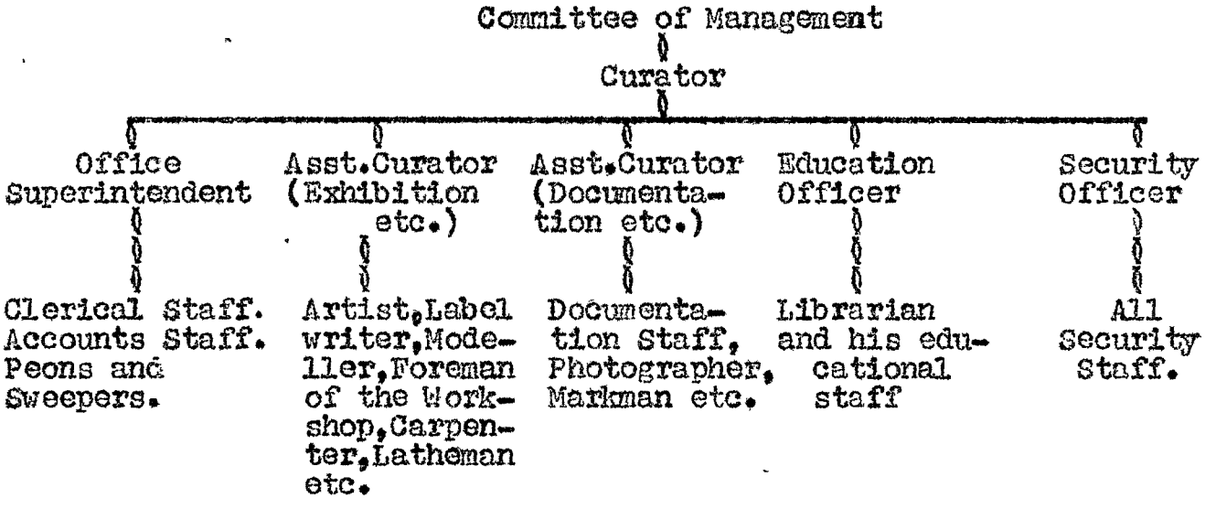
The salary and the service benefits of these persons should be same as that of a Central Government employee serving in similar position and rank. Regarding appointment of any staff, it is always better and desirable to appoint an experienced person but not a retired person.

Finally, in this type of museum it is suggested to have a managing committee of at least eight persons excluding the curator, nominated from the following sources to organise, to frame rules and regulations, to find out and tap financial sources and to advice the curator in different aspects of running the museum smoothly and efficiently. Though the curator will remain the sole incharge for running day to day administration of the museum, he is to obey the decision of the managing committee, but he shall have the right to put suggestions in the meeting.

The members of the Managing Committee are as follows: (1) The curator of the museum will act as the office secretary of the Board. (2) One person nominated by the Central

Government, preferably from the Defence Department, will be the Chairman of the Committee. (3) One person nominated by the Museum Association of India. (4) One person nominated by the State Government in which state the museum will be situated. (5) One person nominated by the Chancellor of Universities of the State having Museology as a subject of study, preferably a teacher of Museology Department. (6) One person nominated by the State Police Department. (7) One person from the engineering and technology field. (8) One person nominated by the Chamber of Commerce. (9) One person co-opted from the donors.

To conclude, the staff pattern and the chain of administration in a museum of war materials with educational activities should be as described in the chart below :



FINANCE :

In a developing country like India finance is a great problem in any field of development. In establishing and developing a museum of war materials too the problem of finance is not the least important. The curator of such museum must consider first the potential sources of conventional heads of museum income while preparing his annual budget for the coming financial year. It is always expected, as a non-profiteering institution, that every museum should have a balanced budget of income and expenditure.

In India, the conventional sources of income and the expected heads of expenditure in a museum of war materials may be as follows :

(A) Sources of income :

(1) Admission fee — For the general public there must be some entry fee but this fee should be very nominal. It is always desirable not to charge any entry fee in a country like India where most of the people are poor but as a primary source of income and to check the entry of beggars and other undesirable persons it is always necessary. Moreover we should not forget the general psychology of man that it demands service when he pays. And for this a payment of minimum entry fee makes the visitor more interested in getting something in return from his museum visit and his stay in the museum thus becomes fruitful.

(2) Income from sale of museum publications, models

and replicas, photographs etc.

(3) Charge for supplying typed research data, photographs of particular objects etc., to research scholars. The supply of these materials and their charges are at the discretion of the curator.

(4) Charges for getting permission for photographing, recording, filming and television activities.

(5) Charges for cinema shows in the museum auditorium.

(6) Grants (both lump and recurring) from government and contributions from local municipal authority. It is to be considered as the main source of income for Military Museum in India.

Besides these conventional sources a few more sources are suggested here for the consideration of the museum authorities and the government. They are —

(a) Membership fee — Like library members, different categories of members can be registered with different rates of membership fee. Those members may be student member, institutional member, family member, patrons and benefactors.

(b) Contribution from local educational institutions — An annual contribution from local schools and colleges having 'Military Studies' as a curriculum in those institutions, can be charged for conducting educational programme for their students.

(c) Annual deficit grant can be claimed from State Government for social, cultural and educational services rendered by the museum.

(d) Besides the annual contribution a percentage of 'education tax' collected by the local municipal authority can be claimed by the local museums.

(e) Endowment fund — This income depends upon the nature of investment policy of the museum.

(f) Private donations — Private donations either cash or kind, without any condition or obligation from persons interested in war materials or not are good source of income.

(g) Fund-raising activities — Activities like annual entertainment with cultural show, subscription dinners of all categories of members, military tattoo show, dress parade, museum flag-day, lucky entry ticket lottary etc., can be good sources of income. Here one point to be considered that these activities must be in keeping with the dignity of the museum. As for example, the dress parade of 18th century Indian soldiers of different regiments of India including the State Forces and the dresses of the tribal heroes may be cited.

(h) Legal provisions — If legal provisions can be made by requesting the Central Government to allow rebate or exemption of income-tax, wealth-tax, estate duties etc., for the donations to the museums, then public generosity will

be stimulated to increase the income of the museums.

(B) Items for expenditure :

(1) Staff salary — The salaries and other benefits given to the museum staff constitute the major item of expenditure. It is estimated roughly about 50% of the total income.

(2) Administrative expenses — Maximum 2½% of the total income may be allotted for administrative expenses like office supplies, postages, telephone and telegraphs charges, cleaning of typewriters, duplicator etc., conveyance charges, electric and gas charges etc.

(3) Purchases — About 10% of the total income may be allotted for purchase of museum objects and other audio-visual aids and instruments. During the first phase of the growth of the museum it may be necessary to allot larger percentage for the purpose of acquisition of exhibits.

(4) Library — For purchase of books and journals 2½% of the total income may be spent.

(5) Furniture and Fixture — Maximum 5% of the total income can be allotted for purchase and repair of furniture and fixture for the museum.

(6) Building — For maintenance of garden and equipments, repairs, colouring and petty constructions, taxes and insurances and other expenses relating to the museum building, 5% of the total income may be spent.

(7) Workshops and Laboratory — For expenses relating to workshop and laboratory, 5% of the total income may be spent.

(8) Galleries and exhibitions — For display of objects, fabrication of exhibits, temporary exhibitions, rental fees, transportation charges and other expenses relating to museum galleries, temporary exhibitions and travelling exhibitions, 10% of the total income may be allotted.

(9) Educational and research activities — For museum education and research including museum games and other activities relating to education, 5% of the total income can safely be spent.

(10) Out of the remaining 5% of the income other unforseen expenses can be met. If any surplus remains, that amount will be transferred to Reserve Fund to meet any extraordinary expenditure such as extension of building, modernization of equipments etc.

COLLECTION :

Next comes the problem of bringing before the eyes of the prospective visitors the story of mankind or the history of a nation, its feuds and fights, its developments of war crafts, war organisations and so on. So to exhibit, a museum of war materials must have its collection of objects that it intends to display. The urge for collection is an inherent characteristic of man since the earliest period and the materials so collected and stored, such as food, clothing

and weapons are the major items. Later on, collections of valuable objects like arms, armour and jewellery became objects of personal wealth and prestige. So to say, at the initial stage a museum was a response to the need to house objects collected by the rich or princely collectors and among the collections war materials were one of the items. These collections of war materials by Indian princes were so long closed to the general mass and still to-day, in India, there is not a single public museum of war materials with educational activities on 'Military Studies'.

To start with a museum of war materials, it has already been mentioned what are the minimum objects to be presented before the visitors. Now to collect those objects, the different sources to be tapped are as follows :

(a) Excavation : In this respect the State and Central Archaeological Surveys and the Archaeology Department of different universities can considerably help the museum authorities. By excavations at different archaeological sites in India, where we believe from available records that military operations took place in different historical periods, we may get various types of war materials either broken or not belonging to those days. From the broken materials the archaeologist or a museologist can reconstruct or at least give an idea or a shape of those war materials, and, thereby, we gather a sound knowledge about the various war materials used by our heroic soldiers in those days.

The archaeologists should pay greater attention to the sites of actual battle-fields like Kurukṣhetra, Haldighāt, Khānuā etc., of bygone days because in those days battles took place in a particular area and it was not a total war like modern warfare.

(b) Purchase : A museum of war materials can purchase materials from merchant guilds and ex-military personnel having the hobby of collecting war materials. There are also regular dealers of antiquities and antic shops in major cities in India.

(c) Donation : The war materials can be collected as donation from the ex-princes of the different Native States, ex-zamindars of India, corporate bodies, private persons possessing war materials as hereditory property from their ancestors who might have served in defence services of the country or any State Government possessing personal weapons or war materials used by our national heroes like Netāji Subhās, Rānā Pratāp, Chatrapati Śivāji etc.

(d) Loan or long term deposit : War materials can also be collected by the museum authority from different Regimental Centres, Defence schools and academis, Archaeological museums and State/Central Archieves as a temporary loan or long term deposit. Botanical and zoological specimens too, which are useful for military purpose, can be collected from Botanical and zoological Surveys of India as long term deposit. Objects can also be borrowed from different

museums in India on a long term basis.

(e) Legislation : The recent legislation by the Indian Parliament for registering all antiquities and some kind of art objects will help a lot to collect some sorts of war materials; but for full utilisation of this legislation to collect all types of war materials, the scope of this law should be enlarged. To achieve this purpose the museologists must make the proper authority aware of the necessity and nature of the ammendment of the said legislation.

STORAGE AND DOCUMENTATION :

It is neither feasible nor desirable to place the entire collection of the museum for general display in the galleries and at the same time it is always desirable that the specialists or research scholars must have entry to the objects which are not displayed. A museum having active programme of collection, education and research often faces the problem of storage and recording. Lack of proper storage and recording results in little sense of having good collection without any use, inability to locate objects when required and ultimate deterioration of the objects. So methodical storage and recording can be regarded as one of the keys to the well being of a museum.

In a museum of war materials having educational activities it is always desirable to have a central store close to curator's office. It helps the curator to do

research work, to check the collections for preparing any exhibition, to assist the visiting specialists, to guide research scholars and above all to keep an eye to supervise and help if needed. The store should be spacious and the objects are to be kept in a systematic way according to the records or arrangement of display galleries/sections.

There is no set rule that the store should be on the same floor of the exhibition galleries or in the basement or underground or on the top floor or in the separate building adjacent to the museum building. The main point to note that the store must be dry, safe, spacious, well lighted and easy to inspect. In fact, a store is not a godown or a dumping place of all objects in a disorderly manner. Proper care must be taken to maintain those external and internal conditions which are followed in case of exhibition halls or display galleries.

It is desirable that the heavy war machines like Armoured cars, MT Vehicles, Tanks, Tractors, Guns, Weapon-carriers etc., should be stored on the ground floor and other materials in the general store according to the systematic classification of sections or galleries maintained by the museum for display to the visitors as mentioned earlier.

Regarding furniture to be used for storing, it is always better to use strong but flexible (which can be easily assembled and dismantled according to necessity) materials and they should be of such design which occupy minimum space

within the store but at the same time the accessibility to any object is not impeded. For example, verticle supports for shelves can be made according to desired measurement with the help of plumber's pipe and joints with wooden or steel shelves; sliding screen panels can be used for storing maps and charts etc. Again to keep the floor clean, ceiling supported storage is possible. Similarly, walls can also be utilised for storing purpose. Thus, the planning and design of store furniture depend upon the idea and experience of the curator and the nature of objects to be kept in the store.

A good museum store is of no use if the individual object is not properly recorded. Keeping records of each museum object is an irksome job. Though this recording is a very unpleasant job on the part of a curator, still it is essential, because it helps the curator to spot any object in no time than trying to find out the same which may have been moved in different places from time to time by different museum personnel. So documentation of objects is a very important aspect of museum administration. It is a method of recording and maintaining the relevant information about the museum objects in a scientific way. This scientific maintenance of known facts about the objects helps in finding the location of a particular object and at the same time provides all pertinent informations about the object in the museum collection without any delay. The information may be

brief but scholarly. Correct and systematic documentation of objects not only ensures easy location of the specimen and the speedy detection of losses if any by the museum staff, but also enables the casual visitors or the interested scholars to have an easy access to the objects of their interest for close study and research. Thus documentation provides the identification and history (bio-data) of each individual object in the museum collection.

The scientific documentation helps a lot to museum men in making intelligent display of exhibits as because effective presentation depends to a great degree on precise information about the object, such as its provenance, purpose, its distribution in terms of space and span, social, religious or economic idea or practices associated with it, the exhibitions where it was presented etc. All these informations can be obtained readily if the museum maintain scientific documentation service.

The basic principle of documentation of museum objects for all categories of museum should be same but might be some differences in detail. Acquisition, aleination, movement of exhibits within and outside the museum, packing, unpacking, registration, cataloguing, indexing are the diverse activities within the scope of museum documentation service. In small museum this documentation service is done by the curator himself with the help of an assistant but in a large museum this service is entrusted with a specialized

department. The records maintained by this department may be divided into two categories — Primary or Basic inventory and Auxiliary inventory. The basic or irreplacable records are the Accession Register and the Catalogue. The auxiliary inventories are the Index card, Location Register, Incoming and Outgoing Loan Register.

Accession Register — It is an official written record and 'to accession' is to record an increase or augmentation. It is therefore an act of recording increase of museum acquisition into the register mainly for administrative purposes. Its immediate purpose is to provide short but permanent means to identify each museum collection. It differs from a museum catalogue whose main function is to classify museum objects methodically with descriptive details to serve academic purpose. This inventory safeguards the patrimony of a museum and the specimens deposited with it. It provides the museum administrative authority with an exact picture of the object acquired, deposited or alienated. It is an effective weapon of combating disorder and repletion of resources. It provides the proof required for legal proceedings in the event of claims on grounds of fraudulent or criminal misappropriation or in case of dispute at law. It supplies comparative information to determine whether new objects should or must be acquired. Pending preparation of a catalogue it is an important aid to research. It is the basic book from which the catalogue is prepared.

This inventory may be a bound or loose-leaf ledger or file-cards. In case of Bound Ledger, the binding must be solid and the pagination continuous and indelible. The leaves must be of pure rag paper and chemically neutral. The entries must be legible and the ink used should be of permanent nature. There shall be no spaces between different entries. The Ledger's date of opening must be indicated on the first page and the total number of pages in this register must be noted in words. It is strictly prohibited to scratch out, rub out or chemically obliterate any writing in this register. Any additions, alterations or erasures which the curator deems necessary should be done in ink of a different colour and must be initialled by the curator.

In a Loose-leaf Ledger the entries are recorded on loose-leaves which are kept clipped together in a lock-file. With this type of register the entries can be typed and that ensures uniformity and at the same time spare copies can be prepared for circulation to different departments if required.

Many museums consider the File-card system as much simpler to keep accession records. The cards have uniformity, scope for recording additional information and can be duplicated if required. The risk to loose or misplace the cards can be avoided if cards are perforated, affixed to rods and kept in locked card cabinets in numerical or chronological order.

It is suggested that the accession records should be

micro-filmed for better protection and preferably be stored outside the museum.

Now the question arises what are the informations to be recorded. This question of headings raises a few problems. If the number of headings is too small, lack of precision may result. If it is too many, the inventory involves too much work, becomes less handy and is liable to overlap with the catalogue. Again, if the headings cover too many unstable elements e.g. the condition of objects, their insurance value etc. which are subject to variation — the register may have to be over-corrected and the cards redrafted too often.

For a museum of war materials following headings are suggested to meet the requirements of scientific preservation and consultation, pending the establishment of catalogue.

(1) Serial number according to classified section.

(2) Date of accession and the initial of the recorder.

(3) Accession number/Photo number/Negative number/ a sketch of the object.

(4) Identification name/Description with possible title and special note about technological, historical and educational aspect of the object to fecilitate research work.

(5) Mode of acquisition — purchase/gift/bequest/ exchange etc.

(6) Surname, first name and address of the seller/donor/testator/exchange agent etc.

(7) Purchase value/estimated value of the object.

(8) Detail measurements of the object.

(9) Author, Culture group, Species etc.

(10) Origin.

(11) Period, if dated, exact date. It is better to record the century rather than the wrong year. If necessary question mark should be used.

(12) Find spot.

(13) Legend associated if any.

(14) Photograph of the object may be kept on the reverse of the card or in an envelop attached to this card. The description of the object along with its photograph will surely express everything in detail about the object. This will also help the policemen and the museum administration in case of theft and illegal export or sale of the particular object. In case of bound book Register only Registration number is to be mentioned.

(15) Remarks — This space is very important for noting if the particular object is displaced by any one for any reason (if there is no movement register) then the authority must be quoted here with date and signature of the person displacing the object. Very often it happens that a particular object is moved from its permanent location for a long period for purposes of study, treatment, photography,

display, exhibition etc. within the museum and outside the museum on loan deposit etc. Moreover, other important information about the object, not recorded earlier, can also be written in this space.

Numbering and marking — Since each object in a museum is identified by its number, the first step in planning registration is the determination of the numbering system. The registration number or accession number should be one that can be assigned and attached to an object as soon as the object is officially accepted as a permanent accession or loan. The most satisfactory number shows when and whether an object enters the museum collection as a permanent accession, loan deposit or loan for temporary exhibition.

A sequence of simple number (1,2,3,4, ...) may be helpful for a small, homogenous collection, but it is inadequate for dealing simultaneously with accessions of single object and large group of objects.

The use of letters preceding the numbers to designate material and function (W for weapons, A for armours, P for paintings) or geographical area (A- Asia, AF- Africa) makes it possible for each group to be numbered independently, However, such a system requires that an object be identified before it is given a number. Another disadvantage is that a later change in the original attribution (a rare but not impossible occurrence) would necessitate changing the accession number of the objects in accordance with the new attribution.

The difficulties encountered when using a sequence of simple numbers, a number preceded by letters, are obviated by the use of compound numbers consisting of two or three parts separated by a decimal point or a hyphen each part following its own sequence. This system is both more uniform and more flexible.

Of several variations, and one in common use at present is composed of the year of acquisition and the number assigned to the object in the year in which it is officially accepted as a permanent accession or as a loan. For permanent accessions, the first part of the number is usually the year, that changes annually. The second part of the number begins with '1' each year and runs consecutively through the number given to the last accession for that year.

When large collections are received at one time from a single source it is not always possible to determine immediately the exact number of objects to be accessioned. This difficulty can be avoided by using a number composed of three parts — the year of acquisition, the number assigned within that year to a collection accepted at one time from a single source and the serial number of the individual item within that collection. This system is known as 'Tripartite system'. A fourth element may be used when the particular object consists of several component parts. Thus for instance the number 78.20.12.8 would be applied to a component part of a machine gun. 78 represents the year of collection,

20 represents the serial number of the collection of that year, 12 represents the serial number of the machine gun within 20th collection and 8 denotes the particular component part of that particular object.

The numbers used for loans should indicate that the objects to which they are attached are loans and not permanent accessions. Many museums accomplish this by making slight change in permanent accessions system just described above. Loans are numbered consecutively within the year they are received. The loan number assigned to the object is placed first followed by the year in which the loan is accepted and lastly the serial number of the individual object within the loan. In this method sometimes a loan may be confused with a permanent accession number. For example, 78.57.1 may be the first object in permanent accession 57 of the year 1978 or it may be the first object in loan 78 of the year 1957. However, this confusion can be avoided by writing the year in full or with an apostrophe on all loans (78.1957.1 or 78.'57.1) or by prefixing the letter 'L' in the number.

If it seems desirable to distinguish between extended loans and temporary loans for special exhibitions, the letters 'EL' and 'TL' may be used. Instead of reversing the system used for permanent accession, if desired, three separate series of numbers may be used, one for permanent accessions (78.1.1), one for extended loans (EL 78.1.1) and one for

temporary loans (TL 78.1.1). The only risk in this system is the confusion which may be created by omission of letters as a result of clerical mistake.

Marking — All museum objects must be marked with permanent accession number as soon as they have been officially accepted. The numbers for permanent accessions and extended loans should be applied permanently and preliminary tags or stickers attached to at the time of entry should be removed. The numbers for temporary loan objects are usually typed on stickers, tape or tags and fixed where they can be easily removed before the objects are returned to lenders.

This marking of museum objects is indispensible. Information recorded in the inventory might be useless if each object was not marked with the index and the number under which it was classified and described. Care should be taken to ensure that the final marking is neither too visible (unaesthetic) nor insufficiently visible (inconvenient) and it is not placed at a place exposed to wear or obliteration and visitor's notice. Uniform practice concerning the parts of the objects on which markings are made should be adopted. The techniques and materials used for marking depend upon the nature of the object. Generally the materials used for marking are soft lead pencil, wax crayon, Indian marking ink, a mixture of vermillion, turpentine and varnish (3:1:1), brass or copper tag, copper stamp etc.

Cataloguing — To catalogue an object is to record

the full information about it abbreviating the acquisition data. Now-a-days more stress is being given to this document, i.e. to classify museum objects methodically with descriptive detail.

It is the storehouse of research findings on each of the museum exhibits. It serves as a communication bridge between the literate mass of the society using museum collection and the inert collection of the museum. It makes the literate visitors aware about the nature and scope of museum collection. Catalogues are the documents available to research scholars and other members of various learned societies for information on the museum objects. From the museum educational service point of view it is the immediate indication of what may be expected to be found in any gallery or museum store and lastly it is the classified record of the museum objects and information related to them. A catalogue should record detail information regarding a particular object derived from the study and research on the subject.

A catalogue should record the following minimum informations—

(a) Accession number.

(b) Catalogue number (if it differs from Accession number).

(c) Photograph or negative number or a sketch of the object.

(d) Identification name/detail description of the object with suitable title.

(e) Date of acquisition.

(f) Mode of acquisition.

(g) Material or medium.

(h) Correct measurement in detail.

(i) Condition — state of preservation and conservation notes.

(j) Author, cultural group, species etc.

(k) Origin.

(l) Period.

(m) Find spot.

(n) Exhibition history.

(o) Publication reference/bibliography.

(p) Catalogue date and the initial of the cataloguer.

(q) Remarks.

While preparing a catalogue the museum cataloguer carefully examines the objects, takes its detail measurement, takes notes about visible damages and repairs and assigns the accession number. Thereafter he collects and organizes all available informations about the object to be catalogued and prepares a draft in final form. After getting the final approval from the proper authority final catalogue is prepared.

The informations recorded in the catalogue must be correct and care should be taken against spelling mistakes. If necessary the cataloguer may consult with the curator. Good cataloguing can not be done by lazy minds or by rigid ones.

Catalogues can be maintained according to either of the following systems —

(a) Single Card system — Under this system all informations about a particular object which is either single or grouped in a set like manuscript, bound album etc. are recorded in one card of about 8" x 15" size.

(b) Multiple Cards system — In view of the lack of space in a single card to record detail information including history and bibliographical references of the object, modern museums prefer to use multiple cards of 5" x 8" or 4" x 7" sizes (as many cards as required) for recording information and other related notes about each of the objects. Under this system extra cards can easily be added to if additional cards are required in future. All the cards related to one object are tagged together and kept in the card cabinet. Tagging is done through the holes at the centre of the lower part of the cards so that each card of a set of cards could be viewed keeping them in the position when they are set in the cabinet.

Index Cards — It is necessary to arrange detailed information in various orders of classification, such as, material, period, dynasty, person who used them, region, function or type etc. and in that case to avoid multiplying copies of catalogue cards sets of Index Cards are prepared and kept separately as per desired order of classification. Such Index Cards do not show all the detailed entries as is done in case of catalogue cards or Accession Register/cards,

but most essential information is noted there on, for instance, classification order at the top in red ink, accession/catalogue number, description, region, author/ethnic group/culture, material, function and type etc. are typed neatly on the cards.

The Index Cards preferably be of 7.5 cm x 12.5 cm. The cards should be kept according to the subject heading using alphabetical order or the decimal system of classification or classification according to the inventory number.

Location and Movement Register — Every museum object must have a specific location in the museum itself, either in the gallery or in the reserves. The object may be withdrawn from that location for a varying period of time within or outside the museum for various purposes like study, examination, treatment, photography, exhibition, loan, deposit etc. The museum administration must have some means to ascertain the permanent or temporary location of objects and to keep check on their movement from one place to another. So, a location and movement register is essential. This register may be in the form of supplementary card-index or location chart or a 'Dummy', i.e., a card bearing the number and short description of the object. An envelop or pocket is attached with this Dummy Card containing the photograph of the object. When the object is removed a note should be kept inside the pocket by the remover stating the purpose of removal, authority, date and temporary location. The remover must put his signature on the note.

Loan Register — A museum may receive objects on loan deposited for a fixed or indefinite period by another museum, by public bodies or even, under certain conditions, by private individuals. Such deposits must not be recorded in the Accession register or indexes reserved for acquisitions, but in separate register or card indexes for deposit only.

The methods for determining the inventory numbers of deposits are the same as those used for acquisitions, but it is essential that the deposit number be preceded by a symbol 'D' to prevent confusion.

When the museum returns a loan, a notation must be made in all records and a receipt of delivery must be obtained from the lender.

As a museum receives objects on loan, similarly it can give on loan its own objects to other museums. So there shall be two kinds of loan register — Incoming Loan Register and Outgoing Loan Register.

Headings for entry suggested for incoming and outgoing loan registers are given below.

Incoming Loan Register — (1) Accession number, (2) Deposit number, (3) Name and address of the depositor, (4) Date of the deposit, (5) Date of withdrawal, (6) Title and description, (7) Measurement, weight etc., (8) Author/Cultural group/Origin/Species etc., (9) Period of deposit, (10) Physical condition, (11) Insured value and amount of

premium, (12) Agreement reference or authority, (13) Packing and delivery reference (14) Remarks.

Outgoing Loan Register — (1) Accession number, (2) Catalogue number, (3) Particulars of the receiver, (4) Date of deposit, (5) Expected date of return, (6) Actual date of return, (7) Title and description, (8) Weight and measurement, (9) Author/Cultural group/origin etc. (10) Physical condition (11) Purchase value/estimated value, (12) Insurance value and premium value, (13) Agreement or correspondence reference, (14) Packing and despatch reference, (15) Acknowledgement of receipt.

CARE AND PRESERVATION:

Along with the question of collecting war materials, the problem of care and preservation of these objects crops up. The solution of this problem has been suggested here in a simple way without going into the detail chemistry or the laboratory methods involved in it. The simplest methods suggested here for care and preservation of war materials at a minimum cost can be done by any technical assistant of the museum without the help of a qualified chemist.

From the discussions in the foregoing chapters it is clear that the war materials are made of different elements of varied physical nature. Here, from preservation point of view, the war materials are classified under two broad heads — Inorganic materials and organic materials.

The inorganic materials are as follows :

(a) Stone — The pre-historic implements or weapons are mostly made of stone like chert, flint and quartzite and they are relatively inert. They are generally damaged due to rough handling or by overcrowding in the storage; otherwise, no special care is required for them. Normal routine dusting and cleaning are sufficient for these materials.

(b) Glass — The use of glass on war materials as decoration and mementoes are not rare. When in good condition glass does not require any treatment except careful handling, regular dusting, washing with luke warm water and soft soap and drying with clean warm cloth.

If on close examination multitude of small spots are found on the glass and if the glass loses its normal brilliance then the glass is said to be 'diseased'. This diseased condition of the glass can be easily cured by any trained museologist by treating the glass with 1% dilute sulphuric acid further diluted with distilled water. Then after drying it under free air and cleaning with warm cloth a thin layer of dammer varnish to be applied which will restore the original brilliance of the object and act as an additional protection against changes.

Again, if the glass is found sweating and in advance stage of decay, the simple treatment is to wash the glass under running water at intervals for a weak and then after drying the object to be kept in an air-tight case containing

calcium chloride or silica gel.

Defect like scratches on glass can be removed by treating the object with xylol and methylated spirit and finally cleaning it with chamois leather.

Lastly, ordinary glass can be cleaned by a solution of chalk-powder and methylated spirit painted over the object and after drying it should be cleaned by soft worm cloth; but to remove fungus attack application of putty powder produce good result.

(c) Metals — Among the metals copper, bronze, lead, iron, silver and gold are used in various forms as war materials. Again, copper, bronze and iron are three very important metals specially for manufacturing different types of weapons and are being used in India since early period.

To a museologist, objects made of gold require minimum care for conservation but at the same time golden objects require maximum care for security. Pure gold war materials are rare excepting plaques and medals. As a war material gold is used for decoration on various weapons and as coins. These golden objects contain a little proportion of other metals like silver, copper etc. So the chemical changes in golden objects are due to presence of these metals which causes tarnish or discolourisation. To clean the golden objects washing with soap and warm water aided by soft cloth or brush is sufficient. If this treatment fails to remove stains on golden objects then the objects should be treated with

commercial concentrated nitric acid available in the market and then washed thoroughly. Thereafter, dilute (1%) ammonia solution may be applied. Similarly, gilt specimens too can be cleaned with warm dilute ammonia solution aided by sponge.

Silver can be found in a museum of war materials mainly as coins depicting various figures holding different types of weapons and rarely as decoration on different weapons. As pure silver is very soft metal, so alloying it with other metals, specially copper is necessary to overcome its softness for various uses.

Silver objects turnish quickly in industrial area where atmosphere contains high percentage of sulphur compound. This turnish can be removed easily by treating the object with 10% ammonia solution and thereafter thorough washing is necessary. If this treatment fails due to heavy corrosion of the object then the percentage of ammonia may be increased upto 20% and when the object is found cleaned, thorough washing and drying must be done.

It is already stated that copper, bronze and iron are the metals which are largely used as different types of arms and armament. The cleaning and preservation of these metals and their alloys in museum present a complicated and vast field of study. So for their treatment a careful and detailed study is required by the museum chemist. Here, a few simple methods are suggested for cleaning these objects at the primary stage of corrosion.

(i) 2% caustic soda (NaOH) solution can be used for cleaning the incrusted parts of copper and bronze objects.

(ii) A mixture of tartaric acid, caustic soda and water in the ratio of 1:1:10 can be used for cleaning copper objects. This mixture is very cheap and at the same time gives quick and effective result.

(iii) Copper and bronze specimens can also be cleaned successfully by rubbing them with green leaves of Oxzlis corniculate (Bengali - Āmrulpātā).

(iv) Cellulose acetate or Polyvinyl may be sprayed or applied with soft brush on copper and bronze objects to retard tarnishing and to preserve 'patina' on old objects. Sometimes to check further corrosion the treated objects are placed in a air-tight case with silica gel; otherwise corroded objects are treated with 5% cold dilute (2%) solution of sulphuric acid followed by through washing under running water to get good result.

(v) For objects made of iron or its alloy care must be taken against rust formation by treating the objects with any kind of commercial preparation based on petroleum products to avoid air contact.

(vi) Rusts in the primary stage can be cleaned by rubbing with wire-brush and thereafter linseed oil may be applied over the whole body of the specimen.

(vii) After brushing as before, the electro-chemical method with zinc and sodium hydroxide may be applied followed

by washing and brushing to get satisfactory result.

(viii) Another simple method to check rust formation is to apply very thin layer of a solution prepared of 'kaolin' or china clay and sodium silicate.

(ix) 'Three-in-one' oil or 'Stanolax Oil' is also a good preservative for iron objects. This oil is smeared after cleaning the iron objects with emery paper and fine wire brush.

(x) Paraffin-wax or linseed oil also can be used as good preservative against rust formation.

Lastly, it is suggested that exclusion of moisture in storage condition is essential to protect iron objects from deterioration.

Next comes the organic materials. Among the organic materials found in a museum of war materials following may be mentioned:

(a) Wood — Use of wood as war material is very common. Bow and arrows, handles of different weapons, boats and ships etc., are the common examples of wood products used as war materials.

Fresh excavated wooden materials are generally damp. So, they are first dried fully keeping in cool dry places having free air circulation, otherwise warping and shrinkage may cause irreparable damage to the wooden materials. After drying these objects may be cleaned with 5% carbolic soap

or fuller's earth (Bengali-Sājimāṭi) and then again they are washed and dried as before. Now to strengthen those objects glue may be applied, if required, to fill in the channels or pores in the objects. After that, as a good preservative, a solution of green mango steen (Diospyros embryopteris) and 'neem' fruit (Melia azardiradhta) in equal proportion may be safely used at regular interval.

Insects are the main enemies of wooden objects. To prevent insect infestation first the objects are to be fumigated with carbon-disulphide vapour atleast for a week or more if required. In a museum laboratory a carbon-disulphide chamber can be prepared at a minimum cost by using a big wooden box made of ply-wood of average size (5' x 3' x 2'). This box must be made air-tight by lining with black card-board, felting or brown paper. Four or more brackets are fitted inside the box at a height of 8" inches from the bottom and a perforated tray is placed on the brackets. Two or more cups, according to the requirement, containing two ounces, of carbon-disulphide each are kept inside the box. Now the box is ready for use.

To check fungus growth the objects should be treated with a solution of creosote and kerosene oil in the proportion of 1:2 either by spraying or by dipping into the solution. Then the object is dried for three days and finally the object may be immersed in vinyl-acetate or paraffin-wax or treated with Shellac solution (Shellac

crystal 20 gms, Mercuric chloride 2 gms and Methylated spirit 100 cc) so that the organic elements in the wood could not attract insects.

To remove oil and grease spots on any wooden object the easiest method is to treat the object with petrol or benzene or by soaking the object in a solution of petrol and benzene in equal proportion. Acetone may be added if required.

(b) Grass, reed, cane etc. — Different parts of bows, arrowstick, stuffing, lasso, shields etc., are made of materials like grass, cane, reed, bamboo bark etc. These objects become brittle in course of time. For superficial cleaning, dusting and blowing are sufficient, but in fragile condition application of petroleum with soft camel hair brush or cotton wool will prove useful. Regular spraying of 'sheltox' or 'bagon' solution to save such objects from insect-attack is recommended.

(c) Fabrics — Among war materials the uniforms and other dresses, banners and flags etc., are made of textiles of plant and animal origin. Due to their different nature of origin their treatments for care and preservation also vary.

Textiles of plant origin like cotton cloths are to be cared in such a way as to form no crease, because creases weaken the cotton fibres along the line of creases. But the textiles of animal origin like wool, silk etc., on the other hand are subject to attacks by insects. To check this attack regular spraying of 'sheltox' solution is useful. Napthalene

balls or camphor cakes may be placed hanging at all the corners where textiles of different origin are stored or displayed. Beside these, small pieces of paper soaked in spirit turpentine are recommended to be kept in the folds of various types of uniforms and other objects of textiles to get rid of the insects. Further, to preserve the original colour, the private dresses of outstanding heroes and the uniforms of the men of the armed forces must be kept away from direct light.

The fabrics that can not be removed from their position for the purpose of cleaning and preservation are generally treated with 'size-solution' by means of tissue paper. The solution is prepared by mixing 10 gms of glue in 500 cc of distilled water and to be kept for 24 hours. After 24 hours this mixture is to be heated and stirred but not boiled to get a solution. Then 2 cc formaline is added to this solution to get the final solution which is to be applied immediately on tissue paper that held firmly against the fabrics. Carbon ink and iron stains on fabrics can be removed by dabbing 10% Oxalic acid solution and thorough wash with warm water, but blue-black stains are removed by treating the object with 10% Oxalic acid or 10% tartaric acid alternated with chlorine water or dilute solution of bleaching powder followed by washing with warm water.

(d) Paper — Important military maps, documents, books, etc., are generally written, typed or printed on various types of papers made of rice, cotton, rag, bamboo or wood pulps.

All these papers are subject to attacks of various insects such as - white ants, termites, cockroaches, silver-fishes, etc., and they are all of nocturnal habit. The easy ways to prevent them with little expenses are as follows :

(i) Cleaning and dusting of the objects at regular interval. (ii) To spray 'Sheltox' solution once in a month over the specimens. (iii) To expose the objects to sunlight for an hour or two at regular intervals. (iv) Dry leaves of 'neem' (Malia ozardirachta) or tobacco (Nicotiana tabacum) are to be kept between the folds of the objects and camphor cakes to be placed at random where these important objects or papers are stored or displayed. (v) A preservative powder. prepared of orris root (Bengali-Boch), cloves (Bengali-labanga), black pepper (Bengali-golmorich) and cinnamon (Bengali-dāruchini) in equal proportion kept in small cloth packets are to be placed on the shelves. This powder is comparatively costly but very effective.

(e) Leather — The war materials like the shields, armours (both for soldiers and animals), quivers, bow-strings are generally leather products. The main causes of decay of these materials are atmospheric oxidation, bad tanning and dyeing by inferior quality dyes. These causes of decay can be prevented easily by regular application of refined castor oil or white vaseline to lubricate the animal tissues and to get it free from air and other harmful atmospheric gases. Objects made of raw hide should be painted with a solution of alcohol

and refined castor oil (3:2 proportion) and soft brush should be used for the application of the solution. Sheāl-kāṇṭā (Argemon mexicana) oil and Mahuā (Bassia latifolia) oil can be used as substitute for castor oil and ceder-wood oil respectively. To check insects like cockroaches, silver-fish, etc., fumigation at regular interval will produce good result.

(f) Ivory, Bone and Horn — It is very common that ivory, bone and horn are used as handle of different weapons like swords, daggers etc. They are also used for decorative purposes on other war materials.

Horn generally requires no treatment in a museum except regular dusting and cleaning with luke warm water. If horn is found attacked with insects then fumigation and spraying of insecticides commonly available in the market will surely produce good result.

Between ivory and other bones, ivory is more permanent in nature and so requires lesser treatment against decaying. However, old ivory and bone should never be treated in water. Brushing by soft brush is recommended. After brushing the ivory should be sponged with soft cotton soaked in a solution of acetone and rectified spirit of equal proportion (1:1), and then protected by impregnation with bees-wax. But in case of other bones methylated spirit in place of rectified spirit and Shellac solution (2%) with 0.5% mercuric chloride in place of bees-wax may be used. Precaution should be taken that these objects must be kept always away from direct sunlight or heat.

(g) Pictures and paintings — There are various classes of pictures and paintings such as - Mural paintings, Paintings on plaster, Oil paintings, Paintings on wood board, Tempera paintings, Water-colour paintings, Photo prints, Drawings and sketches etc. A museum of war materials may possess different varieties of pictures, paintings and prints of battle scenes, various events on military topics or of outstanding soldiers and heroes of the country.

The techniques for conservation and preservation of pictures, paintings and prints require great study and involve fine mannual work along with clear knowledge about the constituents of pigments, medium, varnishes and chemicals used in them. These objects should not be cleaned without a full preliminary examination through scientific process. So it is suggested that these objects must be treated for conservation and preservation by expert museum chemists on this line. As a routine work careful brushing with soft brush can be done and precaution should be taken against direct or reflected sunlight, too much variation of humidity and atmospheric pollution.

However, a few simple methods are suggested here for treating these objects :

(i) In tempera or mural paintings gum, glue or albumen of egg is used as medium, on which lichens may grow. To remove lichens from the tempera paintings application of 1% dilute ammonia solution followed by brushing with soft brush and mild washing with distilled water and 50% alcohol is recommended.

(ii) When the tempera is defaced due to smoke, dirt, spider webs, birds excreata etc., the object must be cleaned first by soft brush and then a mixture of petrol and benzene in equal proportion may be applied with soft brush. If traces of different kinds of salts are detected then 1% celluloid solution dissolved in equal parts of acetone and amylacetate may be applied two or three times with a soft brush to obtain good result.

(iii) For cleaning and restoration of fresco paintings first careful and soft brushing is required. Then application of 50% alcohol with cotton wool is suggested followed by thin layer of paraffin-wax mixture prepared by melting 4 parts of paraffin-wax, 1 part of turpentine and 15 parts of 'toluol'.

(iv) For cleaning dirt and dust from the paintings on plaster, cotton wool soaked in a mixture of petrol and benzene can safely be used both on varnished and unvarnished surfaces. Alcohol and water must always be avoided in this case because alcohol will remove the paint and water will destroy the object if there are cracks on the plaster.

(v) Treating oil-paintings is a difficult job and is dangerous to a layman having no knowledge about the chemical constituents of the pigments, medium, varnishes etc., used in the paintings. So, it is always advised to consult a chemist for treating an oil-painting. But as a routine work following measures are suggested to clean dirt and smoke

deposited on an oil-painting.

(a) Application of old bread crumb is useful. One day's old bread crumb is to be rolled on the oil-painting gently by the fingers and this process is to be repeated till the original colour and brilliance of the painting comes out.

(b) 1% saponin solution can also be used with the help of a cotton wool pad for cleaning dirt and smoke.

As regards oil or grease spots on any print the application of petrol and benzene mixture with the help of a cotton pad will produce satisfactory result.

Retouches in photo-prints are to be done with water-proof ink and to be dried completely. Then the photo-print should be immersed in a solution of iodine (15 gms), potash-iodide (46 gms) and distilled water (3.5 ozs). After this, this photograph should be dipped into normal 'hypo-solution' for a few minutes followed by washing under running tap-water.

(h) Biological specimens — Biological specimens include both botanical and zoological objects. In a museum of war materials only the harmful and beneficial specimens in relation to military studies are preserved. The treatment for care and preservation are also different in their case. The simplest method to preserve the plants is described below.

The leaves or plants to be preserved are first dipped in a solution of 4 gms., of mercuric chloride and 200 cc of 75% alcohol and dried on a blotting paper. Then the specimens are mounted on cartige papers by means of nylon or silk

thread. Before sewing the thread is also dipped in the same solution. In the storage condition these cartidge papers (Harbarium sheets) are kept in suitable envelops to identify and placed in standard cases available in the market to hold these envelops. Regular dusting is to be done and insecticides to be sprayed.

Zoological specimens vary from collection of unicellular protozoa to large mammals. As the habit and habitats of the members of different phyla are different and each type possesses some specific attributes to be preserved for their proper identification, the methods of their collection, care and preservation vary widely and that is a vast subject for study within the scope of natural history museum. Here, some simple methods are suggested for care and preservation of zoological specimens which will fulfil our purpose. For detailed study about the collection, narcotization, mounting, preservation, storage etc., of zoological specimens lots of standard books are available in the market.

In a museum of war materials, it is suggested not to do all these detailed process of work for biological specimens. Our aim will be to take care against future damages of these preserved biological specimens. The smaller animals and the skins of the larger animals are generally damaged by rodents, insects and moulds which can be easily protected in the following ways :

(i) Microscopic specimens preserved by making permanent slides for study and inspection are to be kept in slide-boxes or in standard slide-cabinet available in the market.

(ii) Insects are to be kept inside the glass covered trays with napthalene balls or camphor cakes or paradichloro-benzene as a precaution against mould, insects etc.

(iii) Small specimens which can be preserved in bottles or glass jars are generally placed into 50-75% alcohol or 5% formaline solution filled in the jars.

(iv) Other animals like big peptiles, aves, mammals etc., which are comparatively larger in size can be preserved by stuffing. These stuffed specimens are kept on big shelves or in glass cases.

The skins, hairs and feathers of the zoological objects are often attacked by different kinds of insects. So, it is advised to place napthalene balls or thymol crystals inside the cases and fumigation by formaldehyde or thymol is also suggested as a precaution against these enemies.

In conclusion, it is suggested that any museum object must be handled with care and the hands must be covered with thin and fine quality rubber gloves. Gloves are necessary because human hands are always found to be greasy due to constant perspiration containing acid and salt. Another point to note that when an object is treated for conservation a record must be kept in the following manner :

(1) Name of the specimen

(2) Museum number.

(3) Condition of the specimen before treatment.

(4) Date of treatment.

(5) Reagents applied.

(6) Date of inspection.

(7) Atmospheric temperature.

(8) Humidity percentage.

(9) Report of previous treatment, if any.

(10) Remarks.

These data for each object can be maintained in a bound register or in separate cards preserved in card cabinets.

Museum photography and its storage :

In a museum of war materials photography has a great role to play to serve the interest of the scholars and the general public and at the same time for successful organisation and utilisation of museum objects.

This photography service is required for the following purposes :

(a) Documentation — The catalogue is the most important record as it records all the necessary informations about the museum objects. If a photograph is attached along with the information recorded then any one, specially a research scholar will be able to identify easily a particular object without going to the object itself. Further, selection

of objects for special study or exhibition or publication may be conveniently made by going through catalogues which contain photographs of the objects. Photographs for documentation are also necessary for those war materials which can not be brought to the museum and also for the objects that can not be replicated for the purpose of sending to different places for study or exhibition. Likewise, microfilming of rare documents of military importance of museum collection facilitates in the similar way for storage and study. photographs attached to catalogue cards also help to find out and reclaim the object of the museum if stolen or lost. They facilitate as an evidence in case of legal proceeding in establishing the museum's patrimony of the object.

(b) Display — Photographs of war materials can be helpful in a museum display. For instance, objects which are of special nature in a particular war museum can be photographed and the photographs can be easily displayed in other museums. Similarly, if it becomes necessary not to allow the visitors to come in the proximity of some war materials then photographs of those materials can be displayed for public demonstrations. The display of war materials in a mobile museum service is much dependent on photography only because photographs can be moved easily from place to place; require minimum space for demonstration and at the same time museum authority can avoid carrying of the war materials with consequent possibility of loss, damage and dislocation.

Transparencies which can be projected are also useful in this respect as they can show much bigger pictures in the projection.

(c) Educational activities — In a museum of war materials any instruction about the objects can be given in the presence of the material itself. This gives a clear physical conception of the object and at the same time a definite and permanent impression of the instruction. Here too, photographs are found to be very necessary. After instruction a photograph of the war material can be taken by the scholars for preservation and remembrance. Topics on military studies that require a chronological or systematic study of war materials which may not be accessible to the students can be demonstrated with the help of photographs arranged likewise. Research workers in a museum of war materials depend much on the photographs of the war materials. Scholars require continuous study of the museum objects as well as comparison of their different aspects with correlated things. Such works need keeping these museum specimens for a considerable period of time with the scholars, but museum administration can not allow it. So the photographs of the war materials to be studied by the research scholars are indispensable to them. Again, if only one member of a family visits the museum, the photographs taken by the visitor give benefit to the other members of the family who did not get the chance or may not have the opportunity of visiting the museum.

Printed cards sold by the museums also serve the same purpose but these picture cards have their own limitation. Photographs can be prepared and supplied easily by the museum administration for any number of exhibits.

(d) Horror vacuum — It is a mental state of a person, an uneasy feeling of fear that arises when a visitor encounters a blank area without any object to rest his eyes on. In museums generally large wall space in the passages, corridors, stairways, lounges etc. are left blank in contrast to the over-crowded walls of the galleries. Such blank space creates a kind of horror vacuum in the mind of the visitor specially in a war museum housed in an old fort or in a big palatial building with high ceiling and long corridors. To counteract this fearful state of mind museum administration can put photographs of the museum objects with short descriptive note on both sides of the passages, corridors, stairways etc., in an attractive way with proper illumination. These photographs will minimise the horror and create a pleasing environment of the world of museum which the visitor is going to experience when he visits the gallery.

The department of photography must have its space and equipments according to the volume of work it has to handle. The space available to this department should be sufficient to accommodate the following :

(i) The minimum space (8' x 10') for office work of the photographer and his staff.

(ii) Sufficient space (10'x 10') for dark-room. This is the vital part of this department and at the same time a most delicate one. This dark-room preferably be air-conditioned with safe-light arrangement inside it and calling bell arrangement from outside to draw the attention of the photographer to any urgent matter outside when he is working inside.

(iii) Sufficient space for studio (12' x 10') with suitable height and ventilation.

The equipment includes both general and technical equipments required for a modern photography department, such as cameras, camera-stand, exposure-meter, cable-releaser, overhead lighting arrangement, flashgun for camera, enlarger, printing-box, developing trays, measuring apparatus, chemicals and so on.

For the purpose of storage the negatives may be kept inside cellophane-paper envelop or good quality plastic sheet pockets open at one side only. Different size pockets are required for different size negatives and it is better to keep the negative envelopes within air-tight, heat-proof boxes as a precaution against accidental fire, mould etc. Each negative must bear an index number. Likewise the final prints are best preserved in album fixed with photo-corners and each page covered with transperent paper. Each photo-print must have the index number and the title of the negative from which it was prepared just above or below the print. Slides, micro-

-films etc. which require projection are stored in specific type of boxes available in the market. It is advisable to maintain separate registers for slides and films classified subject wise.

The photographic index number should contain the Accession number and the negative number to pin-point the date and the particular exposure by which it was obtained. To be more clear, for instance if a sword was obtained as an exhibit in 1977 and the Accession number being 800 and its photograph was taken on 3rd January 1978 for some reason and the serial number of that exposure for that year was 27, then the index number of that particular negative will be '77-800-78/27-Sword.'

MUSEUM LIBRARY AND DOCUMENTATION

In a museum of war materials with educational activities and research facilities, a well organised library with documentation section is essential. The library will be used not only by the museum staff but also by the research scholars and the students of military studies studying in the local schools, colleges and universities. Thus considering the importance and requirements, both actual and anticipated, the library is to be organised and manned as a library on 'Military Studies' in the proper sense.

The library science is a specialized subject. Here the aim is not to discuss about the organisation, administration, staff pattern and other details about various types of

libraries but to refer only to the different kinds of services a library of a museum of war materials is expected to render to its visitors.

The principal services of this library will be — administrative services, technical services, readers' services and special services.

The administrative services on the highest level are usually performed by the curator or the managing committee. In the library, the activities performed by the librarian with the assistance of his staff include: preparing and administering the library budget; planning library development; selecting, training and supervising the library staff; preparing and administering policies and regulations; maintaining relations with other museum officials; developing and supervising the selection and collections of books and journals and their policies and procedures; participating in the planning and equipping of new library facilities and in the alteration of existing facilities; preparing reports and memoranda; conducting survey and analyses of services; ordering supplies and equipments.

The technical services mainly comprise the job of acquisitions, classification, cataloguing, binding, photographic reproduction, microfilming, recording and lending operations.

The acquisition function includes the selection of

library materials and all that relates to their acquisition by purchase, gift, exchange or deposit.

The classification and cataloguing jobs are associated with the identification and description of library materials along with their organisation through classification for effective use.

The binding is related with wider functions of preservation and care of the library collections. Photographic reproduction, micro-filming, recording etc., services include a large variety of activities like copying articles, statistical tables, diagrams etc., from books, journals, reproducing catalogue cards and preparing slides, filmstrips and records for instructional use.

The readers' services, also called as Public services are those offered directly to the users of the library. The fundamental role of the library is educational. Like the museum this too is not a store-house of books but a dynamic instrument of education. It is to feed the intellect of the students, encourage researches and invite all to take part in its intellectual and cultural affairs. The librarian acts as a teacher in guiding the students in the ways of investigation and research and the library actively serves the teaching and research needs of the museum. The library collections should be so organised to allow easy access to their contents; its borrowing privileges should be free and generous to every enrolled members; the students and the museum authorities

should be informed about the resources and services of the library; the library must conduct programmes of instruction in library use and will organise so to facilitate these functions and finally the library staff together with its museum colleagues should co-operate and collaborate in every possible way to achieve the aims and fulfil the purpose of the museum. Above all, though a bit difficult, the museum library can offer reference information and documentation services on 'Military Studies' provided one or two extra specialized hands are engaged in the library for this purpose. The simple meaning of the term 'Documentation' is 'bibliography-building with emphasis on micro-units of thought embodied in articles, in periodical publications and occasional releases'.[2] In other word, it covers bibliography building, reference service and mechanical reproduction of any special reading material required by an interested reader or research scholar. Documentation work requires capacity to get into the thought content of some particular topic and its related materials, to make entries about them in the most simple and lucid form, arranging in a helpful order providing necessary added entries so that the main entries become easy to understand. This is a specialised job requiring specialised knowledge and technique involved.

Besides the above mentioned functions a museum library may do some other special functions depending upon its human and material resources. But in practice, it becomes

rarely possible for any museum library to perform any special service to its clientels because the education officer, the librarian, the curator and other education staff of the museum remain so busy about various exhibitions and educational programmes of the museum that it becomes very difficult to organise any special service only for the library. However, if sincerely desired, a museum library can perform special services like — Book exhibition on Military Studies, Mailing service, Mobile library service in the locality, Lectures relating to library services and so on. It would be wise to scrutinise very carefully each proposal for such special service whether feasible or not, before organizing it.

MUSEUM EDUCATIONAL SERVICES[3]

Regarding educational activities, the main practical problem to the authorities of a museum of war materials is that they are to organise educational services for various classes of people — the adults, the children, the educated interested people, the educated and uneducated less motivated mass i.e., the casual visitors. However, here this problem of museum education has been attacked from six fronts, such as: (a) Why educational services will be done ? (b) For whom this educational services ? (c) Who will do the educational services ? (d) Where it can be done ? (e) When it can be done ? (f) How it can be done ?

(a) Why educational services will be done ?

The museum authorities do the educational programmes not because they think their museum objects are important and valuable but because they put much importance on the visitors, the people at large.

Modern museums are such kind of institutions, which got permanent values to impart, provided they can make their voice heard. They can be regarded as a new kind of temples where pilgrims will go not to become holy or to seek God or immortality but to cultivate those qualities, intensity and perfection which may make them godly. This is the challenge before all those who are really interested and working for the museums in India.

Next, the museums lead the visitors to capture a sense of pleasure and awe regarding the beauty of nature, the skill of men and their relationship. By showing the original specimens museums help their visitors to understand the importance of evidences and to grasp mentally what their senses tell about those objects. Museum objects help to grow interest, to develop sensitivity and the capacity to discriminate in those who are less educated and mentally bored. Museums are such type of institutions which integrate influence in a world suffering from division.

A museum of war materials, as a specialized museum can perform some special duties to its visitors which are enumerated below :

(1) It helps to popularise the subject 'Military Studies'.

(2) It caters for preliminary education to the students and the general mass about the science of war.

(3) It excites the desire of the intelligent students to know more about the subject and invites better students to carry on research works on subjects of military importance.

(4) It can educate the people about the military heritage and characteristics of different martial communities in India.

(5) It can make the people conscious about the defence needs, the problems of the defence forces and the potential danger from the long range weapons (e.g. ICBM) of the developed countries.

(6) The last but not the least, the educational programme of a museum of war materials can supplement the service training provided to the students through NCC (National Cadet Corps), and thereby help to organise a powerful youth movement in India, educational in character, having its base in schools and colleges.

Conclusion may be drawn that though museums are not reference books yet the effects of education through museums are quite different from the effects that a book or a class lecture can provide. The impression a visitor gathers from museum exhibits lasts longer in his mind and profoundly refreshes him more than any book he goes through. Through

proper educational programmes the museum educators can open new horizons of knowledge before the visitors and can do miracles in the field of mass education in India where the percentage of literacy is so poor.

(b) For whom this educational services ?

Even if it is not intended, whatever a museum does is educational in nature. Its mode of display, standard of thoughts expressed through arrangement of galleries, sincere and homely behaviour of the museum personnel and even the publication if any are as much a part of education as are the educational services directly performed to enlighten or to educate the general mass. The educational services to be performed by a museum of war materials are not for making trained soldiers for the country but for the benefit of the uninformed adults and the ordinary visitors, the children and even for the handicapped. The main bulk of the visitors of the war materials are the students of schools, colleges and universities. Besides these young visitors, people interested in the military way of life and research scholars are also potential visitors of a museum of war materials. The illiterate mass of our country having a fear complex about military persons will also come within the four walls of the museum to know about the military history and pattern, mode of military life, culture and other activities and to gather knowledge on different aspects of the 'Military Studies'

out of curiosity and to feel proud about our past glorious achievements and at the same time present advancement in this field of scientific knowledge. Not only our countrymen, the foreigners too shall surely be interested to know about India's military heritage, its technical knowledge and other achievements in the field of military science. So to say, a museum of war materials is open to all and its educational services are freely distributed to all interested visitors irrespective of education, sex and age.

(c) Who will do the educating services ?

A museum of war materials needs a special department for education and research on Military Studies. The curatorial staff can take care about the selection and display of war materials, compile and prepare suitable labels and can even deal sufficiently well with the educated and informed adult visitors and senior students. But the problem arises with the uninformed adults and the children and also for research workers. They generally do not possess the necessary capacity to deal with these visitors. This requires a special teaching aptitude for popular instructions and easy interpretations of military objects to the laymen and to answer briefly but clearly questions and to supply relevant data to the research scholars. The museum educationist in a museum of war materials requires a special knowledge in this particular branch of science and some

practical knowledge about human nature. He must be able to discern the needs, interests and potentialities of the visitors. He should have the capacity to direct skilfully the serious visitors and the research scholars and at the same time the museum educator should not deliver lecture aimlessly or tell all the informations he may know about any particular war material of the museum. He should be well informed about the latest developments in the pedagogical techniques. His main aim will be to arouse questioning and to stimulate thoughts and an active interest in the subject in the most unpromising mind.

It is not easy to find out persons of such calibre; but in no case the service of a museum educator can be successfully replaced by the teachers of educational institutions. The reason is obvious. The museum teacher works within the museum. He is familiar with all the diverse view points about a particular object and so able to interpret the specimen in as many ways as possible, specially to uninformed people without any cultural background. In short, a museum teacher should be museum personnel who understands the unique feature of the museum education based on actual documents and other visual elements with some teaching experience. The best selection of museum educators in a museum of war materials will be a museum person holding the 'C' certificate of NCC with some teaching experience in schools/ colleges or commissioned officers from Army Educational Corps

or commissioned NCC officers from schools or colleges having the Diploma or Degree in Museology. These officers are already trained in group management, tackling the essential needs of immature uninformed minds and temperamentally suited to popular exposition in simple clear languages while they were in their service and training.

The librarian and the assistant librarian's role too in education is not at all insignificant. They are very much educational staff in a museum. To the interested and inquisitive visitors and to the research scholars their services are of great value. They are to supply references and cross-references and other related information about the museum objects and if required they are to prepare notes and precies for the research scholars of home and abroad. They are to keep records of various types of questions asked for about different war materials and the relevant answers with references supplied by them. It is the museum library staff who connects the objects with the published information and interpretation on them.

(d) Where it can be done?

To run educational activities the museum education officer may face the problem of accommodation or suitable place for it. But actually this is not a problem at all. If education means gathering of information and understanding of it, then educational activities can be held at any place

and at any moment. In a museum of war materials this work can be done successfully according to the following plan :

(i) Gallery services — The most suitable place in a museum for education is the galleries where the objects are displayed in best suitable manner with other related objects to bring out their meaning and importance in all possible ways and this gallery service is a continued process. This gallery service may be in different forms, such as —

(a) Through labels — The labels of the museum objects impart informations regarding a particular object in a compact and comprehensive form but it is helpful only to the educated visitors. Again, to interested educated visitors labels seem to be inadequate to satisfy them for their compactness, as there is no end of educational chain-reaction set up by the museum exhibits. However, the labels can induce the interested visitors to move to other places in the museum in search of further information for their satisfaction.

(b) Through Hand-outs, Folders, etc. — The drawback of the label can be compensated by the printed hand-outs, folders, pull-out sheets, catalogues etc. For the purpose of education the museum can publish these materials at low cost for free distribution to the interested visitors.

(c) Through guide lecture — If the visitors still got any doubt, the guide lecturers are there to help them. Almost all museums who provide educational services conduct guided lectures in the galleries either at some specified

times or at the request of the visitors. The guide-lecturers are proud of their job and gladly come forward to help the visitors without any obligation. They not only stimulate the interest of the visitors or satisfy their curiosity but also give information regarding reference books and journals to consult and related informations to encourage the interest aroused.

(d) Through Audio-visual gadgets — The main emphasis of educational services is laid upon the inspection of three-dimensional objects in the museum galleries; but when guided lecture tour becomes difficult due to some unavoidable reason audio-visual gadgets like, portable micorphone, lantern slides, film shows etc., as auxiliary aids, can also be used inside the exhibition hall for the purpose of education.

(ii) Lecture hall — So long the number of the visitors are small, space is not a problem. But in case of a large group visit or in case of young children making noise and messy activities, a separate place or an additional accommodation becomes necessary. If separate accommodation is justified then the educational activities in a museum of war materials can be performed in the work-room, demonstration space or inside the lecture hall.

(iii) Seminars, symposia etc. — Education officers of different museums of war materials can hold discussions,

seminars, debate etc., within the museum and outside it in different public halls throughout the country and deliver popular lectures on various topics on military studies through radio and television.

Seminars, discussions or specialists' lectures with locally available participants can be organised throughout the year; but these activities of State, National or International levels depend upon certain factors like climate, examination cycle of the students, political atmosphere or international relations etc.

(iv) Mobile museum — It is not the fact that to enjoy or to participate in the educational activities the visitors are to come in the museum always; the museum educational staff can also go to the students in schools and colleges to show their exhibits or lend their specimens to the educational institutions for a specific period according to the lesson plan chalked out before hand in consultation with the teachers of the institutions. Thoughtfully planned and prepared school loan kits may also be sent to the schools and colleges.

(v) Mobile exhibition — A modern museum may also spread its educational activities in remote places within its local jurisdiction among the villagers by organising cinema shows, temporary exhibitions in different fairs and local gatherings in various relegious and national festive occasions. Mobile exhibitions organised by the museum education department at

clubs, youth-centres, village organisations, adult education centres and such other places with the help of their museo-bus, museo-jeep or even by museo-bicycle can spread education on different aspects of military science in a most interesting way. This mobile exhibitions too depend much upon the climate, croping seasons, socio-relegious festivals and the examination cycle of schools and colleges.

Hence, the educational programme by the museum of war materials can be organised at any place, inside or outside the museum precinct, according to the capacity, talent, initiative and experience of the education officer and justifiability to the need.

(e) When it can be done ?

As a general rule, educational programme in a museum should be planned at right moment when the visitors are ready to accept it. But this right moment can not be foreseen. None can say when the spark will strike in the minds of the visitors, when their imaginations and feelings will be touched or when their sense organs will function properly to see and understand the museum specimens. These things happen only when circumstances, personalities, atmosphere and mental conditions work in harmony — that is something which no organisation or institution can bring about. However, a museum education officer, by his talent and experience can anticipate and take advantage of special occasions or important events within the country to attract

visitors to its galleries and different programmes organised by the museum.

An individual visitor creates no problem to the museum educators because he visits the museum when he feels the right moment for him. But group visitors, both young and adult, from schools, colleges or other organisations create problems. Their visit requires planning and preparation beforehand, and naturally the moment which is right for some of them may not be so for others. So, here the leader of the party will have to decide when the interest of the majority will be served.

It is sure that the museum education department will not be able to comply with the requirements of the group leader. So, a mutual adjustment must be made through close and frank discussion and co-operation between the museum authority and the group-leader. Here again, if the museum authority realises the genuine difficulties such as school and college timings, travelling distance, transport problem, financial trouble, pressure of examinations etc., they should fulfil the desire of the group visitors at any cost accepting all difficulties on the part of the museum.

There is no doubt that the museum educators will take all possible troubles for the sake of group visitors but there are some limitations as enumerated below :

(i) Size of the visiting group — The number of the visitors in a group must not be too big; otherwise the

educational staff will not be able to communicate with them properly. Thus the main purpose of the visit will be foiled. The number of visitors in a group should not exceed twenty in any case.

(ii) Periodicity of visit — Care should be taken about how often a group must visit the museum. The number of visits actually depend upon the age of the visitors, the distance they are to travel, their educational background and the nature of the theme they are studying. A series of visits usually pay more to the children because the first visit can only arouse emotional stimulations; at that time they are over-excited, a little awed in the unfamiliar atmosphere of the museum and naturally they require time to settle down.

(iii) Duration of the group in the museum — As a general principle the stay within a museum should not cause boredom on one hand and should be of some use on the other. So, the visitors' too long stay within the museum must be avoided. A short lively visit organised to maintain alert interest is always enjoyed by all. If the group visitors once get interest and enjoyment they are sure to come again and again at their own leisure time either alone or with their friends and relatives. This is a good sign of the success of any group visit and these voluntary visitors will act as a stimuli to the museum teachers to think and do more services to the visitors.

(f) How can it be done ?

Museum educators act only as the communication bridge between the visitors and the museum objects. But how this communication can be established, how the museum educational staff can interpret museum specimens to arouse interest among the visitors ? This depends mainly upon the receptivity of the visitors and the methods of communication adopted by the museum educators. Surely it is a difficult task and at the same time a long term endeavour on the part of the museum educators.

However, the main aim of the museum educational staff will be to supply enough informations, but not too much, to guide the visitors. All these depend upon circumstances and there are various ways to help the uninformed visitors of all categories who will come within the precinct of the museum and form a habit of looking at objects with discrimination and affectionate understanding.

To achieve good result, it will be the prime duty of the museum educational staff to give a clear, coherent display of objects arranged simply, logically and pleasingly. But to a lay man these may not be sufficient; he may need more to find a real interest in the museum materials. For example, a mere date on an object will help the visitor to place the object in its time and sequence but additional informations about construction, preservation, place of occurrence, its use and many other questions that may crop

up in the minds of the visitors will remain unanswered. Similarly, about a military dress — who are the people who wore it, how it was worn, the way of life of those people etc., can be answered with the help of models, photographs, maps, sketches, coloured charts etc., provided with discretion, skill and taste. These will surely increase the importance of the exhibit and the visitors also will find help, get encouragement and satisfaction out of it.

So, mere display of exhibits is not enough. Some form of interpretation is always necessary for all classes of visitors; otherwise the visitors are to wander aimlessly from one gallery to another. Genrally, this interpretation is in the form of short notes attached with the exhibits as labels or a formal talk by the guide lecturer or both. The labels are of no use to the illiterate mass and to others they are necessary evil. The labels impart information in a compact form, but how much compact ? It is mentioned earlier that there is no end to the educational chain-reaction of the objects displayed in the museum. So, to satisfy the visitors the labels will take the form of short essays, which will again produce museum-fatigue due to strain on visitors' eyes. Further, if the label is very close to the object then the label will draw the attention of the visitors more than the object itself. Again, a guided formal lecture though stimulating is not always successful. In it lies a risk of denying the existence of human differences and

individuality. Men differ much in their opinion, taste and intelligence. Naturally, it is not possible to satisfy the needs of every visitor of a group consisting of highly and less informed persons or highly or less academic visitors. To a less informed and less academic visitor a talk may not correspond to the labels of the museum objects seen. Still, the value of a label or the service of a guide lecturer in a museum of war materials can not be denied like any other museum.

An improved method of this guided lecture in a specialised museum like a museum of war materials may be suggested here. The museum educator will deliver a short introductory talk to a group of visitors only to suggest them the lines of interest and enquiry. Then the visitor is allowed to move following his own line of interest and ask questions that may arise in his mind to the museum educators. A successful museum educator realises that to raise questions in a visitor's mind is more valuable than to give answers beforehand. Likewise, a discussion about the exhibits at the end of the visit is more rewarding to the visitors than simple hearing about them from the lecturer.

To young visitors, the guided lecture is of no use, because children do not like set lectures, however good it may be. They are accustomed to follow their own interest and to work at their own time, because they find some sense

and purposes in what they learn in their own way. Modern system of education also recognises the importance of active methods of learning. So, it is a bit difficult job for a museum educator to create interest and make use of museum resources among the children. The young visitors require something more than mere seeing the museum objects and hearing charming lectures. This something is to encourage them to use more of themselves, to participate in museum activities and to experience through their sense organs. To reach this, 'Please touch me' galleries, various types of participation programmes like museum games are much helpful. If museum authority allows some of their exhibits for the active use by the young visitors then the visit will be really purposeful and it becomes a reality. For instance, a young visitor dressed up in military uniform and armour, carrying arms and handling weapons used during 18th century A.D., in India will surely feel something of what the life of a soldier was in those days in India and understand more deeply than by mere seeing the objects and hearing lectures about them. From his gestures and movements the young visitors will sense the past more vividly, even though the uniform the boy wears is a replica and prepared only the other day.

Museum educators can make more use of dramatic techniques to interpret their exhibits. Models, charts, photographs, diagrams etc., can not replace the original objects but if they are used carefully they can have great

educational value. Prints and models have the power to stimulate one's interest and produce the urge to see for oneself. Similarly, charts and diagrams depict the relation of a chain of facts. Likewise, colour prints and photographs add life and interest to the museum publications.

While planning for the educational activities of a museum it must be kept in mind that such activities are not the end but a means to develop in mind of the visitors a closer understanding and appreciation of the museum exhibits. The purpose of museum activities is to induce an alert and receptive state of mind and feeling; otherwise it will be a mere waste of time and energy.

Over and above the normal educational activities, a museum of war materials can also fulfil its purpose of education by using itself as a community centre having various activities like popular lectures, demonstrations, debate, discussion etc., on military topics and presenting different historical facts based on military operations in India through 'Sound and Light' technique.

A museum's jurisdiction lies basically on visual objects and so the appropriate technique of interpretation and explanation of these objects should also be visual. For the purpose of education, the proper uses of modern mechanical, visual and audio-visual aids are justified because they bring exhibits to life and provide links among them for enjoyment of the visitors.

Lastly, mention must be made about the museum publications as a means to increase interest in the museum objects and to interpret their meaning. In a developing country like India having low percentage of literacy, simple, attractive but very cheap publications can widely appeal to the non-academic visitors. But for the educated interested persons and the research scholars, scholarly publications in a specialist's language are also necessary. So, various grades of publications are required for different types of visitors.

To conclude, there is no 'blue-print' or text book to guide museum educators how to make full use of museum exhibits for the purpose of education. A museum can follow its own methods according to the experiences and talents of its education officer. However, the methods must be flexible, aids must be varied and in interpreting museum exhibits the museum educators must think about the visitors, their needs and interests. Though museum educators work with museum objects, they must keep in mind that they are working for the people.

MUSEUM SECURITY:[4]

The security measures to be adopted in a museum depend on the nature of the museum small or large, old or new, types of museums, value of collections and its nature, whether replaceable or irreplaceable. Considering all these

points, the degree of precaution and the security measures to be chosen must be in reasonable proportion to the nature of risk involved, the importance and the value, both money and aesthetic, of the collections to be protected.

In museum of war materials too the security of building, men and materials is a great problem. There is no standard rules for security services to guarantee all round protection all time, everywhere and under all conditions. The security services must be rigid but the methods should be flexible enough according to changing situations. In short, the security service is the result of a combination of some measures against dangers caused by : (a) Natural sources such as biological, environmental, climatological and vermin. (b) Human sources like theft, robbery, barglary, over-crowding of visitors, intrusion, vandalism, demonstration, riots, revolution and war. (c) Technical failures such as breakdown of electrical installations, water supply, leakages of roofs etc. (d) Personal accidents.

Though the responsibility of security services primarily lies with the security officer and his men, all other museum personnel in one way or the other are also to be made aware of this problem and their role in times of need. The suggested security measures to be adopted in a museum of war materials are as follows :

(1) The museum building should be of such plan that there shall not be too many entrances and exits. There

shall be emergency entrances for police and firemen and emergency exits for visitors and museum personnel. These emergency exits and entrances must be kept closed during normal time and the keys should be with the security officer but the master-key must be with the curator.

(2) Fire is the number one enemy of a museum, specially where inflammable and explosive war materials are stored. So during construction of the building, modern fire-proof and shock absorbing materials should be used. If possible, provision for dividing the building into sections by means of fireprpof steel doors may be made. It is advisable to use wood products as little as possible, specially for decorative purposes and to avoid inflammable materials. If old buildings are converted into museum then stricter precaution should be taken against fire and earthquake.

(3) All electric works should be installed according to the highest standards of safety and fully insulated to avoid the danger of short-circuits in electrical system.

(4) A printed fire control order must be displayed on the notice board of the office room and be circulated in different sections of the museum, so that everyone serving in the museum knows his job during the emergency of fire. A monthly duty roster should be prepared to fight against the fire, to do salvage work and to avoid panic and confusion, so that highly desired discipline could be maintained

when any unwanted incident takes place.

(5) Usual fire alarms with which big ships are fitted now-a-days should be provided in all rooms, particularly, in galleries where visitors' carelessness may cause fire and in other rooms/stores like, especially inflammable ones, laboratories, photographic section, library and where heating apparatus functions.

(6) A close contact should be maintained with the local fire-brigade and police station and to request them to carry out regular checks and inspections of the building and the installations.

(7) Sufficient number of fire-fighting equipments such as fire-extinguishers of different types required for different classes of objects, buckets, picks and shovels, sand bags, stirrup-pumps etc., must be kept ready at different fire-points selected according to the direction of the security officer.

(8) As water is the best friend to extinguish fire for an overall system, there must be reserve water tanks and ponds for ready supply of water in case of emergency. The museum should be equipped with fire-hoses permanently fitted to the water supply system. The hoses to discharge water should be of such length as to cover every inch of the museum and its approach should never be blocked. On the other hand sufficient care should be taken at time of the use of water so that museum objects are not spoiled or

damaged because of water hazzards. For objects which can not stand water, chemical extinguishers are to be used.

(9) A permanent system of direct communication with the local police station and the fire-station must be maintained to counteract the situation like riot, demonstration, warning, extortion etc. and fire respectively.

(10) Before entry visitors' personal belongings must be deposited in the cloak-room under proper receipt or token.

(11) While handling museum materials, particularly lethal weapons the museum staff must be very careful to take all sorts of precautionary measures as directed by the security officer or the curator so that visitors or the staff do not meet with any accident.

(12) Alarm signal should be provided in such a way that if any body tries to make forced entry or exit during the night, it will give signal indicating room number in a board placed in the guard room. A siren may also be provided to give alarm throughout the museum and the neighbouring area to get quick help, if required.

(13) The museum materials including the building must be insured against fire and burglary.

(14) All locks and doorsand windows must be checked at the close of the day by the security men and the main locks must be checked and sealed daily by the security officer himself after getting O.K. (all correct) report from the senior most guard on duty on that particular day.

(15) The climatic condition of different areas in India varies sharply in different seasons. In defining the climatic condition for museum objects we are to consider the purity and homogenity of surrounding air, its temperature and particularly its humidity percentage. This humidity percentage in atmospheric air is mainly and largely responsible for decay of museum objects both organic and inorganic in origin. So for the security of the museum objects against varying climatic condition precaution must be taken to maintain an optimum atmospheric condition within the galleries, stores and laboratory, if complete 'conditioning' — i.e., purity and homogenity of the air in regard to both relative humidity and temperature, is not possible.

(16) There shall be more than one set of first-aid equipments to redress minor injuries and accidents within the museum and the security men should be trained in first-aid. As preventive measures against minor accidents small steps, thresholds, slippery floors, loose carpets, dangerous electrical wires etc., must be avoided within the museum building.

Thus to conclude, security is a museological discipline requiring specialized knowledge and training. It is based on a sound knowledge of the risk involved and the precautionary measures to be adopted against them. It is a compromise between opposing interests and an acceptable balance must be found out.

All the suggested measures will become futile and the most perfect scientific equipments can not be counted as efficient and adequate unless the security men and other members of the staff also properly play their role. These men must be honest, alert, dutiful, organized and unremitting in their duties.

In India museum men are not at all trained in security services and there is no scope for them to take necessary training in this field of museum service though it may be a major problem when any such incident takes place. These museum men, whose number is not negligible in India, are responsible for the security of invaluable and irreplaceable objects of human culture through ages. Indian museologists are well trained in practical handling and treating with broken, deceased or decaying objects but their knowledge in security service is purely theoretical based on informations in different books, reports and journals or at best through observation of security arrangements in various museums in India and abroad. In a museum of war materials it is desirable to appointmen from defence services or to train museum men in batches by organising a security training course sponsored by government or universities with the assistance of defence personnel, officials from police department, fire-brigade organisation, civil defence organisation and teachers in museology. Fire-fighting training may be obtained from the nearest training school of Fire-Brigade Service on payment of prescribed fees.

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CHAPTER FIVE

CONCLUDING REMARKS

Self-preservation and self-expansion are the two instincts deeply rooted in man's nature. Indians are no exception to this. India's history is indeed a history of continuous warfare, with some periods of short-lived peace, since pre-historic days. As arms and weapons are prerequisites for any kind of war and conquest, so also the stories of war, weapons, organisation of armies and forts are connected with the history of mankind.

To know the military activities of India and to gather the ideas about the development of military skill and knowledge, its gradual progress, the evolution of arms and weapons, their uses, advantages and disadvantages, the ever changing techniques of wars and other related topics on military science, one should go either to the public libraries or to the museums of war materials if there is any. In a developing country like India, with its high percentage of illiteracy, the contribution of a museum to the general mass education is more than a library could contribute. The library is used by a small section of educated persons and a limited number of research scholars; but museums can be used and enjoyed by all — illiterates, less-educated, highly educated and the research scholars.

Moreover, library contains literal description or expression of human knowledge and man's approach to nature and spirit but it is the museum which stores and exhibits actual documents of human expression and nature. Books could interpret what is stored in the museum. Hence better the museum better would be the interpretation contained in the books. Well organised military museum having comprehensive collections certainly contributes greatly to the development of studies in military history, science and technology.

It is only very recently, the role played by museums in the life of the community and the use of their collections for educational purposes have taken real importance. In many developed countries the emphasis on the educational aspect of museum activities has progressed considerably, while India is still laging behind. Modern out-look of developments are reflected through logical and attractive exhibitions. Visitors of all ages and walks of life in large number have come to understand their visits to museums as an important experience. Researches are made to enable the public to view and study the museum collections, to observe, understand and appreciate the cultural and technological achievements of mankind through ages.

Though in India, the art and science of war are being taught to the professional soldiers and academicians for quite sometime in different regimental centres and military schools, but no public museum of war materials

either at national or at regional level has yet been established.

This absence of a museum of war materials has contributed to the general mass of India indifference about the modern techniques and trends in national security and defence. The subject 'Military Studies' has failed to acquire its due recognition in the centres of learning. It will not be wrong to state here that even to-day a large section of teaching community thinks that military science embraces only some physical training, drill, weapon training etc. and the subject lacks in required depth, extension and importance. Probably for this reason most of the universities in India have not yet included 'Military Studies' as a subject for study in degree and post-graduate level. So long, army and its organisation were considered to be a matter of secrecy and to be maintained without any contact with the rest of the community. The rulers preferred privacy in respect of operation of either defence or aggression. They wrongly considered everything concerned with army organisation as tactics and strategy and not to be disclosed. The public should not be encouraged to know about anything what is military. Now-a-days it is debated that a large part of military science and technology concern many other academic disciplines like history, geography, physics, chemistry, biology, engineering, medicine, law and what not. Scholars and experts belonging to these fields should come forward to contribute to the field of Military Studies.

Museum movement has gathered considerable momentum in recent years, and current trend in museums all over the world has laid great emphasis on its role as a vital and most successful weapon for mass education and scholarly study, but in India, it is still in the stage of infancy. Except a few, in India, war materials are collected, stored and preserved carefully in the galleries of archaeological and anthropological sections of the museums.

To popularise the subject 'Military Studies' through quick and easy appreciation of various war materials by the common visitors, to fulfil its purpose and to reach the desired goal, regional and national museums of war materials are immediate need of the country.

'Tangible' is the key word to a knowledge of things. 'Seeing is believing'. This dictum is applicable to study not only military science but any subject of arts or science. A museum is the best place to see objects and to touch them if required for study.

For the purpose of education, the selection of war materials is a problem requiring much thought and imagination on the part of the museum educators. Firstly, the exhibits must be of interest to the different classes of visitors and of a nature to illustrate things which they hear or read about. Secondly, the objects must be reasonably safe to handle and this requirement is not easily met.

In the foregoing chapters the need and importance

of military studies and museum of war materials have been fully discussed. From the discussions the need is felt for a planned museum programme on military studies and the establishment of regional and national museums of war materials. This job is not at all difficult because the required accommodation, materials, man-power etc. are all available in India. The running expenditure is also not too much and the museum itself can earn a major portion of its revenue. The only thing that is required, the museum authority should feel and bear in mind that in a free country, the museums have also the duty to make the people disciplined and educate in military science to create interest among them in the defence system of the country. Researches in this respect will surely bring forth more and more new methods to make museums popular in this field of knowledge. In any educational programme on military topics for the lay visitors, the importance of museum education through recreation should not be ignored and the government should pay immediate attention to this vital problem. The government should come forward to help the museum authorities to collect informations about museums of war materials existing in different military establishments within India and similar museums in other developed and developing countries.

The Government of India Advisory Board of Museums, Ministry of Education, must constitute within its fold a wing to study and advice the means to popularise this important

and interesting subject. If necessary a separate wing under the joint auspices of the Ministries of Education and Defence may be opened for the purpose.

A survey should be made about the institutions on military studies, organisations having adventureous activities and children centres to make a planned programme for extending museum facilities on military studies at least on a regional basis.

Compulsory military education for a specific period must be introduced in all schools and colleges for every able bodied boys and girls below the age of twenty-six.

The universities in India should introduce 'Military Studies' as a subject for post-graduate study and grant affiliation of the subject in different colleges under their control. These colleges must have suitable museums of war materials as required for study and practice.

The last but not the least suggestion is that the Museum Association of India and other regional Associations of Museums should hold conferences with the psychologists, teachers on military studies, NCC officers (at least two from each Directorate/State), Vice-Chancellors of all universities in India and heads of organisations having adventureous activities to draw up a general programme for the whole nation, enunciating the guiding principles in this aspect and extend their good offices to the Government of India so that immediate work may be started in this branch of knowledge.

The present thesis may be considered as the first working paper necessary to establish such Museums of Military Studies or museum of war and weapons and deals comprehensively all the aspects of a Military Museum including the history of weapons, forts, flags, army organisation etc. This thesis may also be considered as the first reference book dealing with museum of military studies of Indian arms and armours, war and weapons, army and organisation, forts and flags, ships and airships, badges and billets and etc.

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APPENDIX - A

A few collections of war materials in India

Allahabad Museum, Allahabad, U.P.

Anthropology Department, Bangabasi College, Calcutta.

Anthropology Department, Calcutta University, Calcutta.

Anthropology Department, Delhi University, Delhi.

Anthropology Department, Lucknow University, Lucknow.

Archaeology Museum, Bijapur, Mysore.

Archaeology Museum, Kondapur, Andhra Pradesh.

Archaeological Museum and Picture Gallery, Trichur, Kerala.

Archaeological Museum, Red-Fort, Delhi.

Archaeological Museum, Sagar University, Saugar, M.P.

Army Museum, Pune, Maharastra.

Army Medical College Museum, Pune, Maharastra.

Asutosh Museum of Indian Art, Centenary Building, C.U.,Calcutta.

Bharat Kala Bhawan Museum of Art and Archaeology,B.H.U.,
Benaras, U.P.

Bharatiya Itihas Samsodhan Mandal Museum, Pune, Maharastra.

Baripada Museum, Baripada, Orissa.

Baroda Museum and Picture Gallery, Baroda, Gujrat.

Bhuri Singh Museum, Chamba, Himachal Pradesh.

Bangiya Sahitya Parishad Museum, Calcutta.

Border Security Force Museum, Indore, M.P.

Calcutta Police Training School, Calcutta.

Central Museum, Indore, Madhya Pradesh.

Central Museum, Nagpur, Maharastra.

Central Sikh Museum, Amritsar, E. Punjab.

Chandradhari Museum, Darbhanga, Bihar.

Dogra Art Gallery, Jammu, J & K.

Darbar Hall, Silehkhana, Junagadh, Gujrat.

Dhubela Palace State Museum, Nowgong, Madhya Pradesh.

Dr. Bhau Daji Lad Museum, Bombay.

Fort Saint George Museum, Madras.

Ganga Golden Jubilee Museum, Bikaner, Rajasthan.

Government Museum, Alwar, Rajasthan.

Government Museum, Gaya, Bihar.

Government Museum, Jaipur, Rajasthan.

Government Museum and National Art Gallery, Madras.

Government Museum, Simla, Himachal Pradesh.

Gurukul Kangri Museum, Hardwar, U.P.

Hazarduari Palace Museum, Murshidabad, West Bengal.

Indian Museum, Calcutta.

Indian War Memorial Museum, Red-Fort, Delhi.

I.V.K. Rajwada Samsodhan Mandal Museum, Dhulia.

Indian Military Academy Museum, Dehra-Dun, U.P.

Jamnagar Museum of Antiquities, Jamnagar, Gujrat.

Junagadh Museum, Junagadh, Gujrat.

Kolhapur Museum, Kolahpur, Maharastra.

Kutch Museum, Bhuj, Gujrat.

K.R.C.M. Government Museum, Kittur, Karnataka.

Khecking Museum, Khicking, Orissa.

Lady Wilson Museum, Dharampur, Rajasthan

Mohant Ghasidas Memorial Museum, Raipur, Madhya Pradesh.

Maratha History Museum, Deccan College P.G. Research Institute, Pune.

Museum of Antiquities, Padmanabhapuram, Tamil Nadu.

Museum and Saraswati Bhandar, Kotah, Rajasthan.

Mysore Government Museum, Bangalore, Mysore.

Nalanda Museum, Nalanda, Bihar.

National Museum, New Delhi.

National Defence Academy Museum, Khadakwasla, Pune.

Orissa State Museum, Bhubaneswar.

Patna Museum, Patna.

Prince of Wales Museum, Bombay.

Provincial Museum, Patiala, E. Punjab.

Rajputana Museum, Ajmer, Rajasthan.

Ramnagar Palace Museum, Varanasi, U.P.

Salar Jung Museum, Hyderabad, Andhra Pradesh.

Sardar Museum, Jodhpur, Rajasthan.

Sardar Vallabhbhai Patel Museum, Surat, Gujrat.

Sikar Museum, Sikar, Rajasthan.

S.P.S. Government Museum, Srinagar, J & K.

State Museum, Bharatpur, Rajasthan.

State Museum, Jamna Bagh, Gwalior, Madhya Pradesh.

State Museum, Lucknow, U.P.

State Museum, Hyderabad, Andhra Pradesh.

State Museum, Gauhati, Assam.

Sri Choturam Museum, Sangaria, Rajasthan.

Sri Venkateswara Museum, Titupati, Andhra Pradesh.

Tribal Research Institute, Chindwara, Madhya Pradesh.

Trichur Museum, Trichur, Kerala.

The Infantry School Museum, Mhow, Madhya Pradesh.

The Maharaja Sawai Man Singh II Museum, Jaipur, Rajasthan.

Victoria Hall Museum, Udaipur, Rajasthan.

Victoria Memorial Hall, Calcutta.

Watson Museum, Rajkot, Gujrat.

Note : Besides the places mentioned above, war materials can also be found in all State Archives and Regimental Centres, Schools/Academies of Indian Armed Forces, Territorial Army, Border Security Force, and National Cadet Corps.

APPENDIX - B

List of published articles.

Museum and Military Studies in India : BHARAT PROTIVA, Calcutta; Vol. II No.4

Fortification in India through Ages : Early period : BHARAT PROTIVA, Calcutta; Vol. II No. 11

Note: The article 'Museum and Military Studies in India' was read by the present scholar at Third Indian Social Science Congress held at Kanpur (Acharya Narendra Dev Mahapalika Mahila Mahavidyalaya) in the month of February, 1976.

PLATES

SOME INDIAN WEAPONS

Plates I to XLIV represent a few weapons of India. A museum of war materials can collect original objects or prepare replicas according to the descriptions available in different texts, records, sculptures, paintings, coins etc., of various types of weapons used in India through ages and exhibit them in galleries in a chronological order to present a complete theme about the nature, development, uses, effectiveness, materials used, legend associated, peculiarities if any and many other interesting points about Indian weaponry.

PLATE I

STONE AGE TOOLS

1) Handaxe : Unifacial pebble tool of Early Stone Age. Only working edges are flaked and is prepared by Anvil method (Block-on-block technique).

2) Handaxe : Triangular shaped tool of Early Stone Age. Probably prepared by Clactonian technique.

3) Handaxe : Heart shaped stone tool of Early Stone Age having broad butt end with incurved sides.

4) Borer-cum-scraper : A tool of Middle Stone Age. Probably used both for scraping and boring.

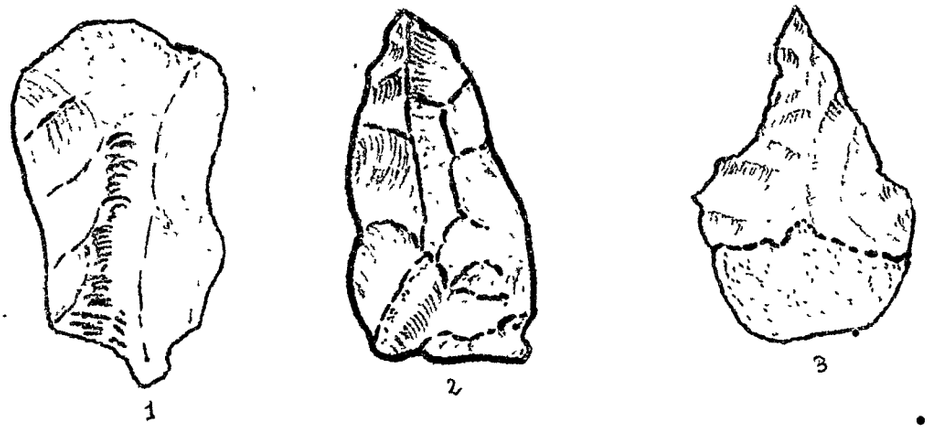
5) Bifacial Point : A tool of Middle Stone Age. Probably smaller and thinner Points served the purpose of arrow-heads and larger ones used as spear- or javelin heads.

6) Mace head or Ring-stone : A tool of Late Stone Age. Probably prepared by grinding and polishing technique.

7) Axe inserted in an antler sleeve. It is a tool of Late Stone Age.

8) A spear head hafted in a wooden pole. It too belongs to Late Stone Age. This hafting could be done in many ways and this hafting technique continued in latter period.

(Collection: Department of Anthropology,
Bangabasi College, Calcutta)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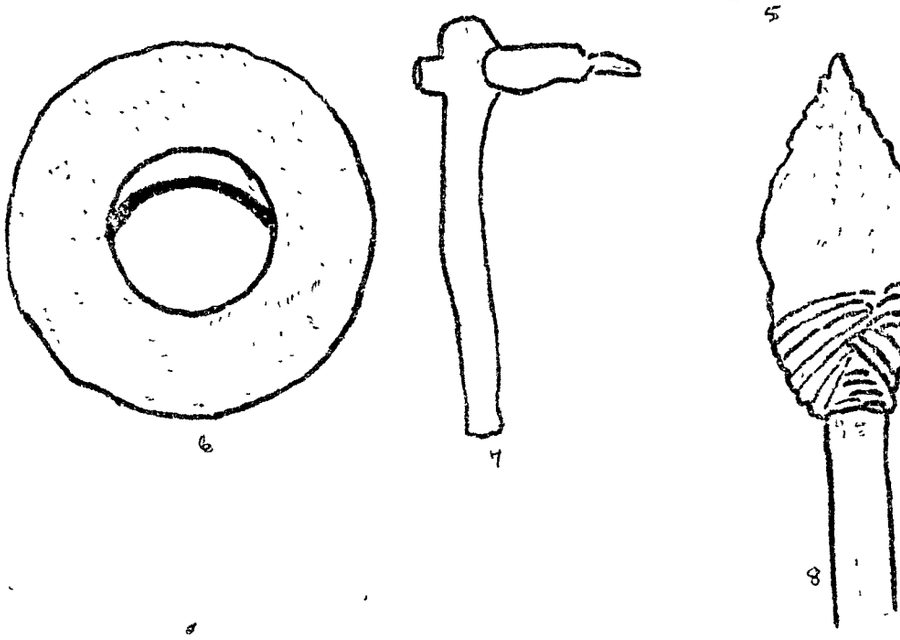
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PLATE II

INDUS VALLEY WEAPONS

1-3) Spear-heads : Bronze spear-heads of different shapes. Probably used by setting in the split-end of shafts.

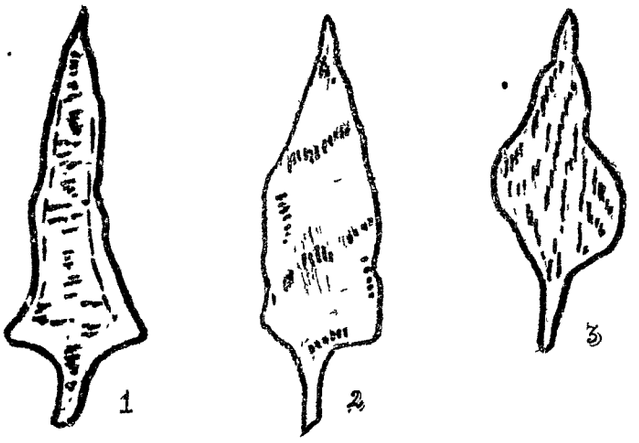
4) Arrow-head : Copper arrow-head with narrow barbs but no tang. Probably used by inserting it in a split bamboo shaft. It was difficult to set it in wooden shaft without enclosing a portion of the arrow-head into the shaft.

5) Axe-adze with shaft-hole : Its working end is crescent shaped, the butt end is straight but slightly curved and the middle portion is the thickest.

7-8) Parallel-sided Chert-Flakes : These were probably used for cutting like knives.

6) Copper Flat Axe : Sides are nearly parallel, the butt end is more or less straight and in cross section it is double convex.

(Source : G.N.Pant — Studies in Indian weapons and warfare.)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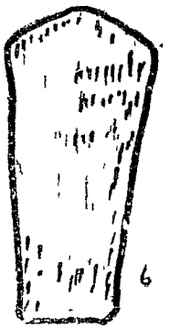
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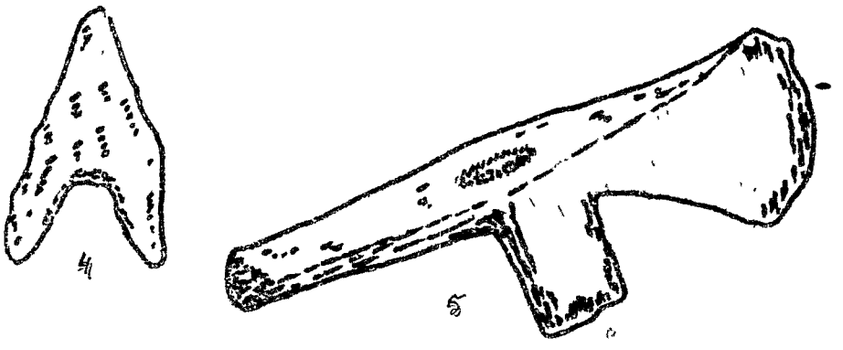
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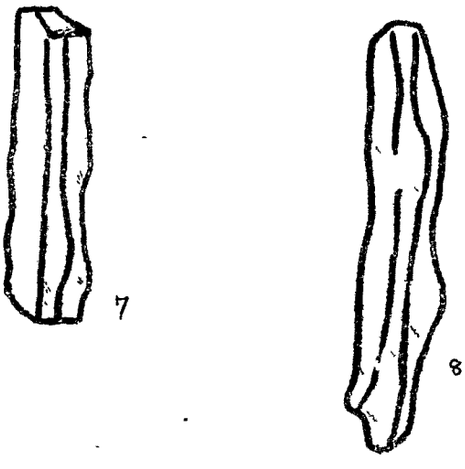
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PLATE III

COPPER HOARD WEAPONS

1-2) Antennae swords : These are long, tapering swords with strong medial rib and bifurcated hilt like the antennae of an insect. The hilt and the blade are of one cast.

3) Bar-celt : It is a parallel sided bar of about two feet long and six inches width with a rectangular cross-section but upper side convex.

4-7) Axes : Simple flat copper axes of different shapes and sizes.

8) Anthropomorphic figure : Probably it was a throwing weapon or an all purpose tool.

9-10) Harpoons : These are barbed arrow-like weapons having strong medial rib and tapering blades. Finely curved barbs of cylindrical cross-section are at the middle region. A hole is present at the junction of the tang and the barbed portion. Probably the hole is for the purpose of tying the weapon to a shaft.

(Collection : Allahabad Museum, Allahabad, U.P.)

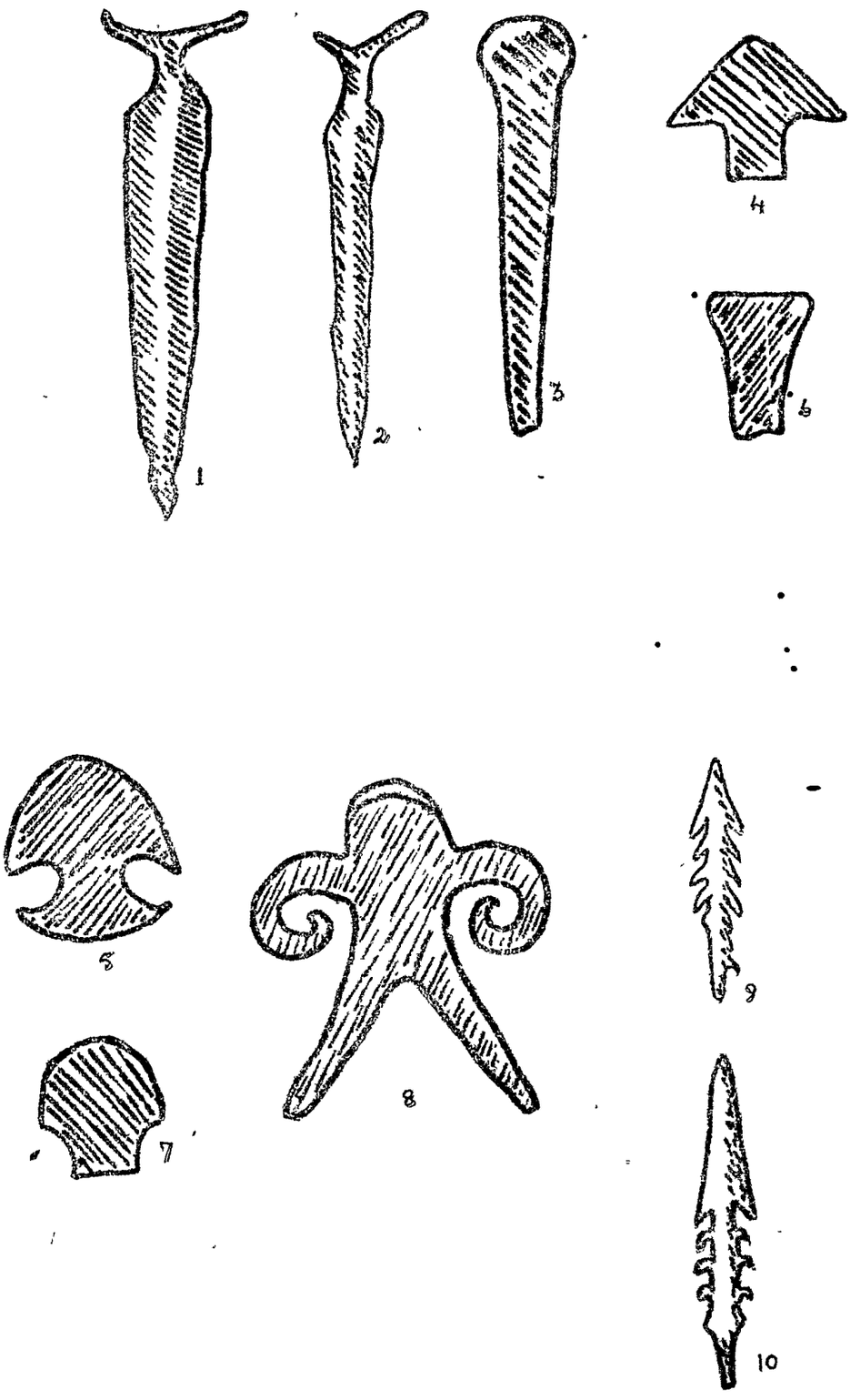
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PLATE IV

Antennae swords from Kallur, Rāichur District, Karnāṭak

(Collection : State Museum, Hyderabad)

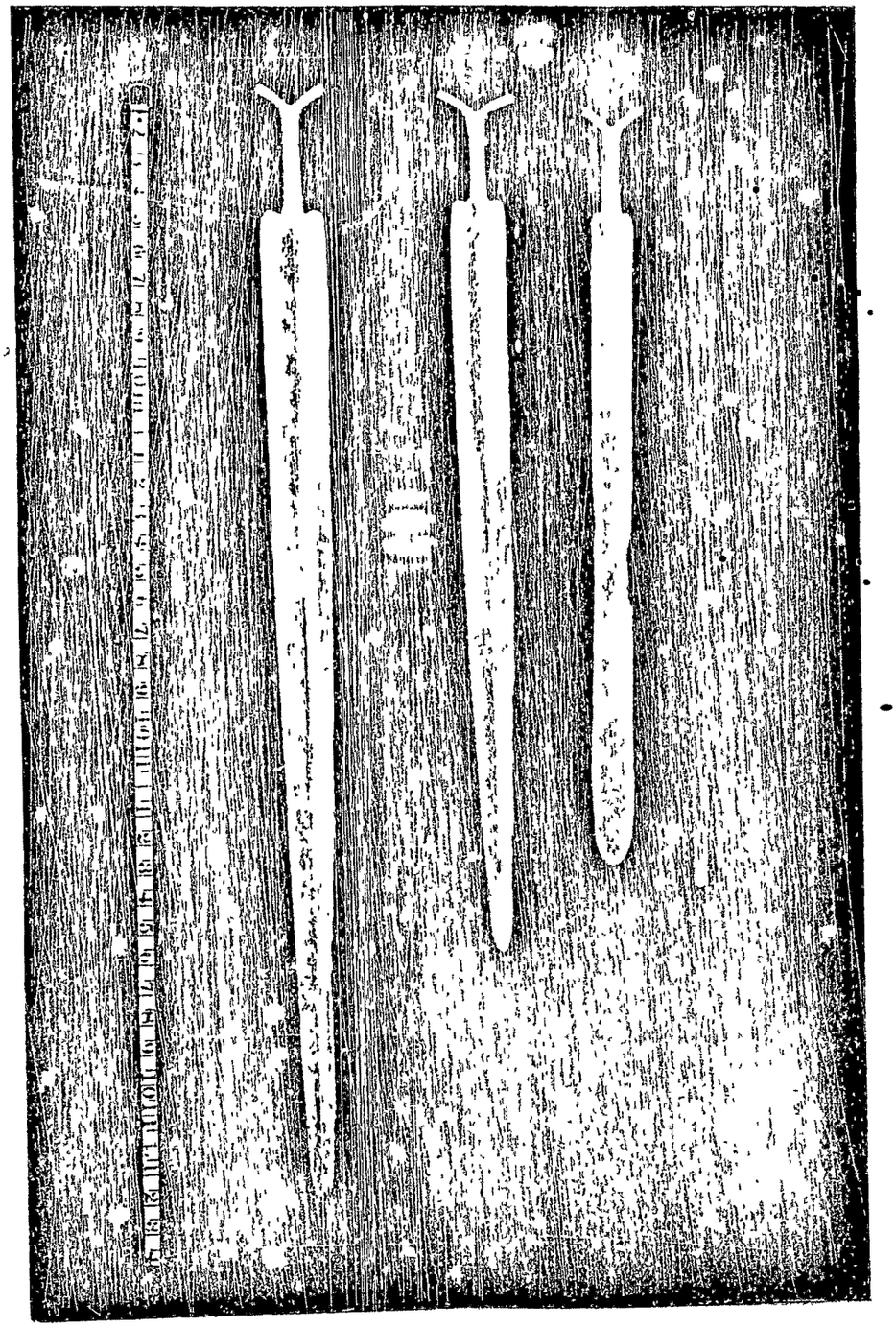


PLATE V

TOP : WAR MATERIALS FROM SĀNCHI BAS-RELIEF

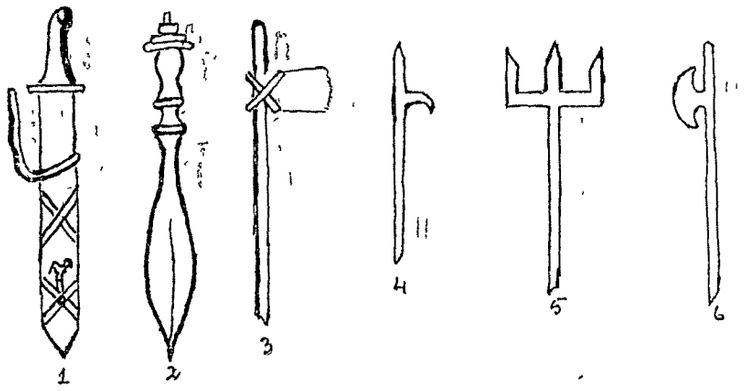
(1) Sword, (2) Dagger, (3) Simple Axe, (4) Elephant goad (ankuś), (5) Trident, (6) Battle-Axe, (7) Javelin, (8) Infantry shield, (9) Thunderbolt (vajra), (10-11) Cavalry shield.

(Souree : G.N.Pant - Studies in Indian weapons warfare)

BELOW : VEDIC ARROWHEADS

(1) Sucimukha, (2) Khurapra, (3) Ardhacandra, (4) Batsadanta, (5) Gopuccha, (6) Aramukha, (7) Karanika, (8) Kākatuṇḍa, (9) Valla, (10) Dibivalla.

(Conjectural drawings by the present scholar)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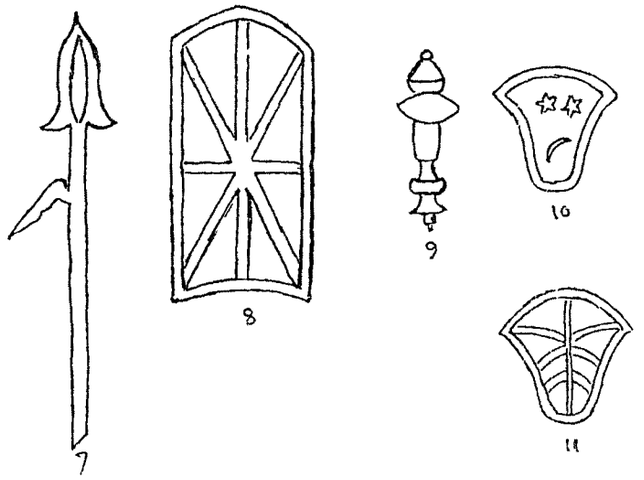
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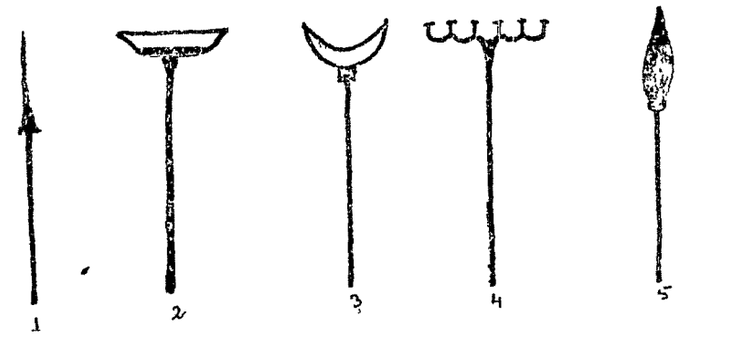
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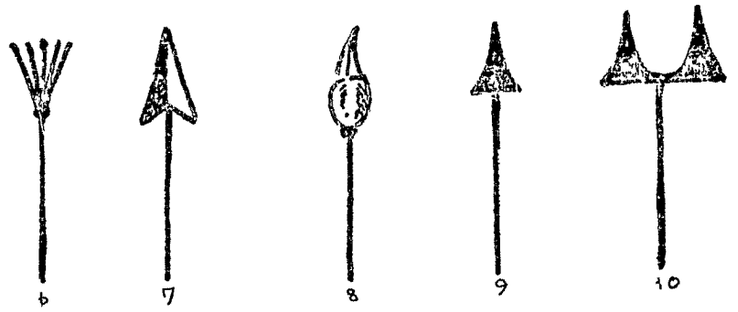
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PLATE VI

TOP : WEAPONS ON PUNCH-MARKED AND TRIBAL COINS

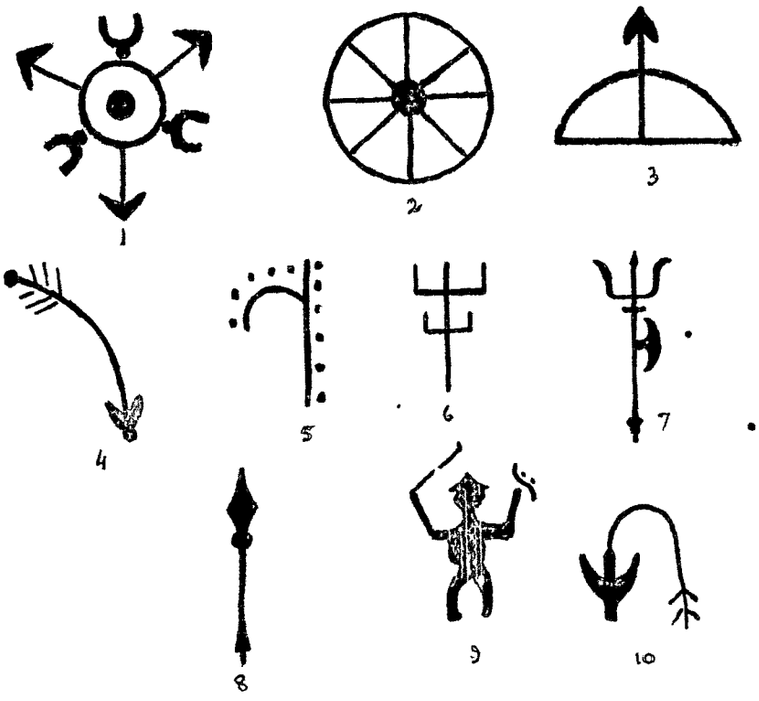
(1) Arrows round a wheel, (2) Cakra, (3) Simple bow with arrow, (4) Curved arrow, (5) Elephant goad (?), (6) Battle-axe (?), (7) Trident with battle-axe, (8) Spear, (9) Human figure carrying sword and shield, (10) Curved arrow.

(Source : G.N.Pant - Studies in Indian weapons and warfare).

BELOW : WEAPONS FROM THE SCULPTURE AT UDAIGIRI

(1) Straight sword, (2-3) Tridents, (4) Arrow, (5) Shield, (6) Thunderbolt (vajra), (7) Simple bow.

(Source : G.N.Pant - Studies in Indian weapons and warfare).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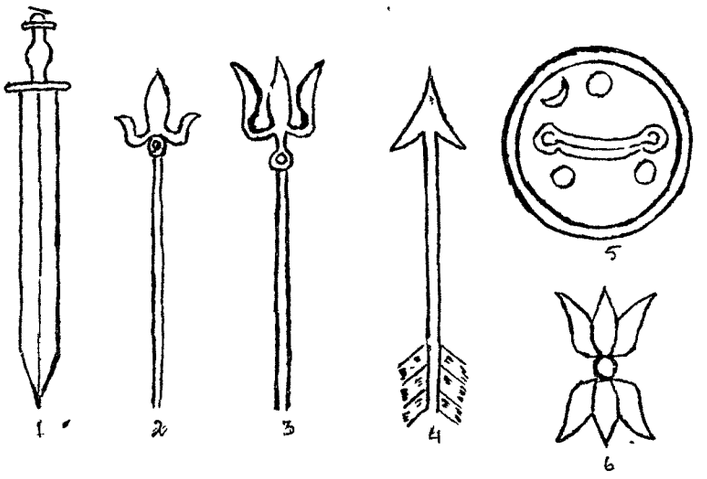
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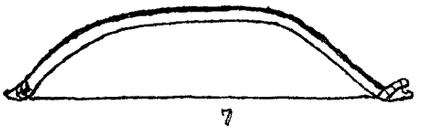
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PLATE VII

WEAPONS ON GUPTA COINS

First row from the top : Different types of spears.

Second row from the top : Different types of battle-axes.

Third row from the top : Different types of bows and arrows.

Fourth row from the top : Spear and different types of swords.

(Source : G.N.Pant - Studies in Indian weapons and warfare).

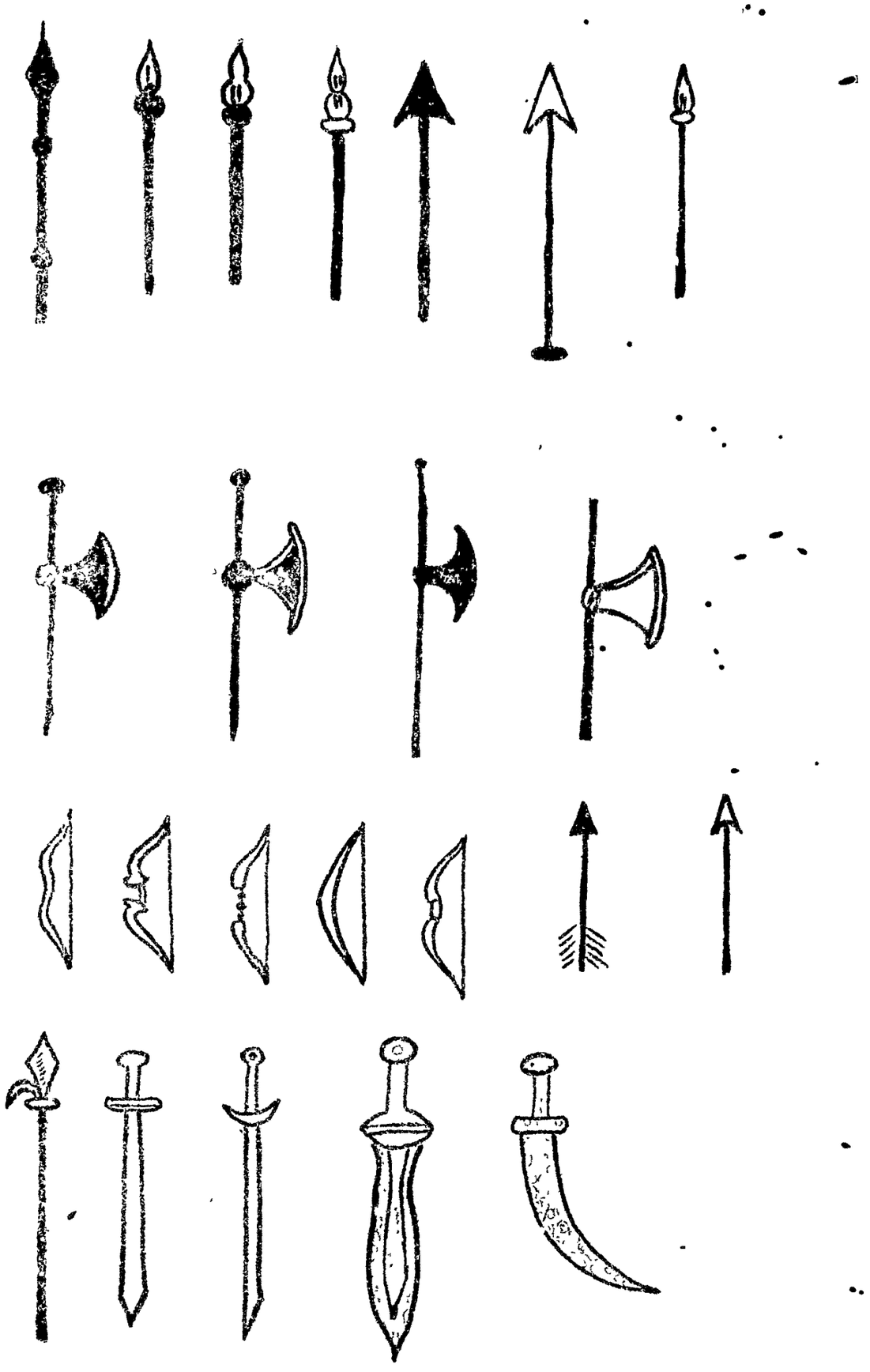

PLATE VIII

AN INSCRIBED BOW OF EARLY 17TH CENTURY A.D.

(Collection : National Museum, New Delhi)

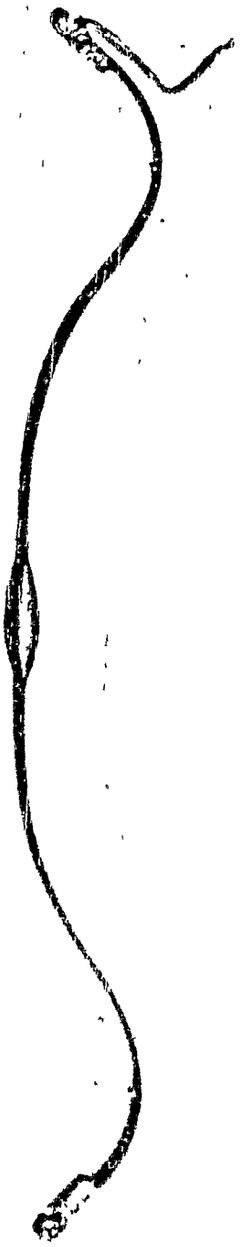

PLATE IX

BOWS AND ARROWS OF 19TH CENTURY A.D.

(Collection : State Museum, Hyderabad)

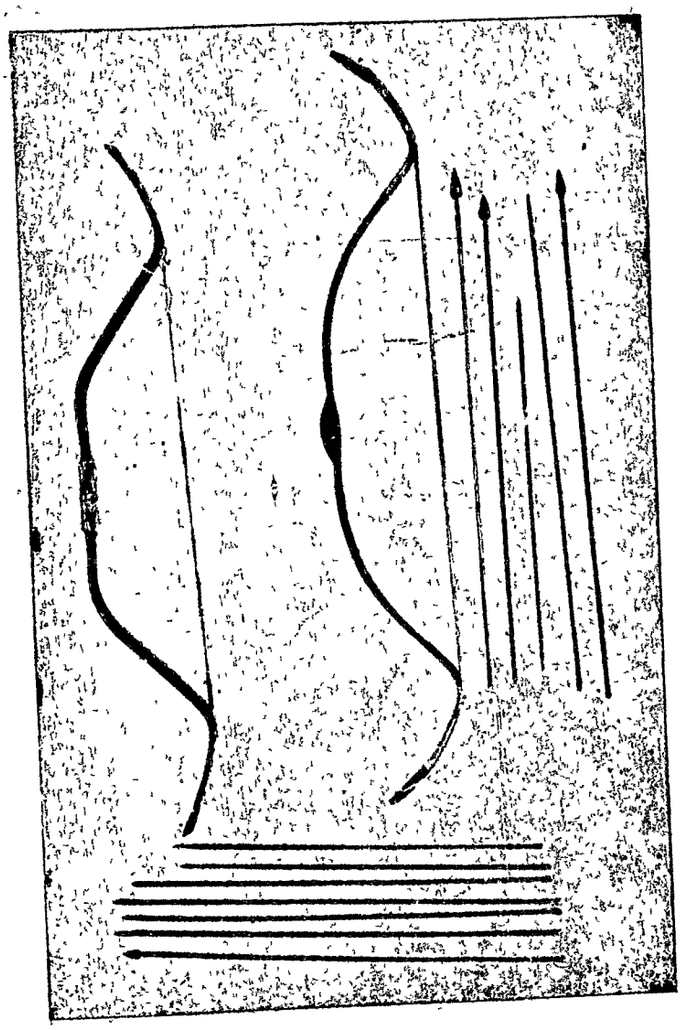

PLATE X

WEAPONS OF GURU GOBINDA SINGHJI (c.1675-1708 A.D.)

(Collection : Central Sikh Museum, Amritsar)

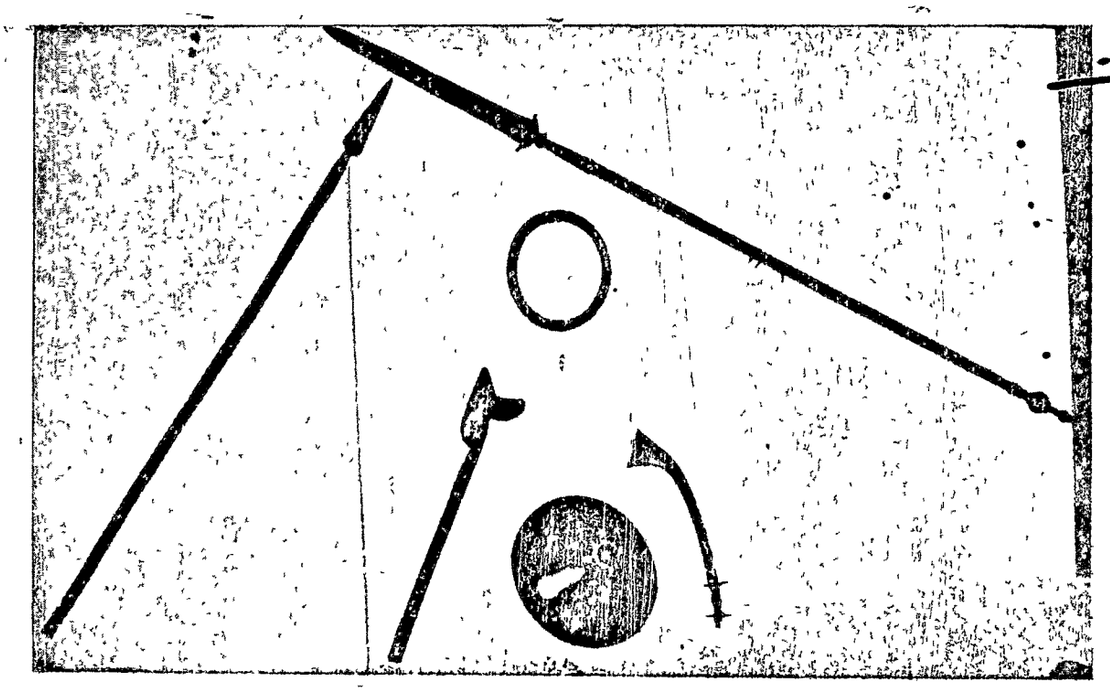

PLATE XI

SPEARS AND LANCES OF 19TH CENTURY A.D.

(Collection : State Museum, Hyderabad).

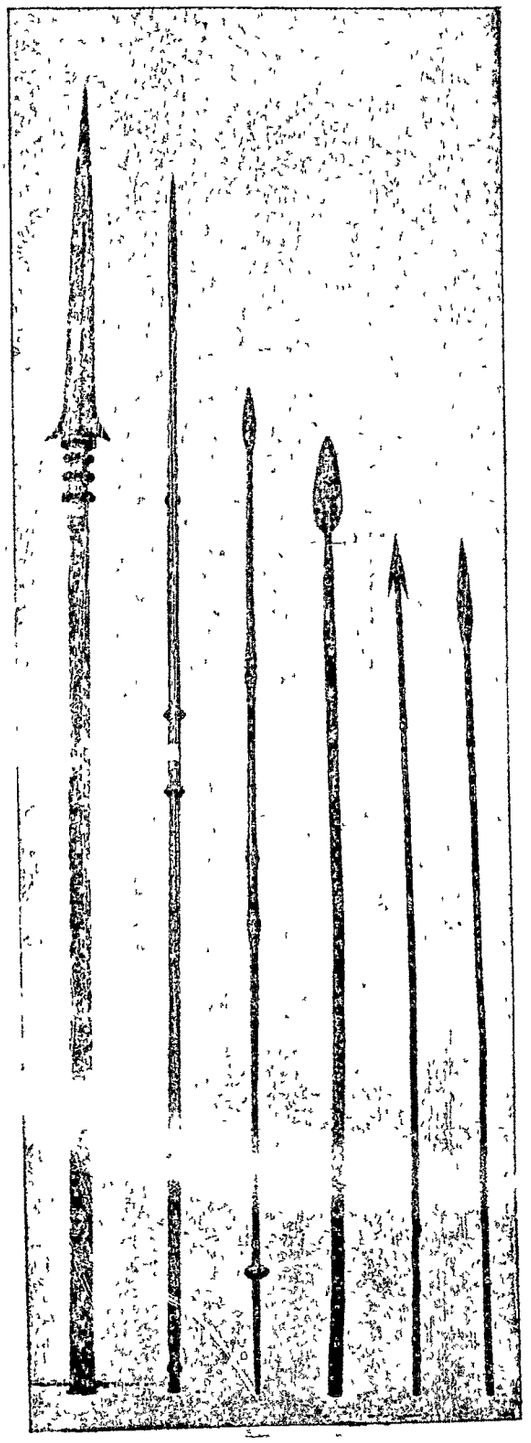

PLATE XII

A FEW WEAPONS USED BY THE SIKHS OF 17TH-18TH CENTURY A.D.

(Collection : National Museum, New Delhi)

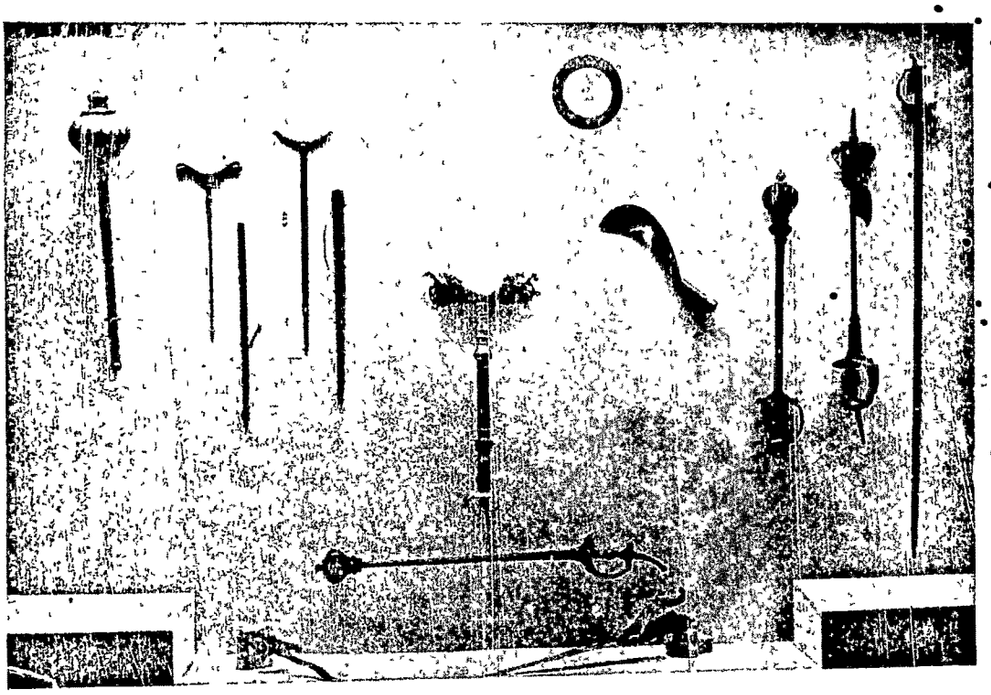

PLATE XIII

SPEARS, BOWS AND BOOMERANGS OF 18TH CENTURY A.D.

(Collection : The Government Museum, Pudukkottai,
Tamil Nadu).

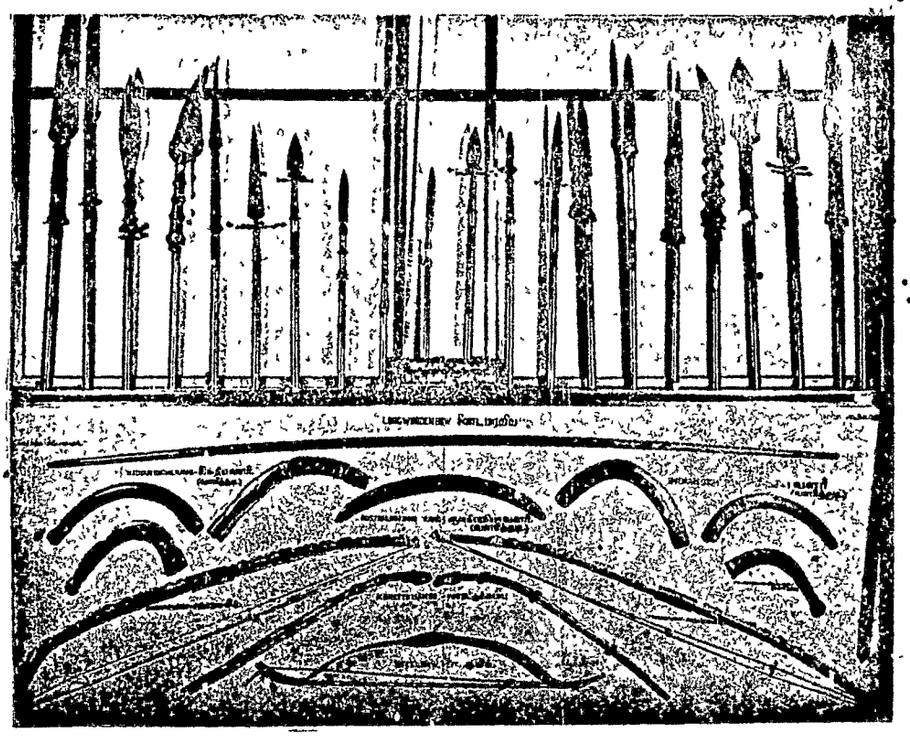

PLATE XIV

MĀROO OR BHID-CHIR OF 18TH CENTURY USED BY THE MARATHAS

(Collection : National Museum, New Delhi)

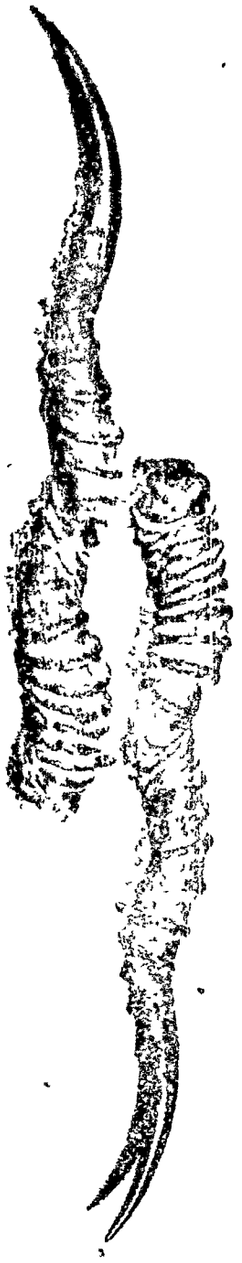

PLATE XV

MUGHAL WEAPONS

1) Shāmsher : A sword having slightly bent blade.
2) Khadā : A straight sword.
3, 3a) Guptis : Swords within walking sticks
4) Jamdhār : A double edged broad dagger with 'H' shaped hilt.
5) Khanjar : A curved dagger with triangular shaped hilt.
6) Jamkhak : A simple curved dagger.
7) Bāk : A curved knife.
8) Jhambwā : A curved dagger with simple hilt.
9) Kātārā : A long and narrow dagger similar to a Jamdhār.
10) Narsing-moth: A short and narrow dagger like a Jamkhak but the hilt differs.
11) Kaman : A simple bow.
12-13) Takhash Kaman & Tir : A small bow and the arrow.
14a) Tir : A simple arrow
14b) Paikarkash: The arrow-drawer
15) Tarkash : The quiver
16-18) Nezā, Barchā, Sak : Varieties of Lances.
19-20) Sainthi and Selara: Varieties of spears.
21) Sushbur : A club meaning lung-tearer.
22) Tabar : The battle-axe.
23) Gurz : A kind of mace.
24) Zaghnal : A battle-axe with crow-bill type head.
25) Cakra : A ring like weapon with sharp outer edge.
26) Tabar-zaghnal : A double axe.
27) Tarangalà : [redacted] Use not known. Probably used by the cavalry men.
28) Kard : A kind of knife.

(Source : Blochmann - Āin-i-Akbari)

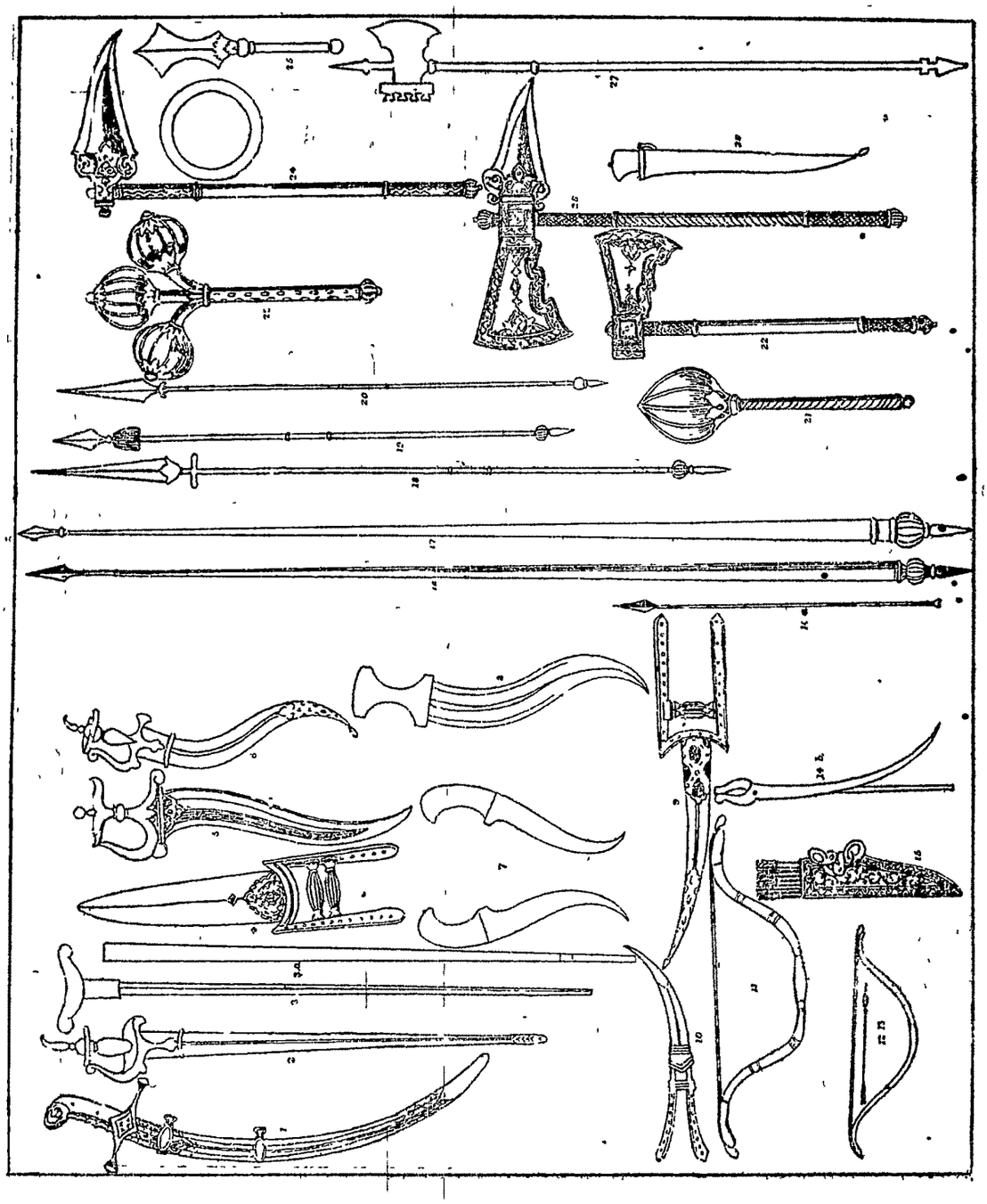

PLATE XVI

(Left to Right)

Khanjarā, Jambiā, Peshkabja and Kāṭār of 18th century A.D.

(Collection : State Museum, Hyderabad.)

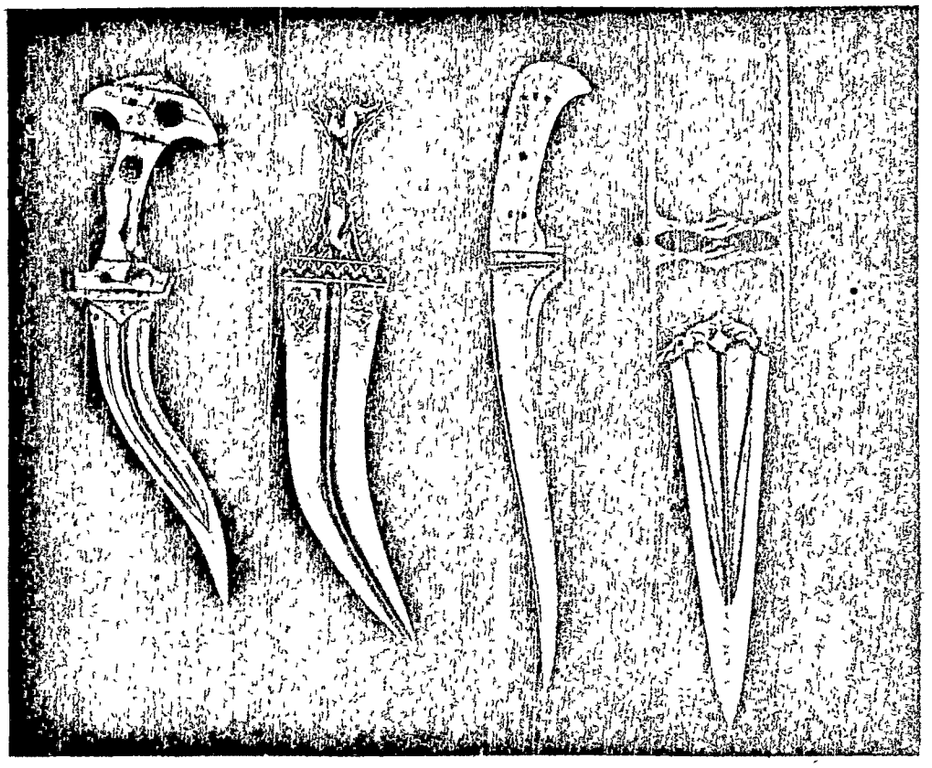

PLATE XVII

Teghā swords of 18th century A.D.

(Collection : State Museum, Hyderabad)

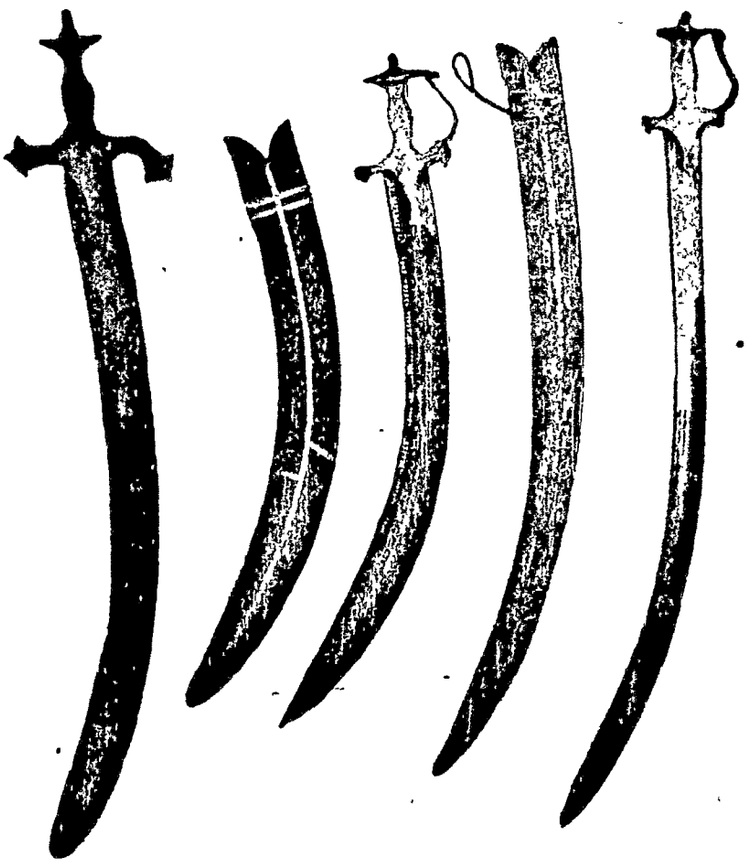

PLATE XVIII

Top : Battle-axe of Nādirshah.

Below: (L to R) Khaṇḍa of Aurangzeb,
Sword of Tipu Sultān,
Dagger of Aurangzeb.

(Collection : National Museum, New Delhi)

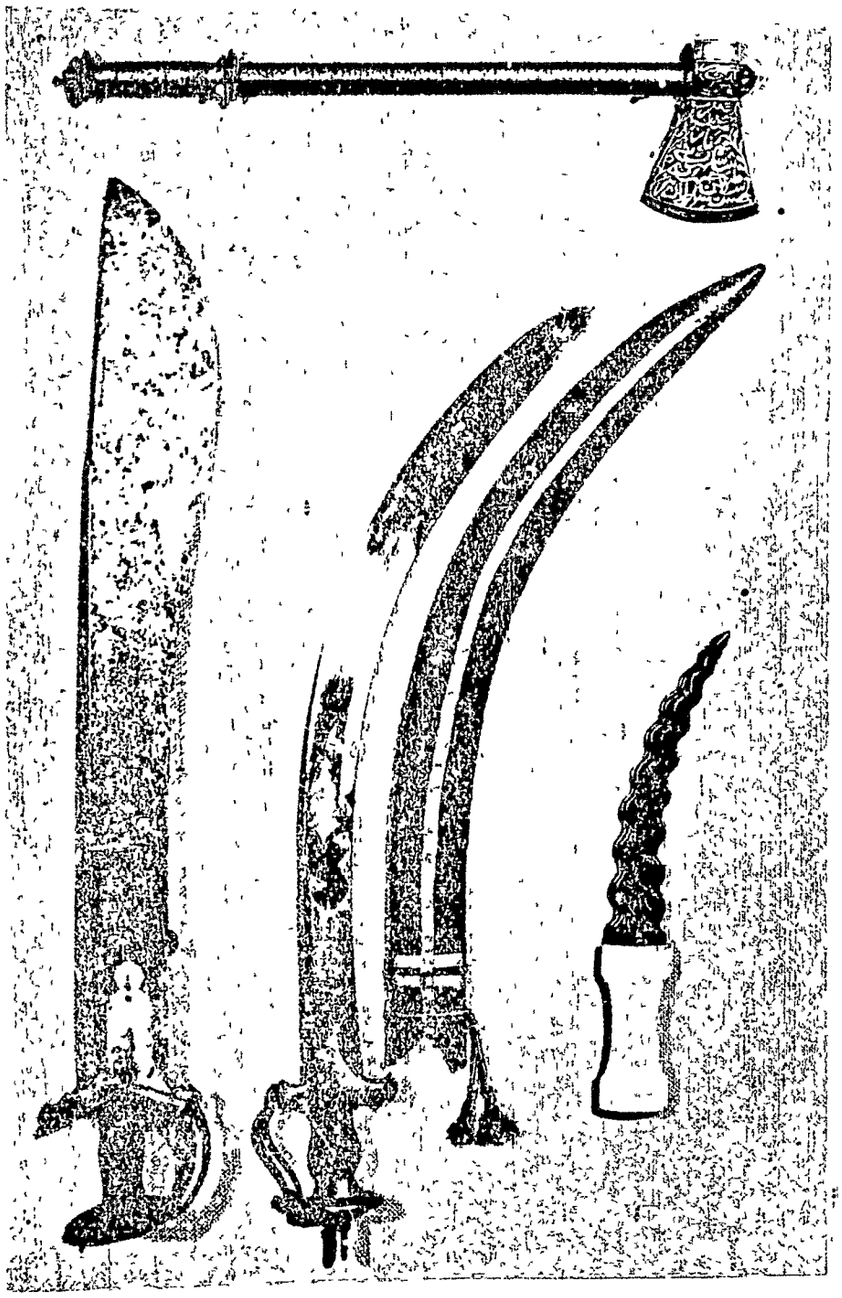

PLATE XIX

Sword of Netāji Subhās Chandra Bose

(Collection : National Museum, New Delhi)

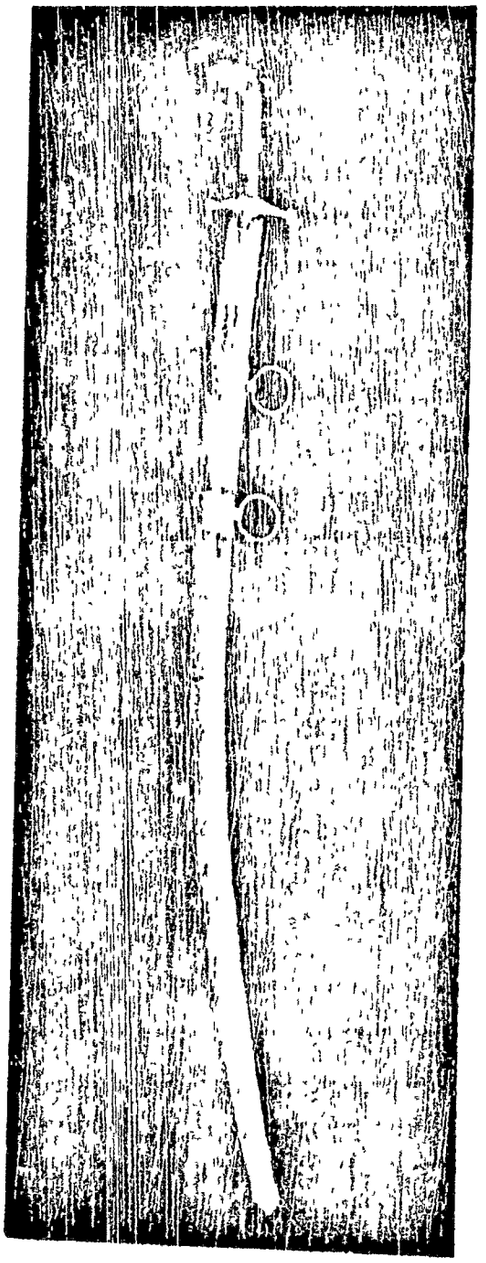

PLATE XX

Quāmā with horn hilt; blade double-edged, grooved and tapering to the point. (18th century A.D.)

(Collection : State Museum, Hyderabad)

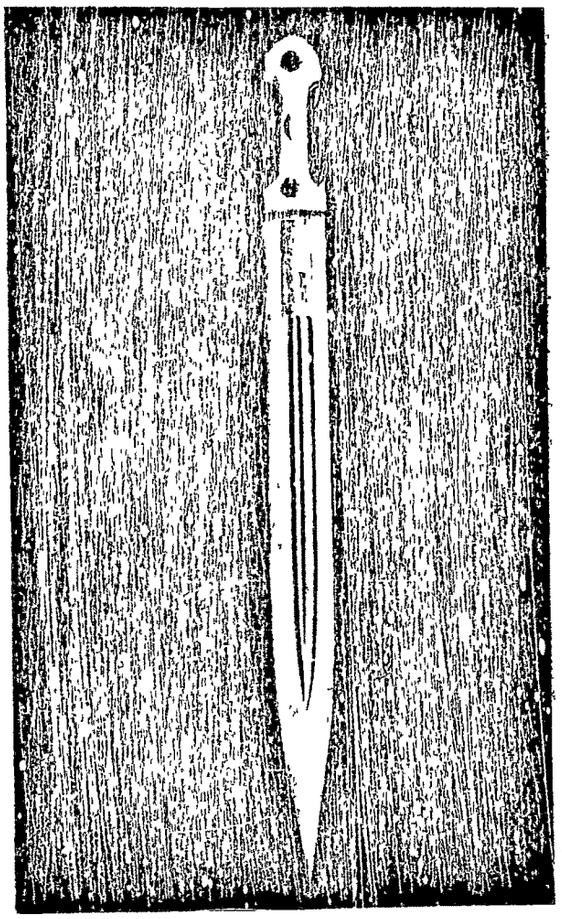

PLATE XXI

Daggers with Jade-hilt, studded with precious stones of 18th century A.D.

(Collection : State Museum, Hyderabad)

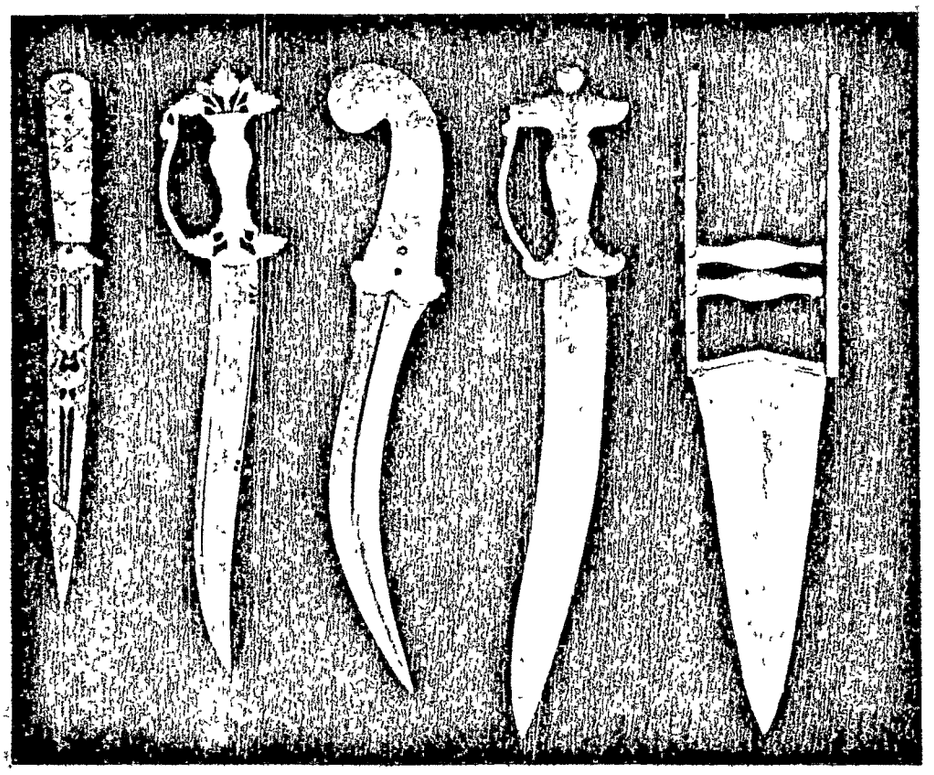

PLATE XXII

Left to right :

1. Gurgaz with multi-bladed head, basket hilt and spike. (18th century A.D.)
2. Gurz made of steel. (18th century A.D.)
3. Gurz made of steel. (18th century A.D.)
4. Māru with two-pronged blade on either side and the handle in the middle. (18th century A.D.)

(Collection : State Museum, Hyderabad.)

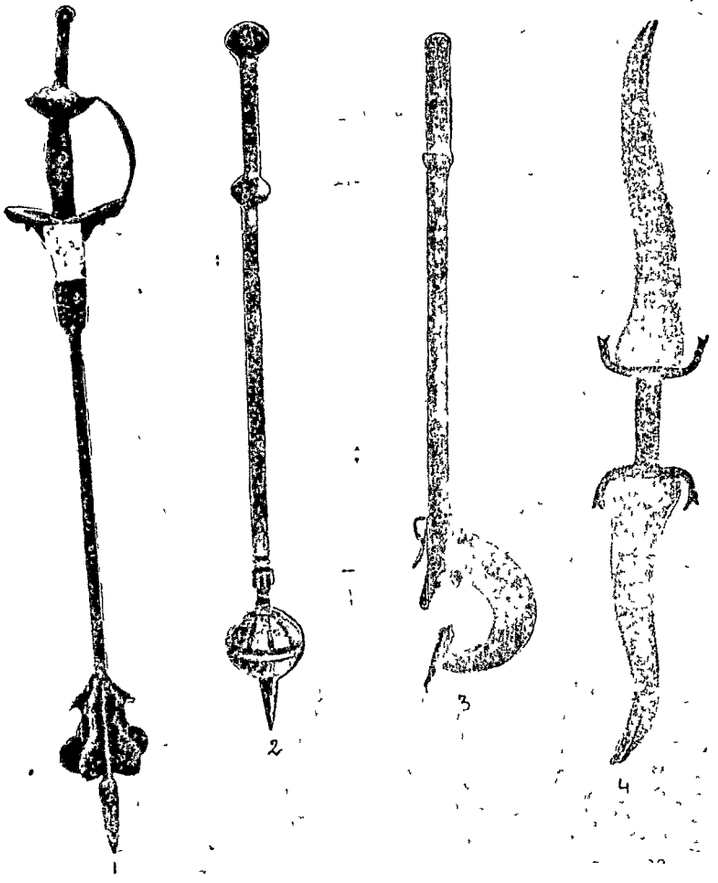
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PLATE XXIII

Left to Right :

1. Parasu with handle and blade made of steel. Handle has a gupti inside. (18th century A.D.)
2. Tabar with blade pierced and spike above. The handle has a gupti concealed inside. (18th century A.D.)
3. Jaghnol with crow-bill type blade. The handle has a gupti inside. (18th century A.D.)
4. Jaghnol with crow-bill type double blades, a disc and spike above. The handle has a gupti inside. (18th century A.D.)

(Collection : State Museum, Hyderabad)

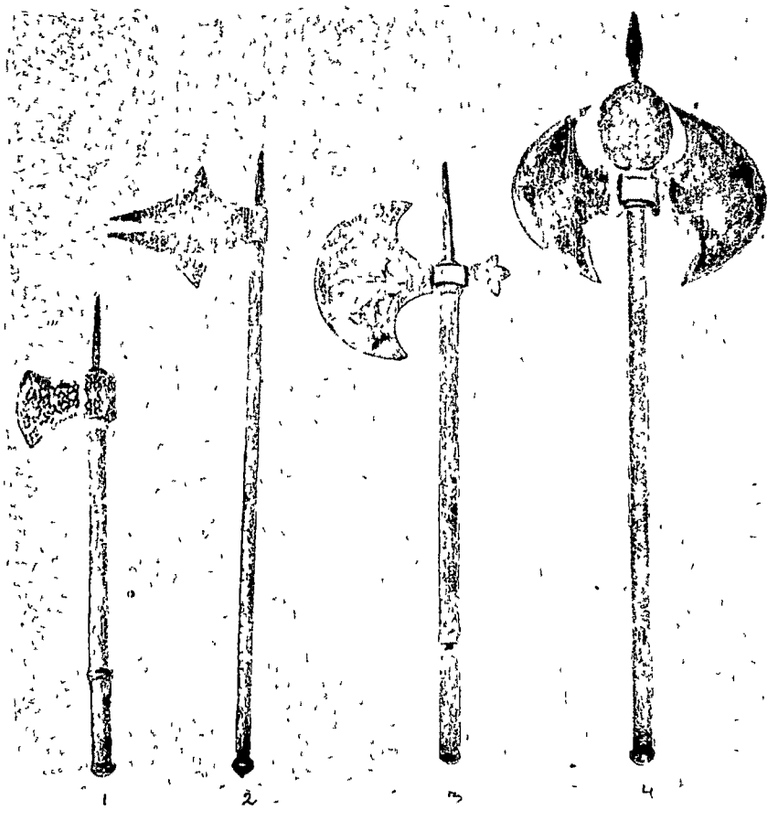
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PLATE XXIV

Tulf-i-khār, the curved sword with the basket hilt and spike. The blade is dented and forked. (18th century A.D.)

(Collection : State Museum, Hyderabad)

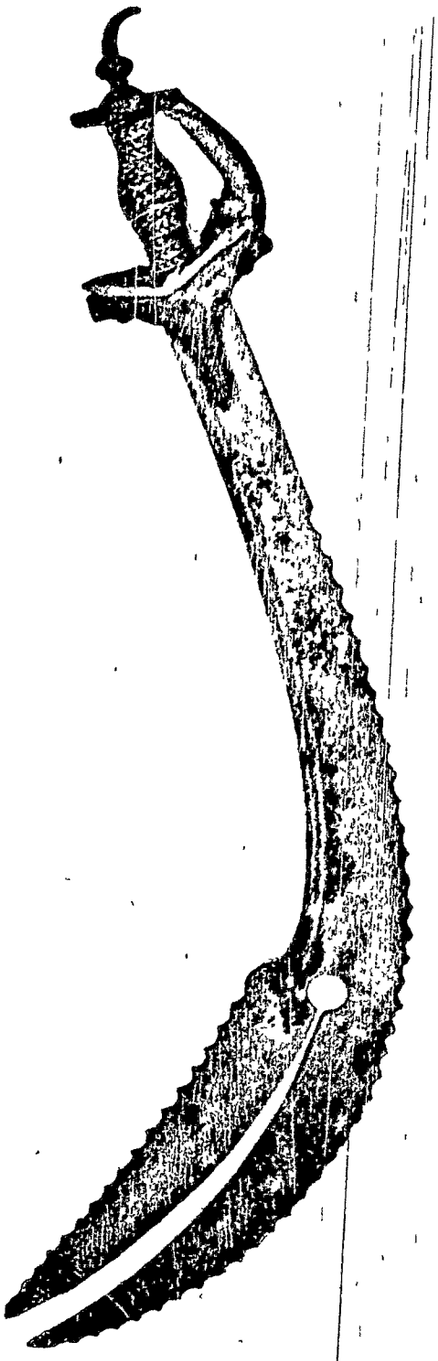


PLATE XXV

Persian-type sword, Talwār of c.17th century A.D.

(Collection : State Museum, Hyderabad)

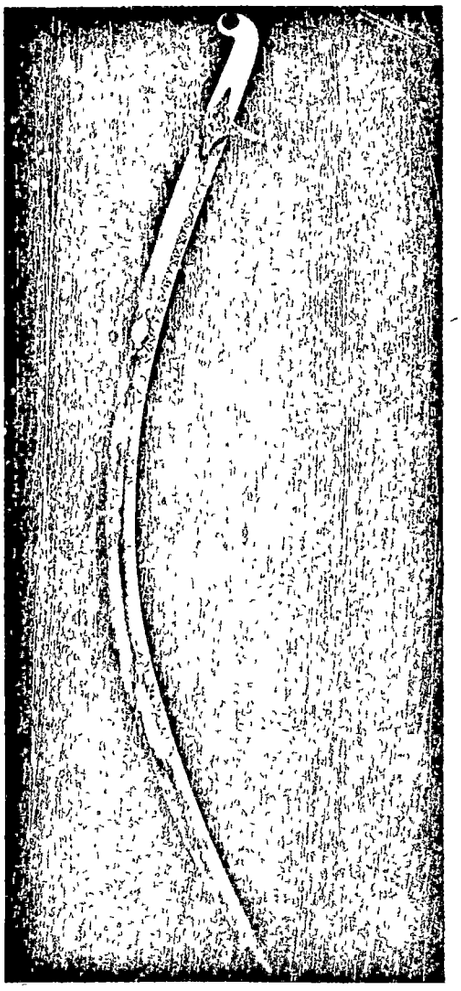


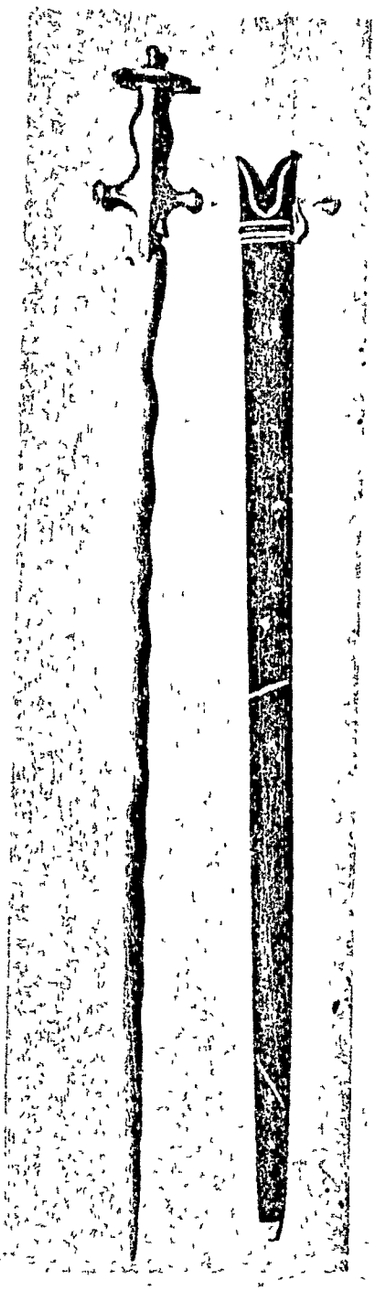
PLATE XXVI

RAJPUT SWORDS

Left : Sakelā blade with scabbard of late 17th century A.D.

Right : Kirk Narduban of c 1750 A.D. of Jaipur.

(Collection: National Museum, New Delhi)



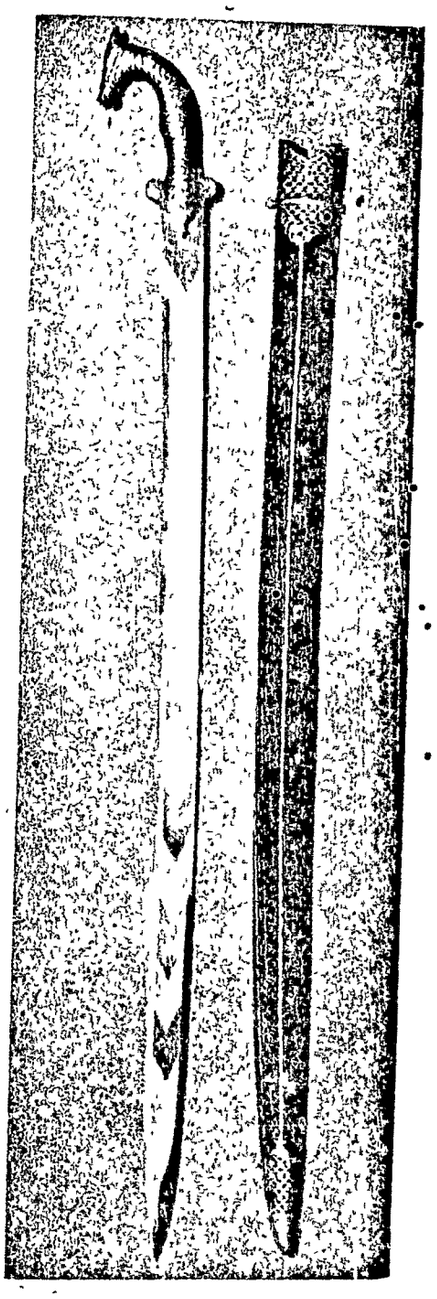


PLATE XXVII

Studding of jewels on the hilts of swords of early 19th century A.D. The inscription gives the owner's name as Nizām, the ruler of Hyderabad State.

(Collection : State Museum, Hyderabad)

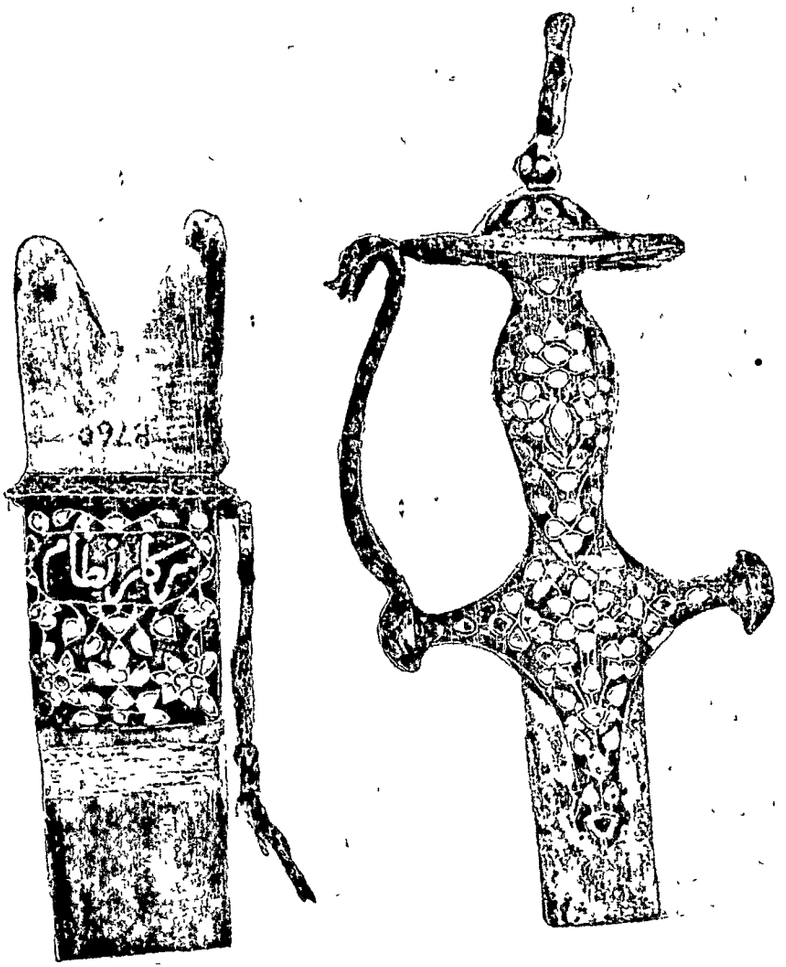


PLATE XXVIII

STRAIGHT SWORDS

Left : Pāṭà with gauntlet hilt which is carved with figures of birds and floral design. The blade is tapering and double-edged. The blade is inscribed with Qurānic verses and the parasol insignia in gold. (early 18th century A.D.)

Right : Pāṭā with gauntlet hilt chiselled and decked with animal figures. The blade is double-edged and tapering. (18th century A.D.)

(Collection : State Museum, Hyderabad)

PLATE XXIX

STRAIGHT SWORDS

Left to Right :

1. Khanda with basket hilt. The hilt and re-inforcement are decorated with gold inlay. The hilt has a spike above and velvet padding inside. The blade is straight and tongue-shaped. (18th century A.D.)

2. Khanda with ordinary Indo-Muslim hilt and the straight spoon-shaped blade. (18th century A.D.)

3. Khanda with basket hilt, chiselled and gold-plated. This has reinforcement on the upper edge only. (18th century).

4. Khanda with basket hilt made of steel. The hilt is padded inside and a spike above. The blade is re-inforced, double-edged and tapering. (18th century A.D.).

(Collection : State Museum, Hyderabad)

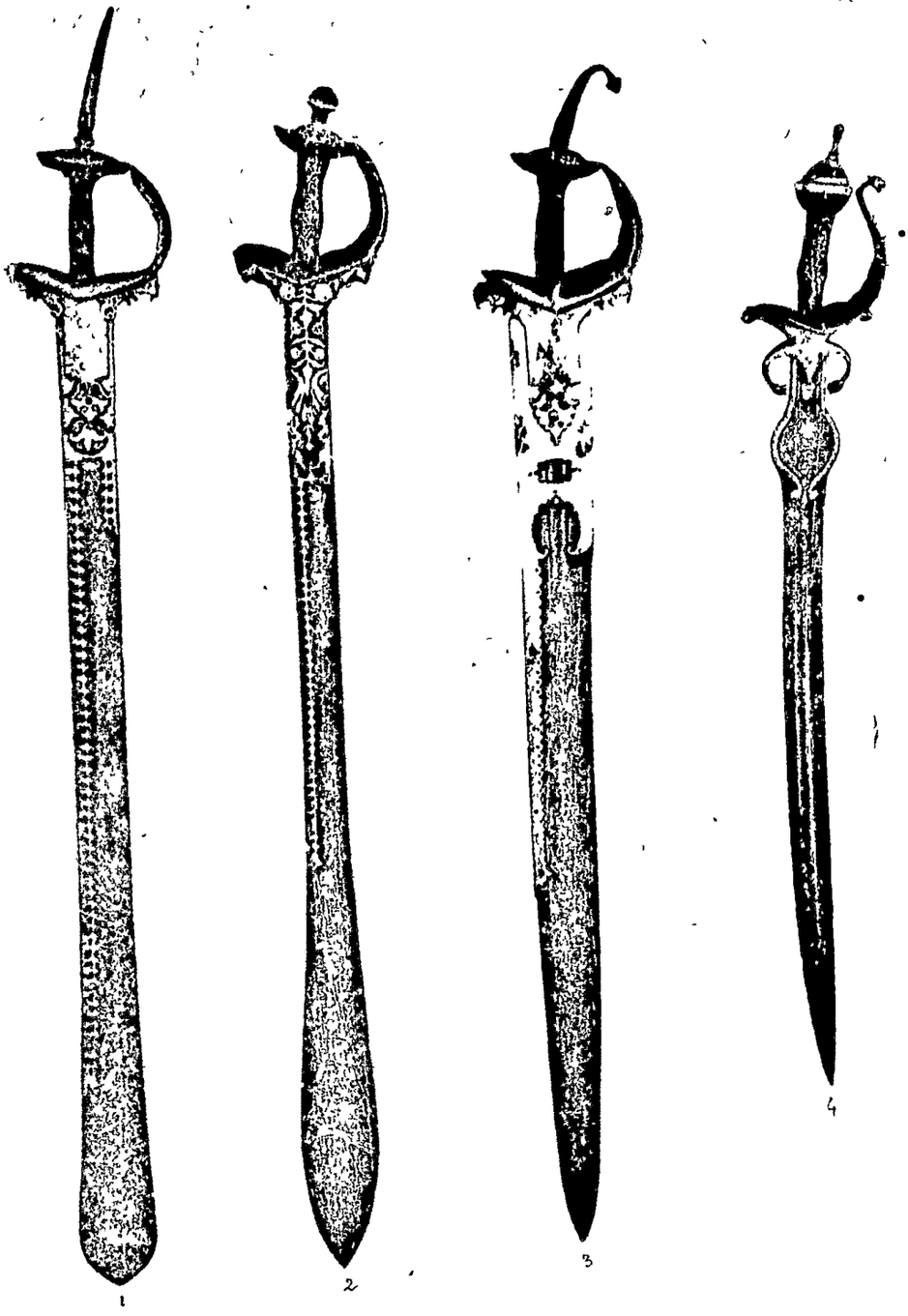

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PLATE XXX

Chiselled workmanship on the hilts and blades of swords.

(Collection : State Museum, Hyderabad)

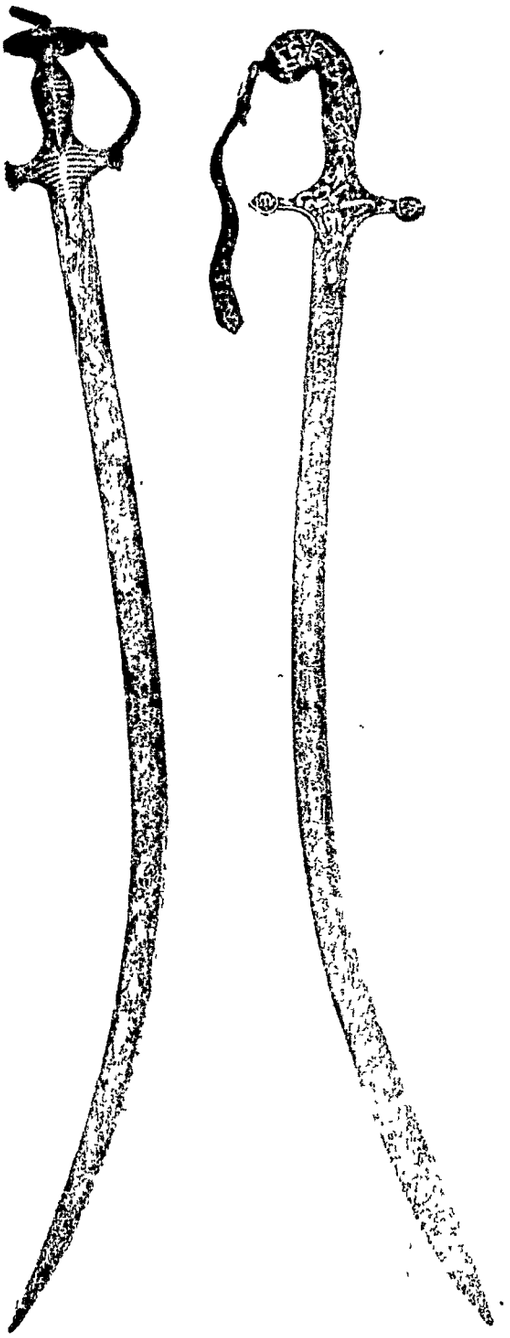


PLATE XXXI

Close-up view of the gold-inlay on the Hilt.

(Collection : State Museum, Hyderabad)

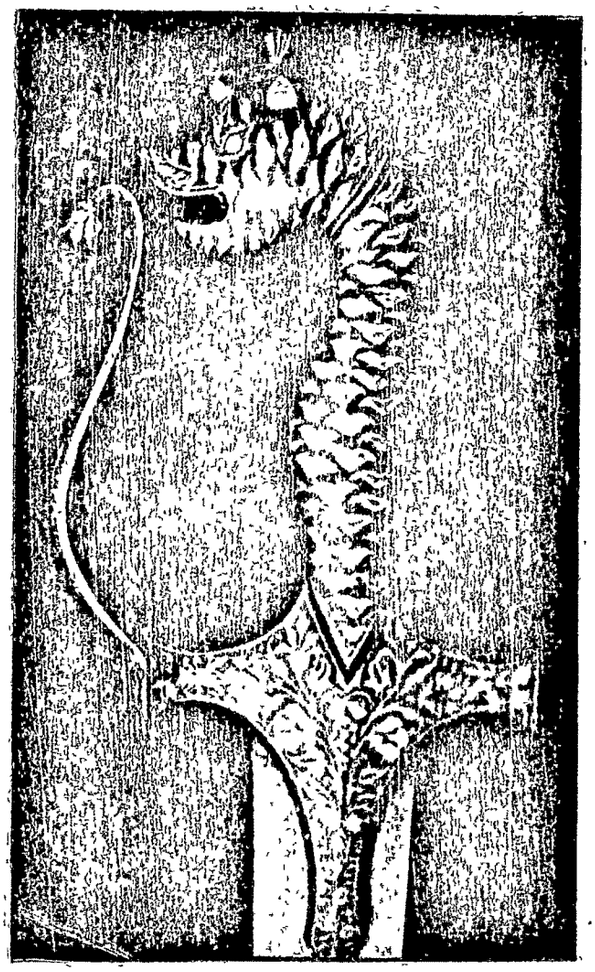


PLATE XXXII

Hilt of a sword with gold 'Tahnishan' work, i.e., inlay of gold or silver wire in deep cuttings.

(Collections: State Museum, Hyderabad)

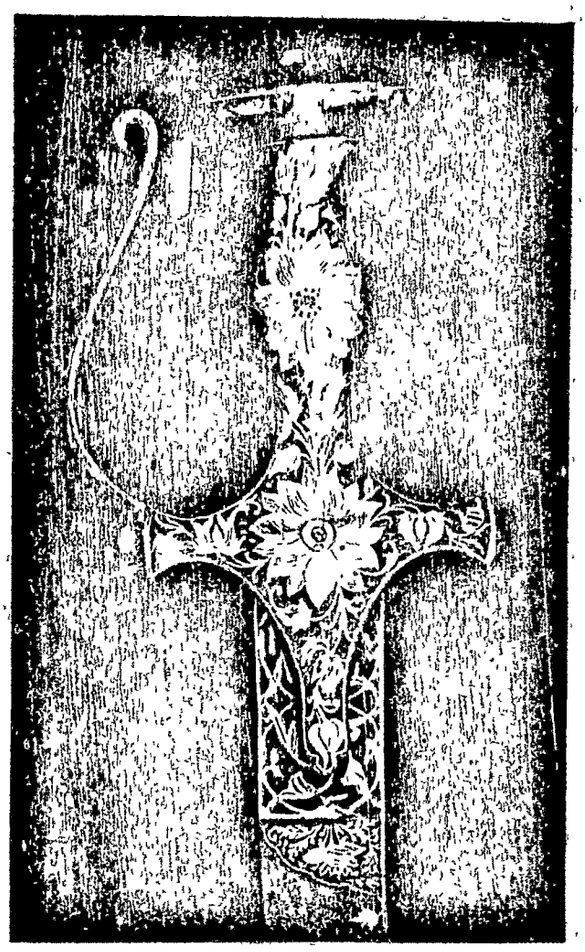


PLATE XXXIII

Close-up view of the inscribed section of the blade.

(Collection : State Museum, Hyderabad)

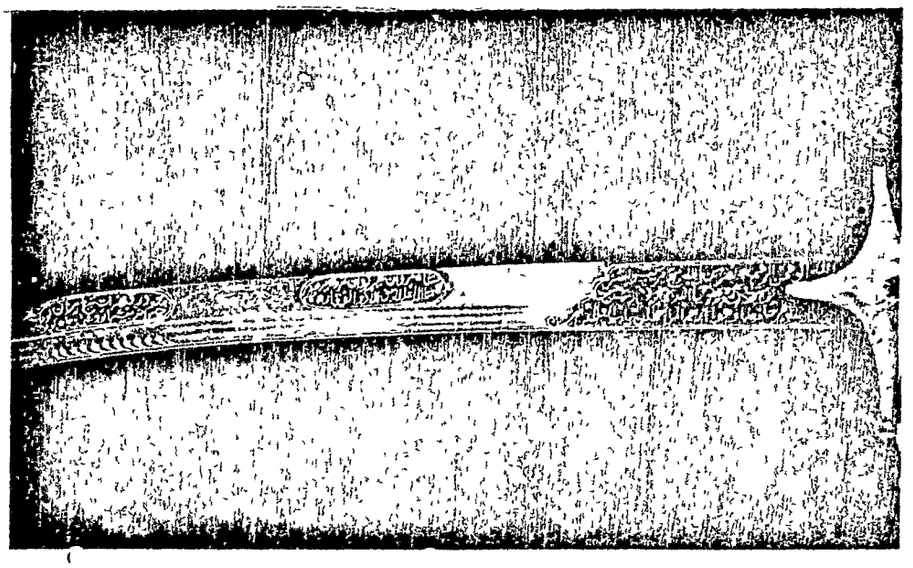


PLATE XXXIV

Ivory inlaid elephant goad of Rājasthān, c 1750 A.D.

(Collection : National Museum, New Delhi)

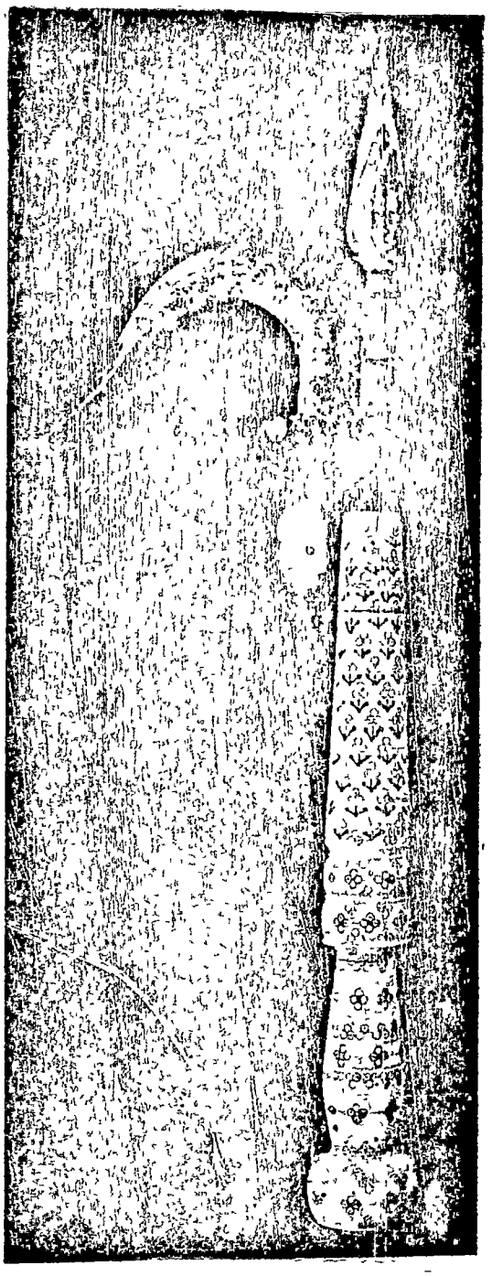


PLATE XXXV

Decorated Gun-powder flasks.

(Source : G.N.Pant - Studies in Indian weapons and warfare)

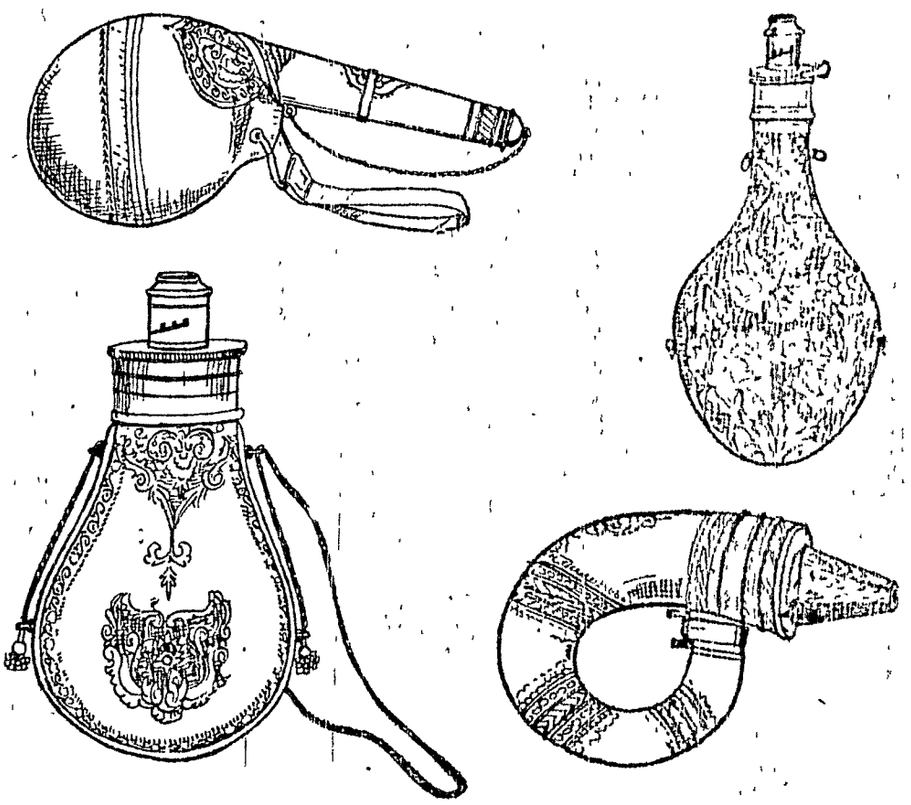


PLATE XXXVI

Ivory Gun-powder flask of early 18th century A.D.

(Collection : National Museum, New Delhi)

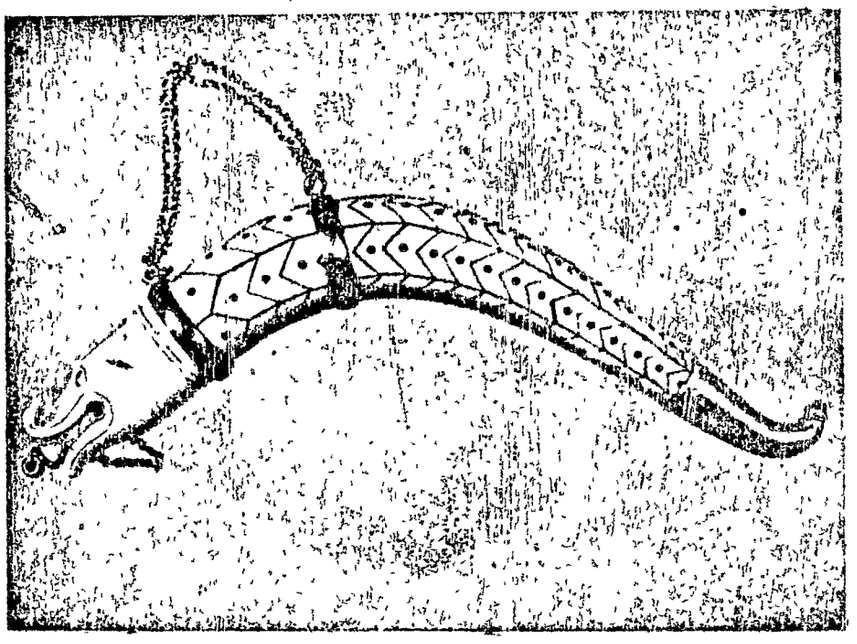


PLATE XXXVII

Decorated Ivory Gun-powder flask of late 17th century A.D.

(Collection : National Museum, New Delhi)

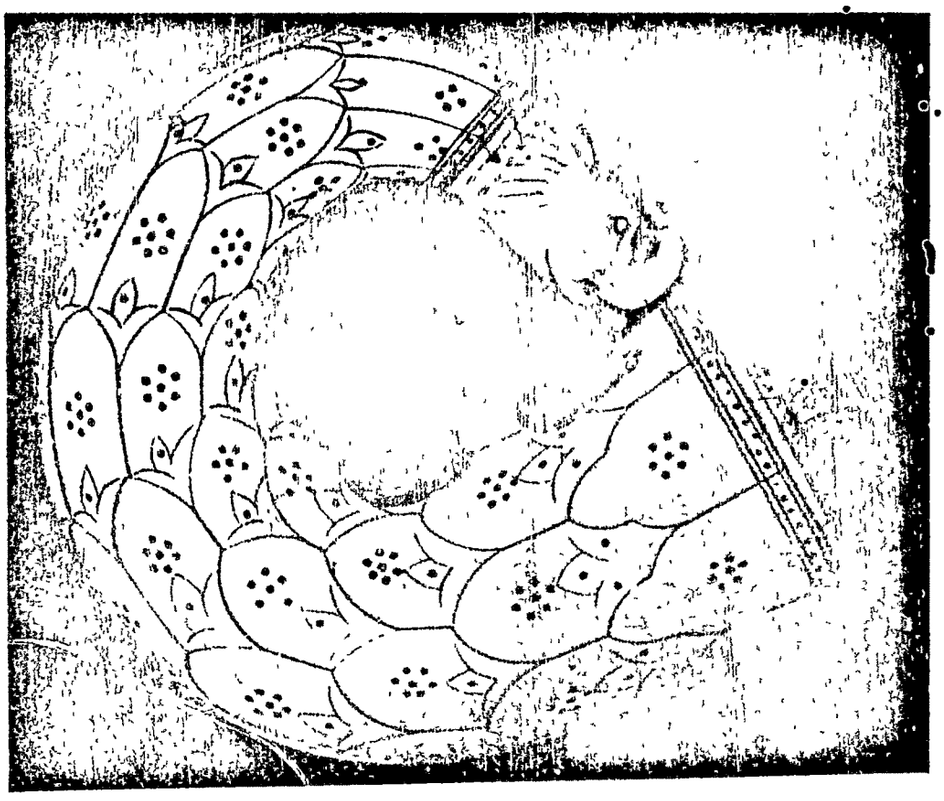


PLATE XXXVIII

Decorated upper, middle and lower fittings of the scabbards.

(Source : G.N.Pant - Studies in Indian weapons and warfare)

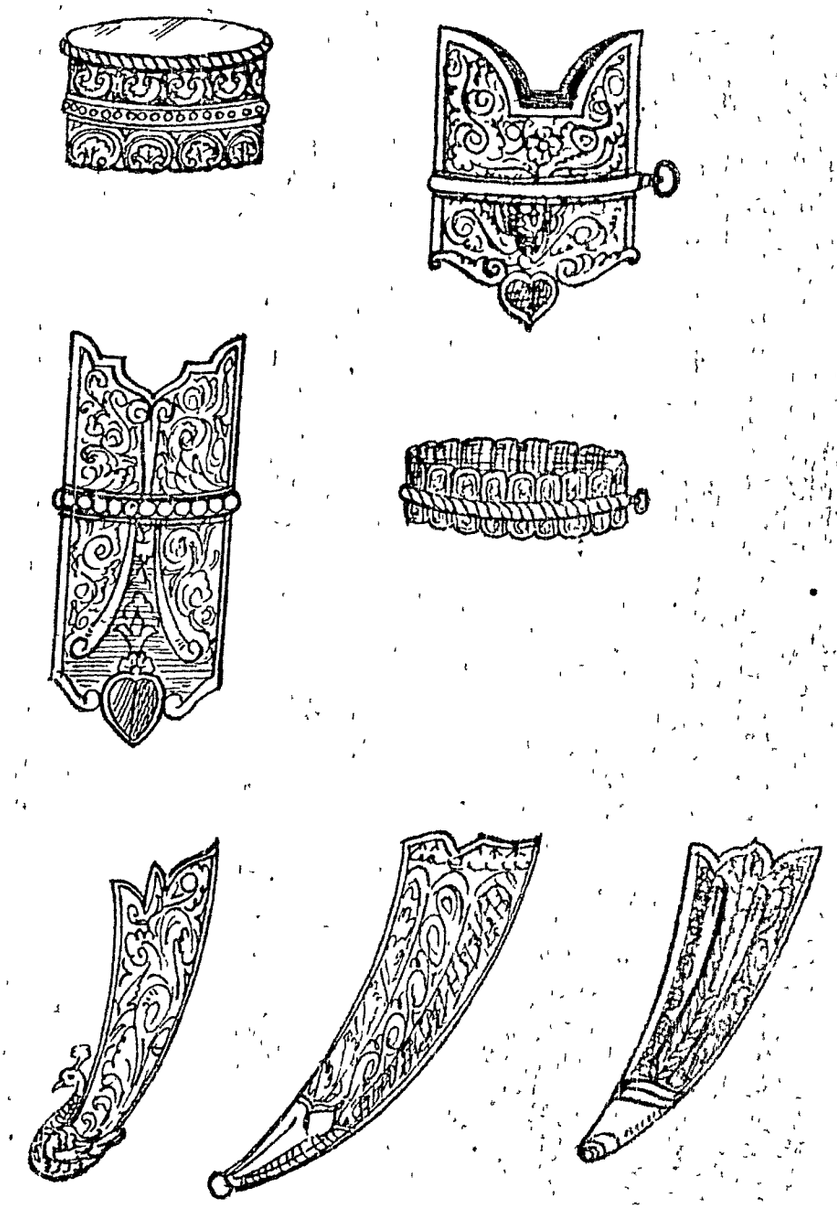


PLATE XXXIX

Matchlocks and Blunderbuss

Left to Right :

Left - Country made gun (matchlock) with wooden butt and barrel attached to the stock by numerous broad bands of brass. The barrel is inscribed. The inscription reads 'Āsaf Jāh'.

Middle - Country made Matchlock with a heavy wooden butt and long barrel attached. It is inscribed and the inscription reads 'Sarkār Nizām Āli Khān Bāhādur, 1193 H.'

Right - The Blunderbuss (flintlock gun) of 19th century A.D.

(Collection : State Museum, Hyderabad)

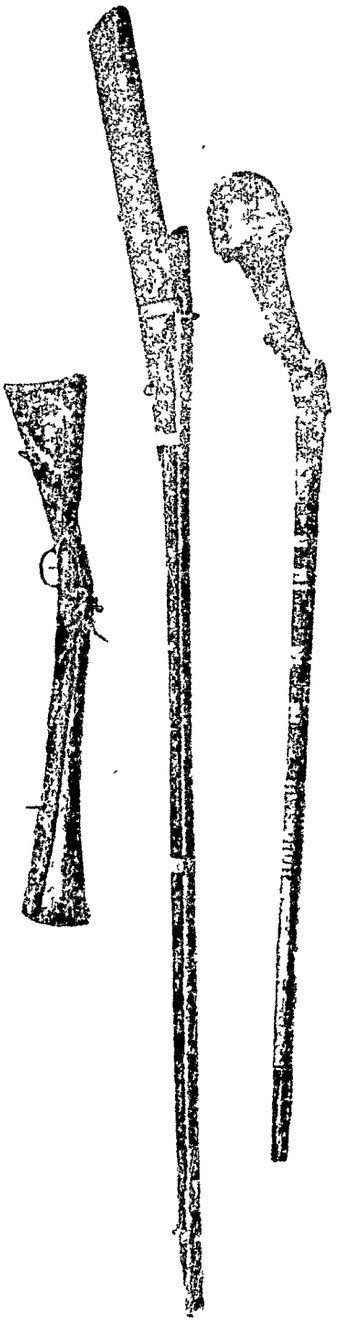


PLATE XL

Top : Mounted Cannon of c. 1780 A.D.

Below : Muzzle-loading gun with damascened barrel of the Mughals of c. 1700 A.D.

(Collection : National Museum, New Delhi)

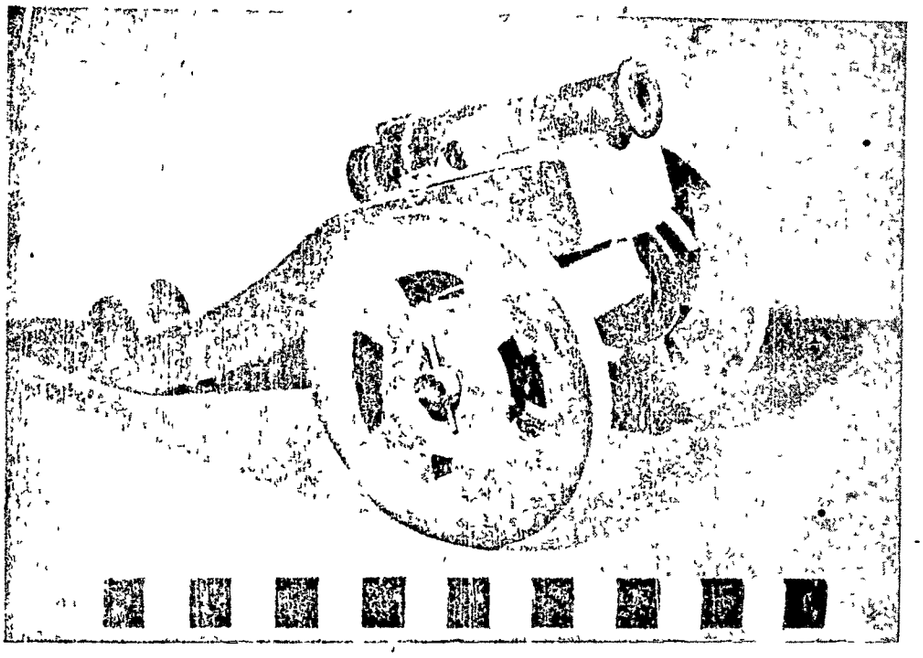


PLATE XLI

Left - Flintlock gun (Banduq) with gold-work on the barrel and ivory inlay on the butt of 19th century A.D.

Right - Flintlock pistol (Tāmānchà) with gold workmanship of 19th century A.D.

(Collection : State Museum, Hyderabad)

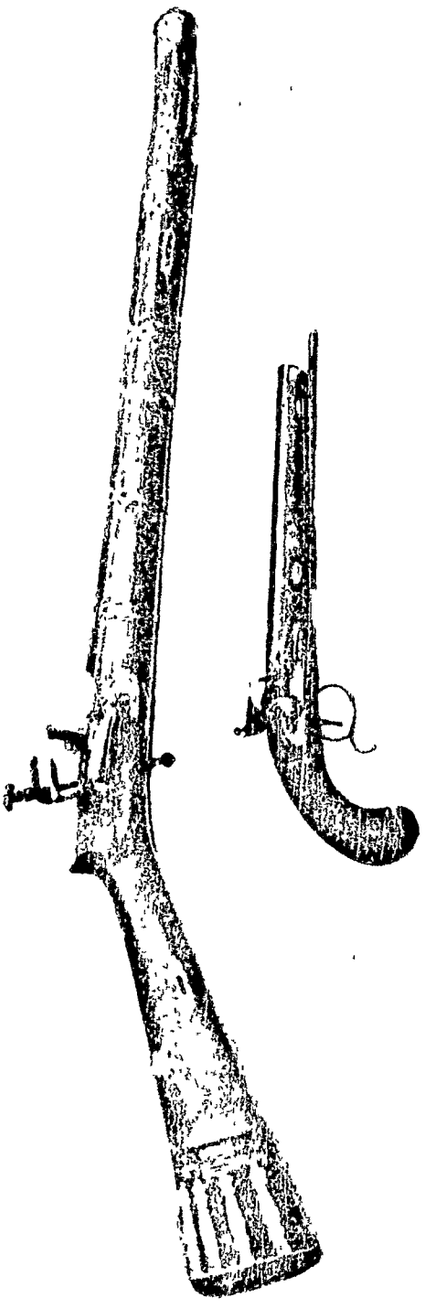


PLATE XLII

Mahārājā Krishnachandra's cannon.

(Collection: Victoria Memorial Hall, Calcutta)

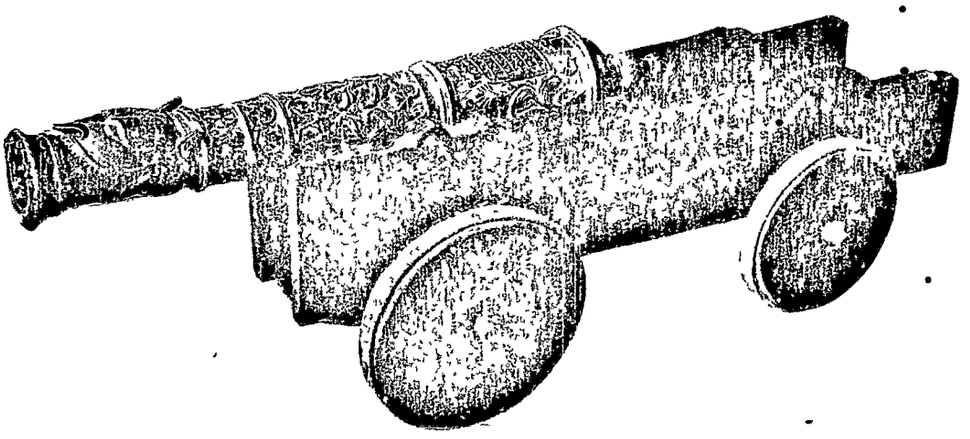


PLATE XLIII

A Cannon of 19th century A.D. mounted on wheels. The monogram RV is inscribed. The crown insignia is also there.

(Collection : State Museum,Hyderabad)

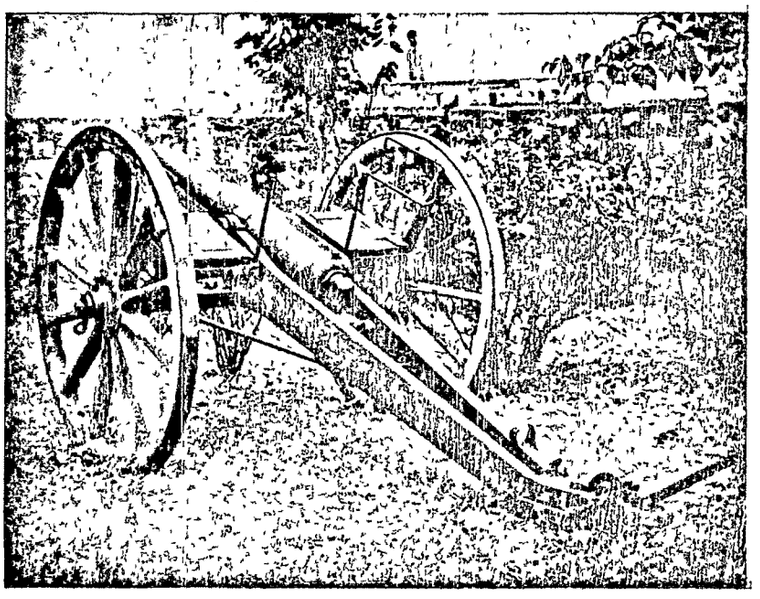
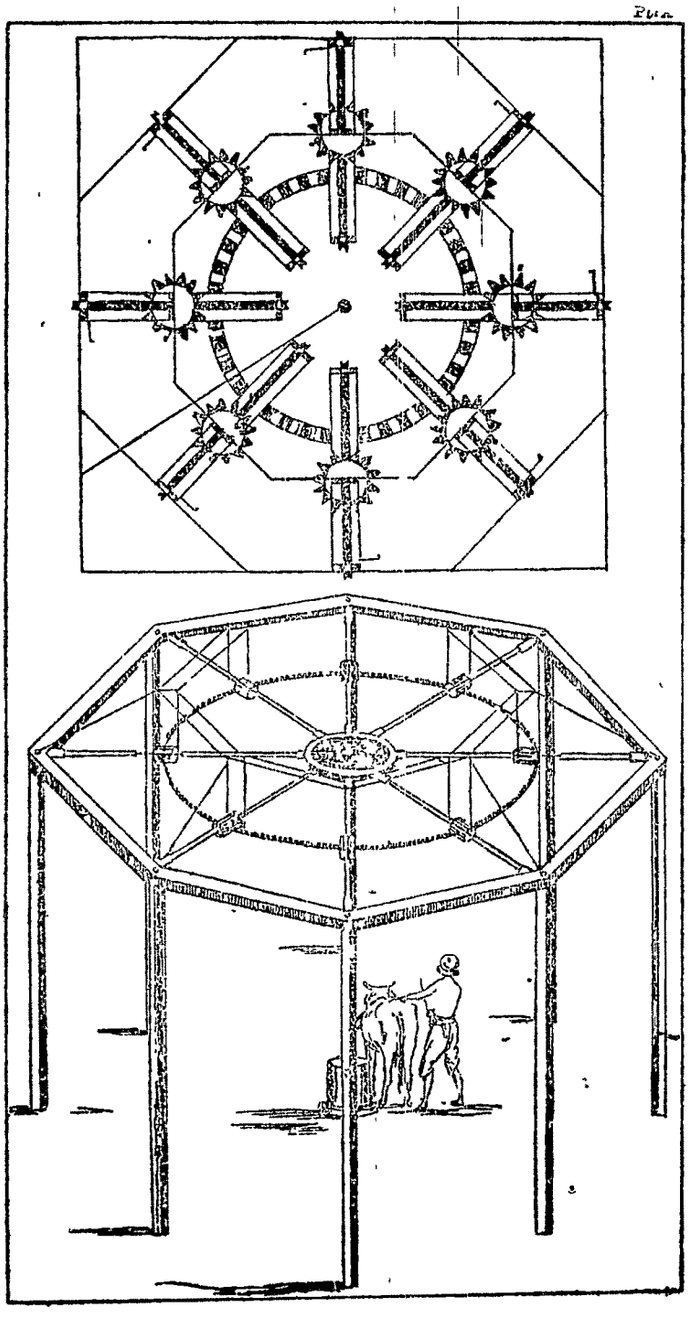


PLATE XLIV

Ākbar's machine for cleaning guns. His Majesty Ākbar invented this machine from his practical knowledge. By the motion of the wheel 16 barrels may be cleaned in a short time. The wheel is turned by a bullock.

(Source : Blochmann - Āin-i-Ākbari)



SOME INDIAN SHIELDS AND ARMOURS

Armours may be called defensive weapons. These defensive weapons are shields, coat of mails, helmets, hand-guards, neck-guards etc. Here the Plates XLV to LIII represent a few armours used by the Indian soldiers. In a museum of war materials different types of armours may be collected. or replicas may be constructed on the basis of available descriptions in different books and records, paintings, sculptures and other archaeological evidences. With the changes in war techniques the nature of these defensive weapons have also changed considerably or became out of use. These armours may be presented before the visitors in a chronological order to give them an idea about the nature, designs, materials used, methods of uses and the evolutionary changes that took place. Charts and drawings are also helpful for this purpose. Armours used by the war animals can also be presented in a separate gallery or at a separate corner in the same gallery.

PLATE XLV

29. Gupti-Kard : A knife concealed within a walking-stick.
30. Qamchi-Kard : A whip with a handle.
31. Chāqu : A clasp knife.
32. Kaman : An unstrung bow.
33. Kamthá or Kaman-i-qurohā : A bow for clay bullets.
34. Tufak-i-dahan : A tube like weapon. Blochmann described it as a pea-shooter.
35. Pushtkar (?) : It is not described by anybody.
36. Girih-Kushā : A kind of lance.
37. Khar-i-mahi : It means fish-spine but its use not known.
38. Gobhan : A sling.
39. Gajbag or Ankus : The elephant goad.
40. Sipār : A kind of shield.
41. Dhāl : Another kind of shield.
42. Phāri : A plane cane shield.
43. Dubalgha : A kind of helmet.
44. Ghughuwā : An one piece mail-coat for head and body.
45. Zirih-Kulāh : A helmet with neck-guard.
46. Zirih : A common mail-coat.
47. Bagtār : A mail-coat with breast-plate.
48. Joshan :An armour for chest and body.
49. Chār-āinā : The armour with breast-plate, back-plate and two side-plates.

(Source : Blochmann - Āin-i-Ākbari)

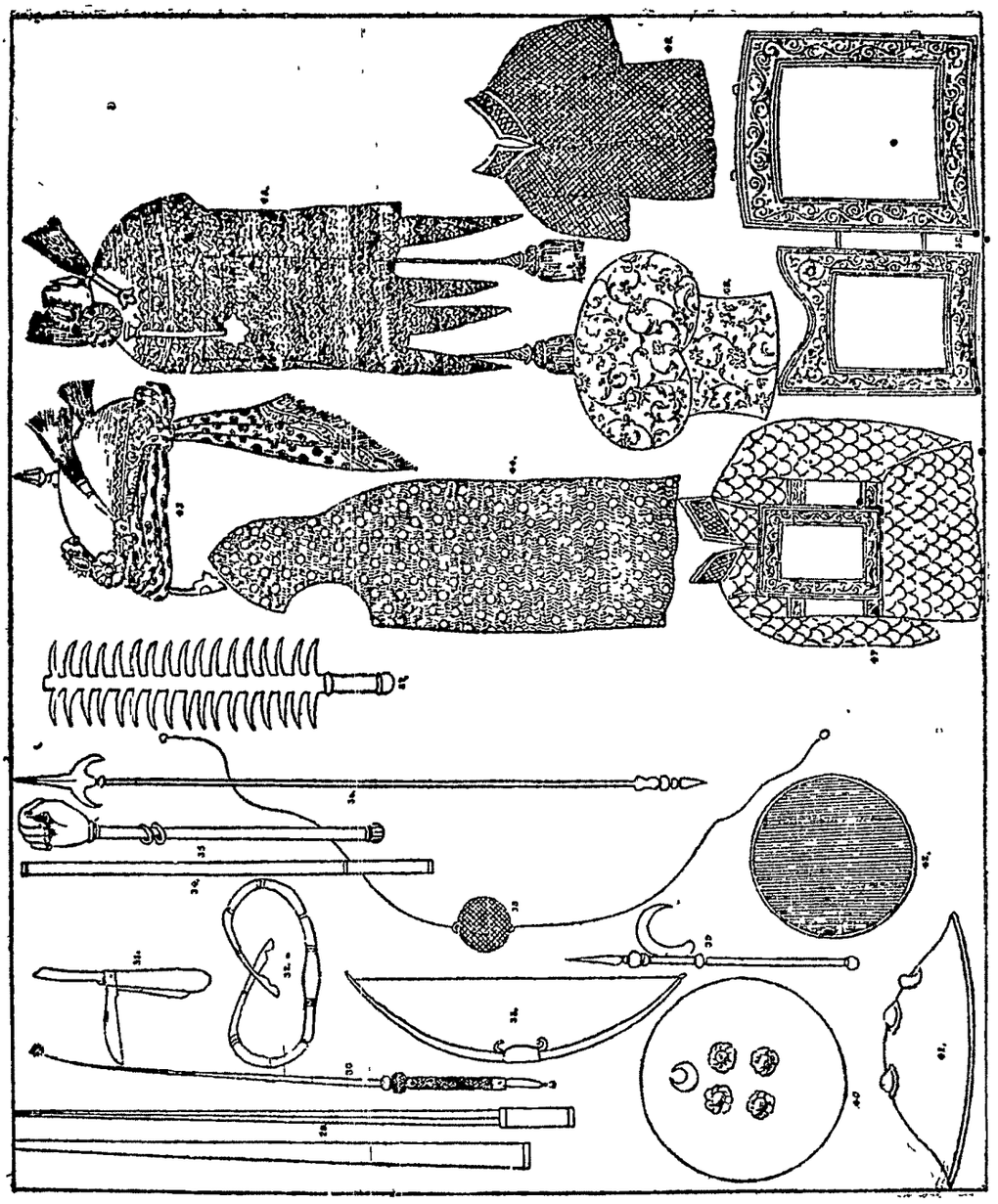


PLATE XLVI

Mughal armours

50. Kọthi : A coat with plates and helmet.
51. Sadiqi: A simple coat armour.
52. Angirākhā : A long coat worn over the armour.
53. Chihrahzirih-i-āhani : An iron mask.
54. Chihilqād : A doublet worn over the armour.
55. Dastwānā : A long glove.
56. Mozā-i-āhani : A small iron stocking. The large one is called Rak.
57. Kajam or Kajem : A mail covering for the back of the horse.
58,59. Arṭak-i-Kajem : The quilt over which the Kajem is put.
60. Qashqā : The armour for the protection of horse's head.
61. Kanṭha-Sobhā(?) : Blochmann described it as neck-guard. The figure clearly represents a spear. Probably the term has been wrongly put by Blochmann.
62. Bān : A kind of rocket.

(Source : Blochmann - Ain-i-Akbari)

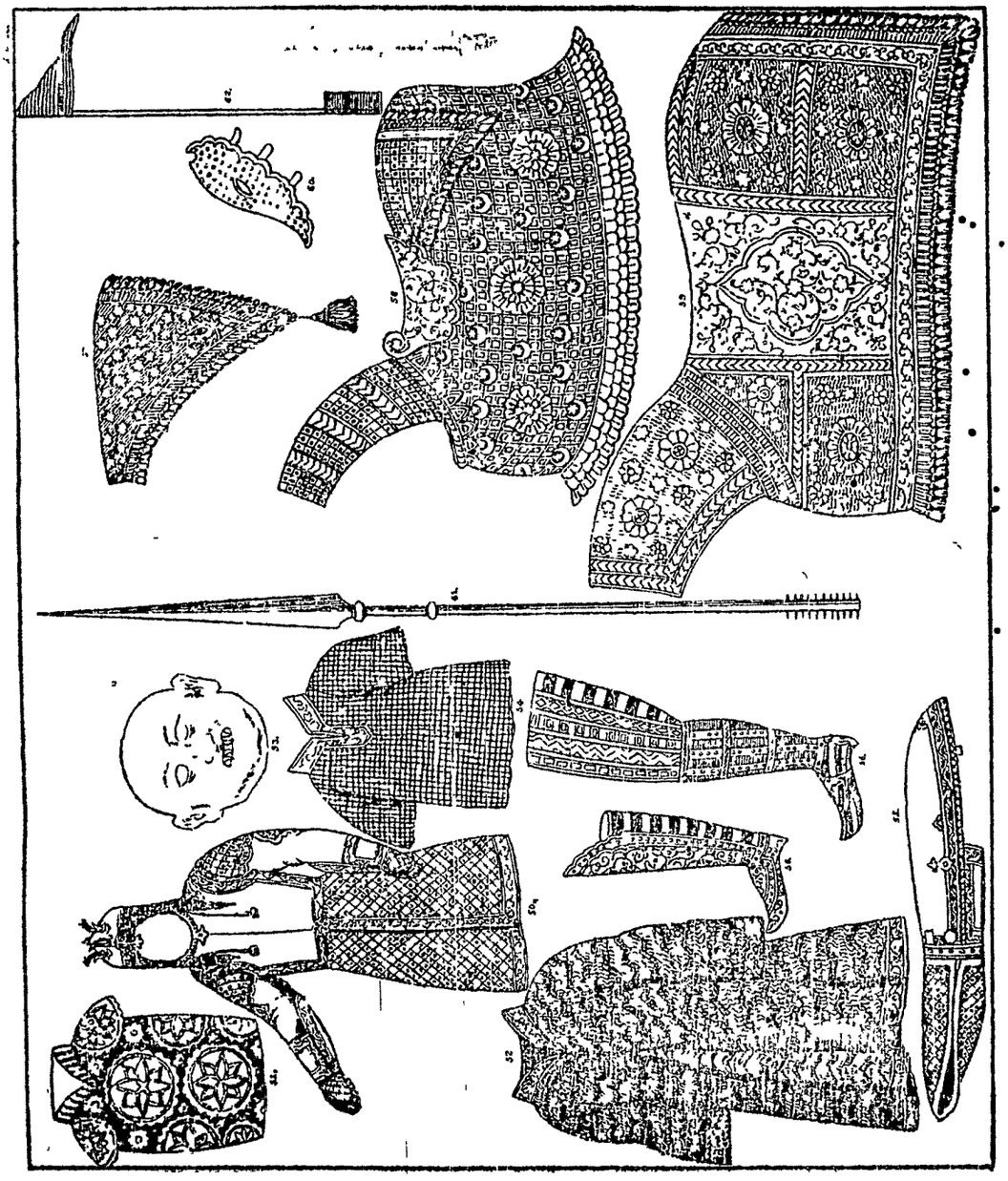


PLATE XLVII

Khud Dabalgah or Top, an inscribed Mughal helmet of c.1750 A.D.

(Collection : National Museum, New Delhi)

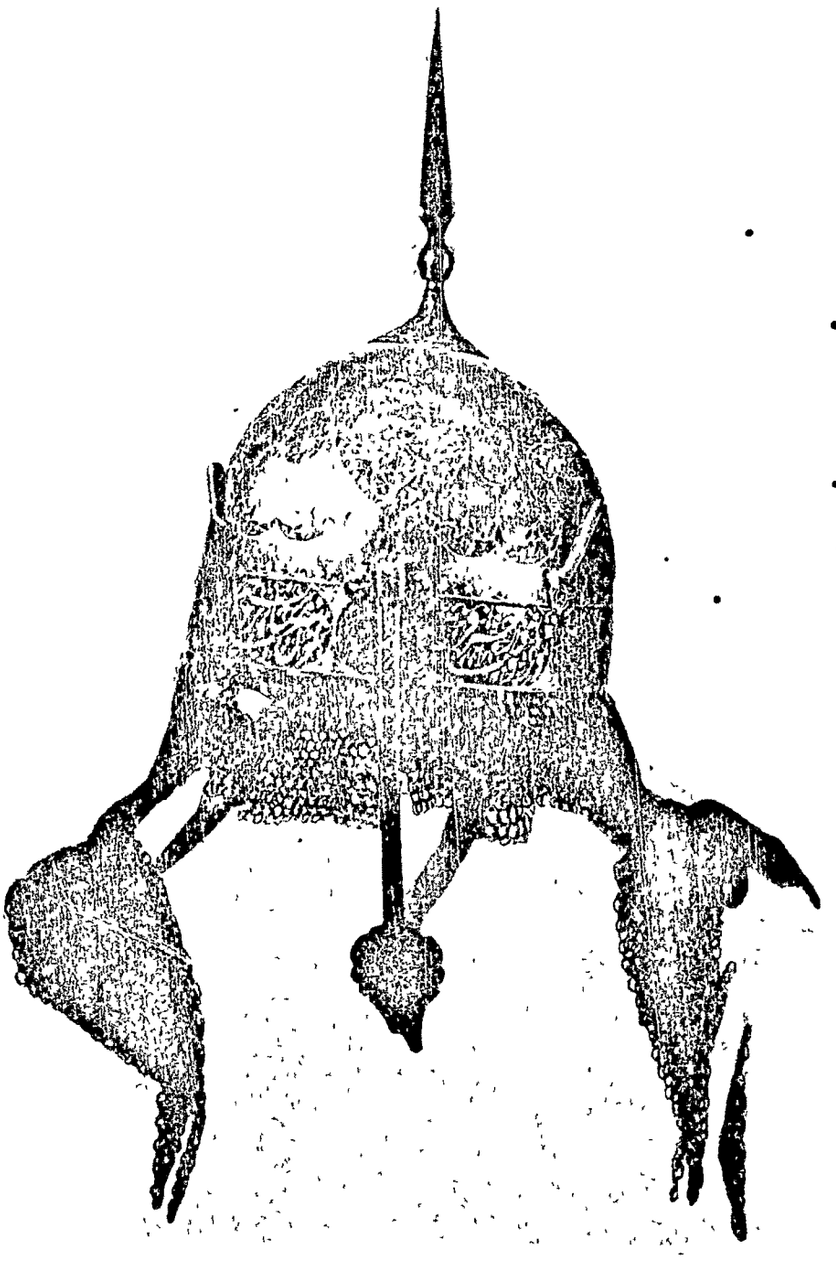


PLATE XLVIII

Mughal arm and foot guards of early 18th century A.D. These are made of steel attached to over a quilted velvet.

(Collection : National Museum, New Delhi)

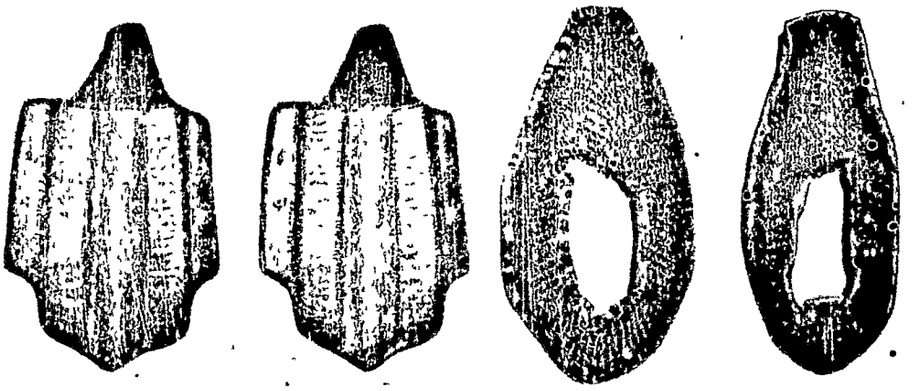


PLATE XLIX

Rajput body armours of early 17th century A.D. These are of damascened steel and profusely decorated.

(Collection : National Museum, New Delhi)

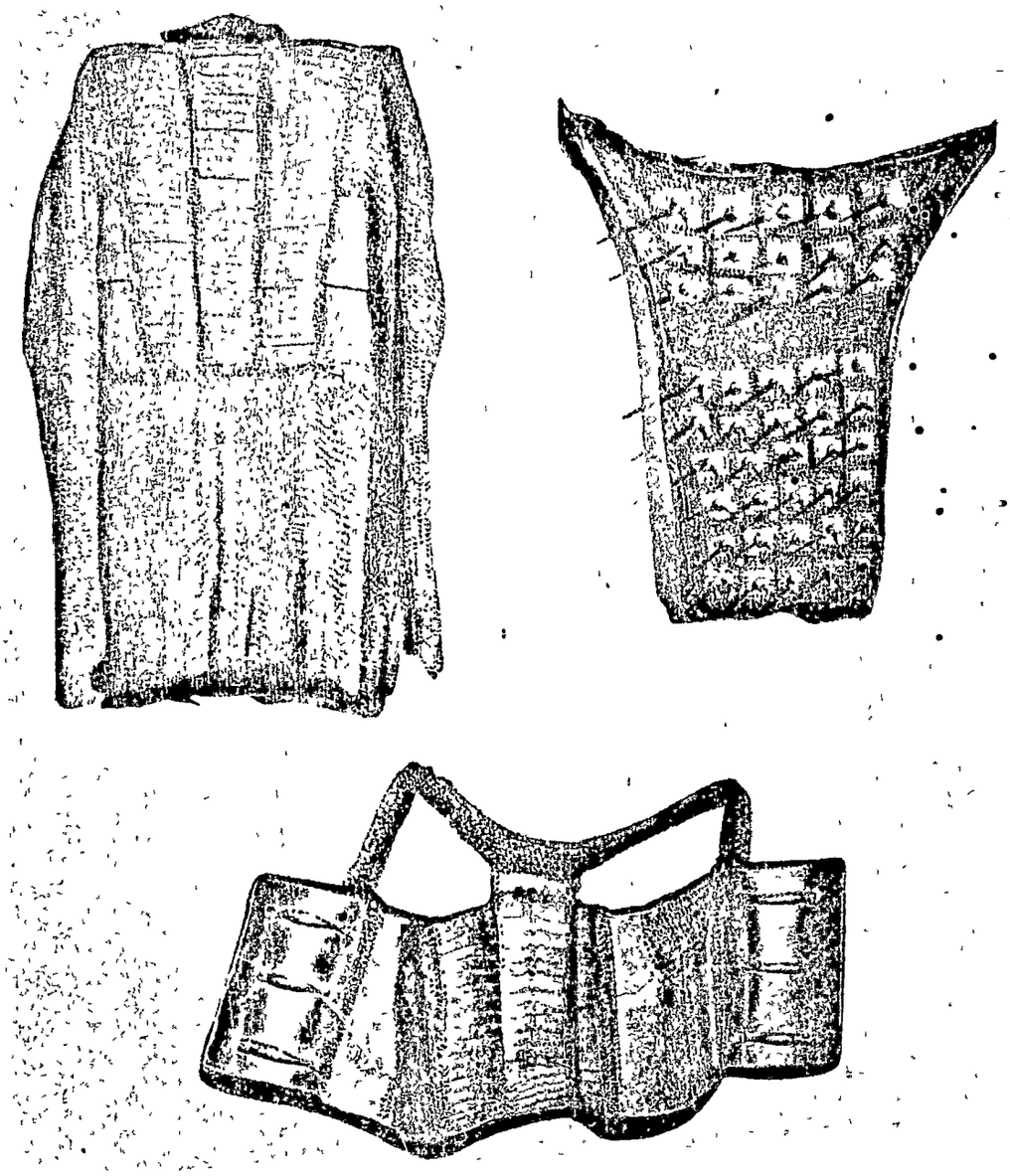


PLATE L

Three different types of shields from Ajanta Paintings

(Source : G.N.Pant - Studies in India weapons and warfare).

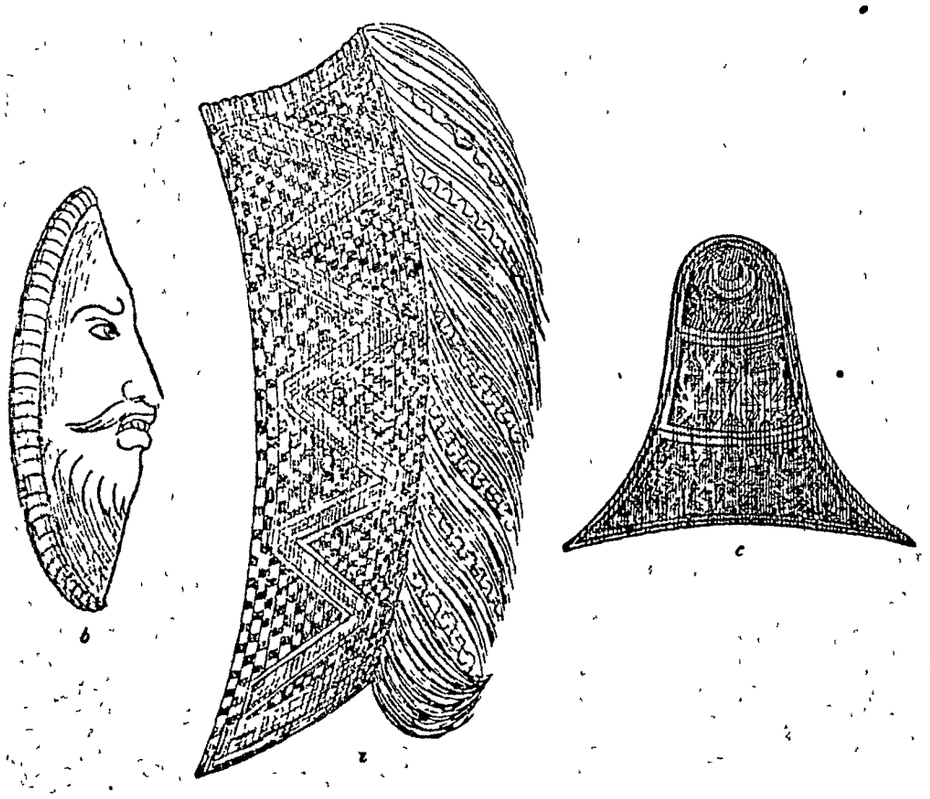

b
a
c

PLATE LI

A South-Indian shield of early 17th century A.D., showing pattern welding work.

(Collection : National Museum, New Delhi)

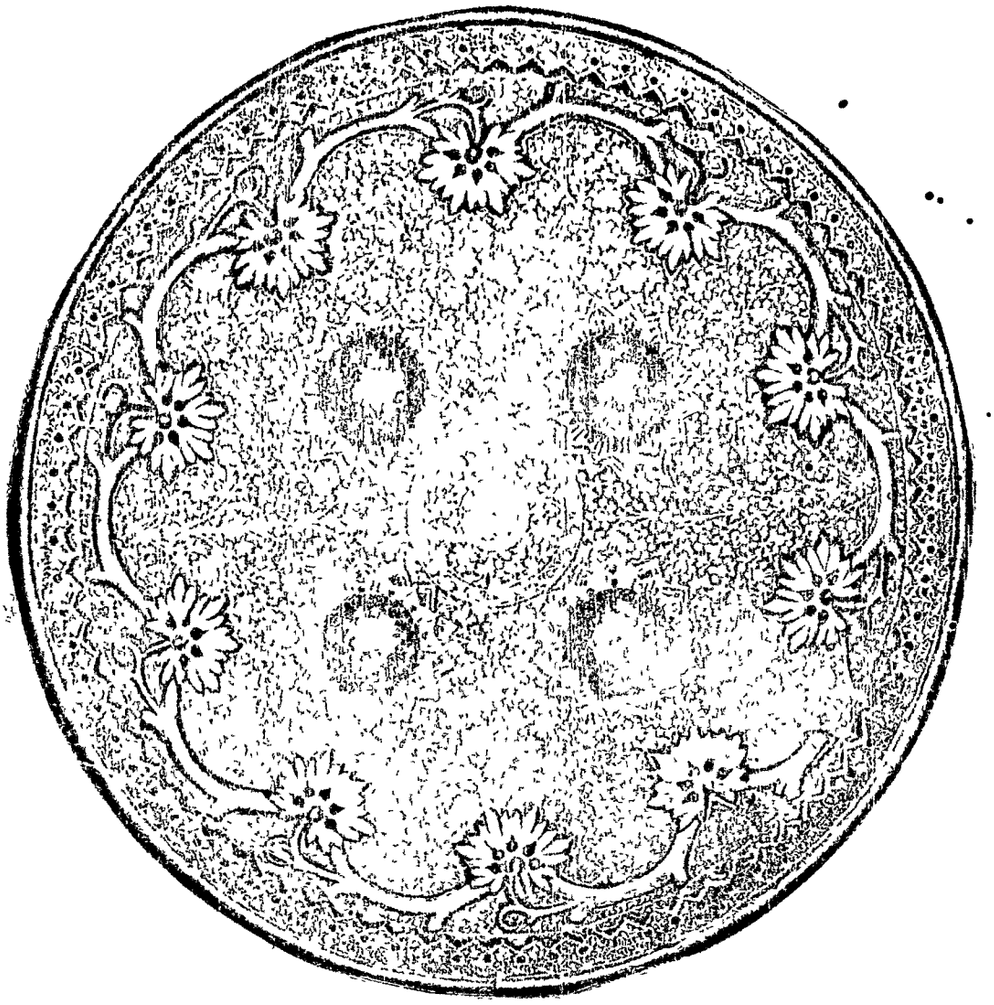


PLATE LII

Decorated shields

Top: (Left to Right) - Bamboo, Damascened steel, Lacquered work.

Below: (Left to Right) - Gold-plated steel, Rhinoceros skin, Hide.

(Collection : National Museum, New Delhi)

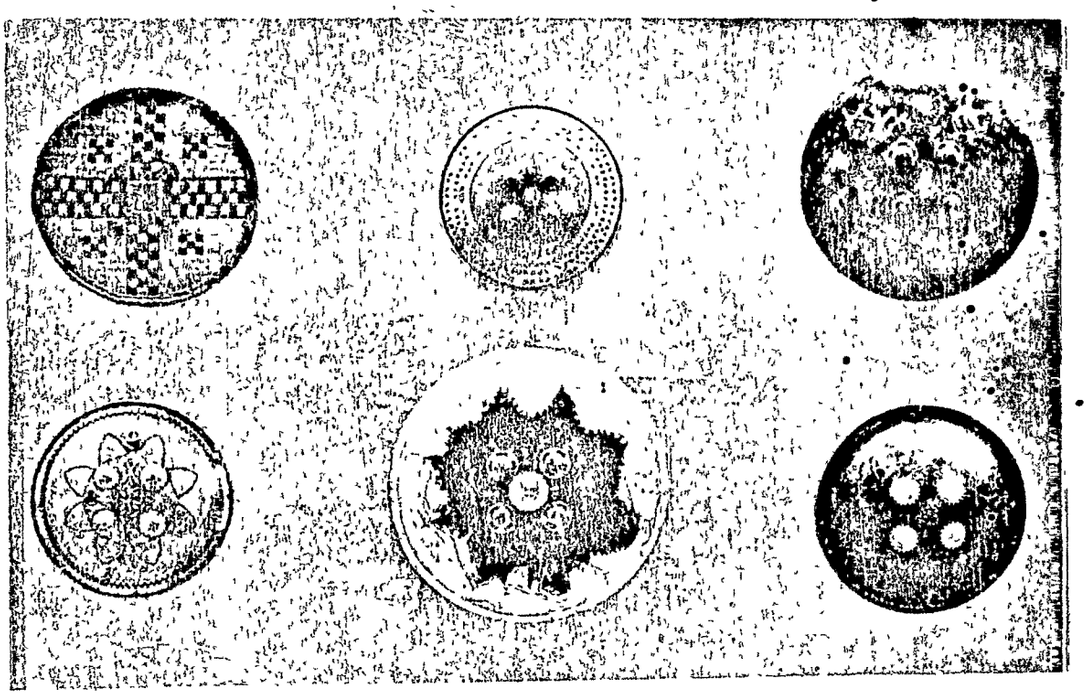
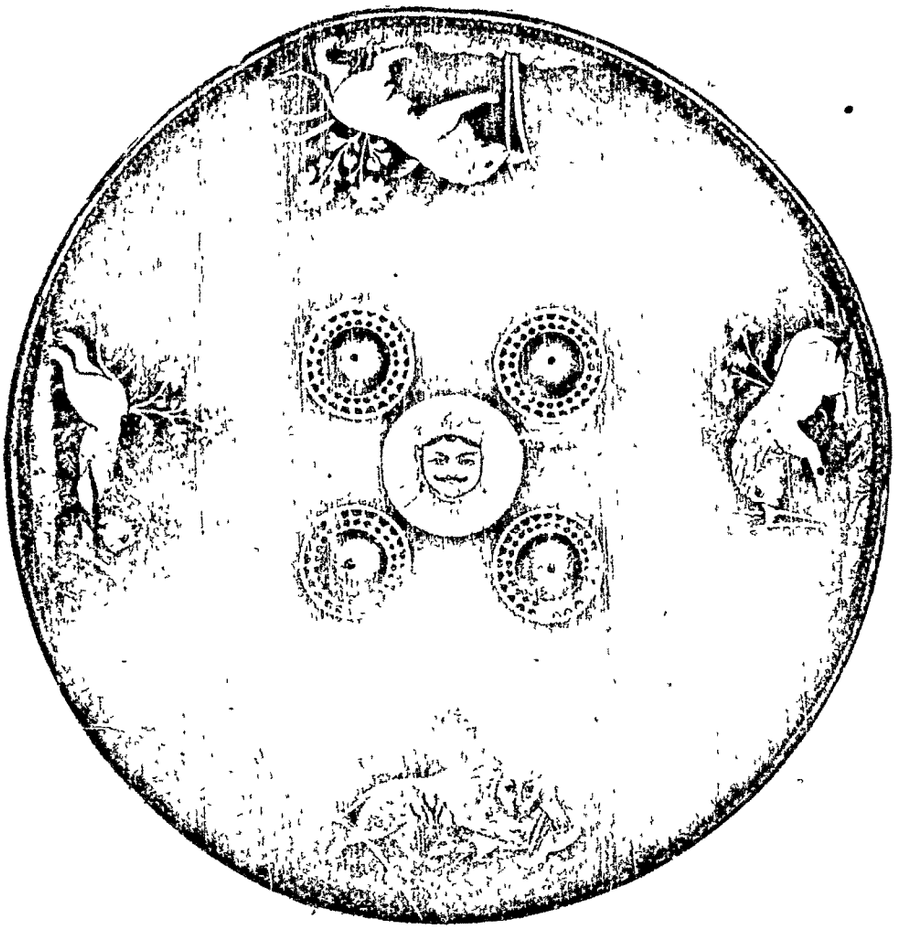


PLATE LIII

A Rājasthāni shield of late 17th century A.D. depicting hunting scenes.

(Collection : National Museum, New Delhi)



A FEW DRESSES AND UNIFORMS OF INDIAN HEROES

Plates LIV to LXIV represent a few dresses and uniforms used by the Indian heroes. A museum of war materials can collect original uniforms or prepare replicas according to the designs and descriptions available from different sources. These uniforms can be displayed with the help of full size models of soldiers and national heroes in a chronological order mentioning the regiments or the forces used them. These varieties of uniforms of various colours and designs displayed in a gallery will give a comprehensive idea about the nature, colour, evolutionary changes and the usefulness of uniforms and surely give an insight into the subject.

PLATE LIV

A Rājput Sepoy of 17th century A.D.

(Collection : Ist Bengal Battalion NCC HQ, Calcutta)

PLATE LV

A Mughal Sepoy of 17th century A.D.

(Collection: Ist Bengal Battalion NCC HQ,Calcutta)

PLATE LVI

A Hindu Sepoy of Mārāthā Army of 18th century A.D.

(Collection: Ist Bengal Battalion NCC HQ,Calcutta)

PLATE LVII

A Màràthà Sepòy of c. 1773 A.D.

(Collection: Ist Bengal Battalion NCC HQ, Calcutta)

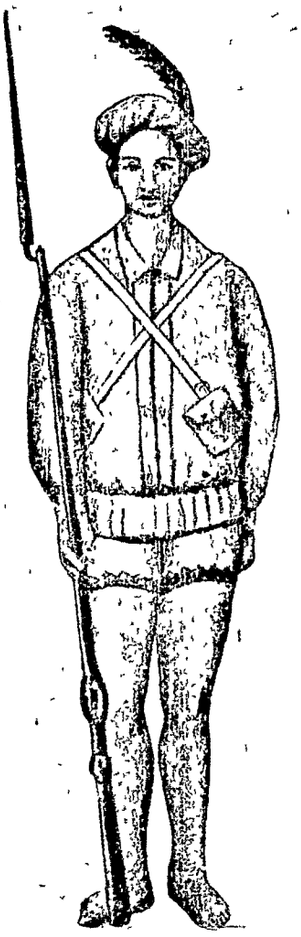


PLATE LVIII

Mahārānā Pratāp Singh

(Collection: Ist Bengal Battalion NCC HQ, Calcutta)

PLATE LIX

A Sepoy of Mahārājā Ranjit Singh's Army

(Collection: Ist Bengal Battalion NCC HO,Calcutta)

PLATE LX

A General of Mahārājā Ranjit Singh's Army (1802-1829 A.D.)

(Collection: Ist Bengal Battalion NCC HQ,Calcutta)

PLATE LXI

Top : Bābā Bāndā Bāhādur Ji

(Collection: Central Sikh Museum, Amritsar)

Below : A Coat of Arms of the Tondaiman rulers of Pudukkottāi.

(Collection: Government Museum, Pudukkottāi, Madras)

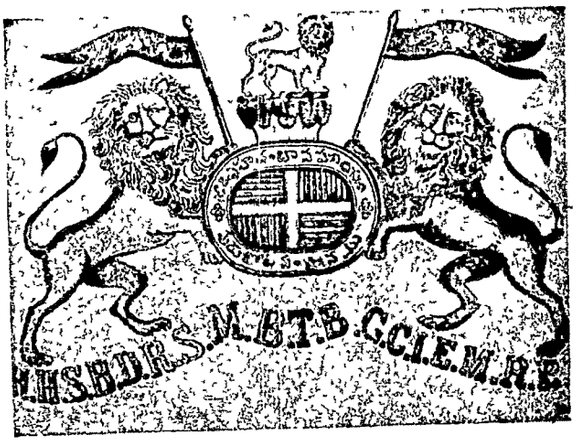

H.H.S.B.D.R.S.M.B.T.B.C.C.I.E.M.R.E.

PLATE LXII

Bābā Phul Singh Ji Ākali

(Collection: Central Sikh Museum, Amritsar)

PLATE LXIII

Mahārājā Ranjit Singh Ji

(Collection : Central Sikh Museum, Amritsar)

PLATE LXIV

Bābā Deep Singh Ji Martyr

(Collection: Central Sikh Museum, Amritsar)

A FEW FORTIFIED AREAS IN INDIA

Plates LXV to LXX represent some fortified areas and fortified palace in India. In a museum of war materials, a gallery can be arranged with the models of still existing forts in India and with maps, photos, charts and models prepared according to the descriptions available in records and archaeological findings of those forts and fortified places that existed in ancient and medieval periods in India. If displayed chronologically, these photos, charts, models etc. are sure to arouse interest and inquisitiveness among visitors, civil engineers and architects. The study of the forts and fortified areas since early days in India along with their plans, nature of construction and administration, materials used etc. makes interesting inroads in the military engineering skill, storage arrangements, nature of war, planning of operations and the evolution of military culture in India.

PLATE LXV

A folio from Bābarnāmā showing a fortified Mughal Palace, 1597 A.D.

(Collection: National Museum, New Delhi)

عهد کرد بعد از عهد و شرط کردن دروازه باو اکرد، ملازمت کرد بعد از دیدن ملی
در صاق قلعه او جلی شناسی نزد آمده شد

PLATE LXVI

Fortifications of Rājgir, Bihār.

(Source: G.N.Pant - Studies in Indian weapons and warfare)

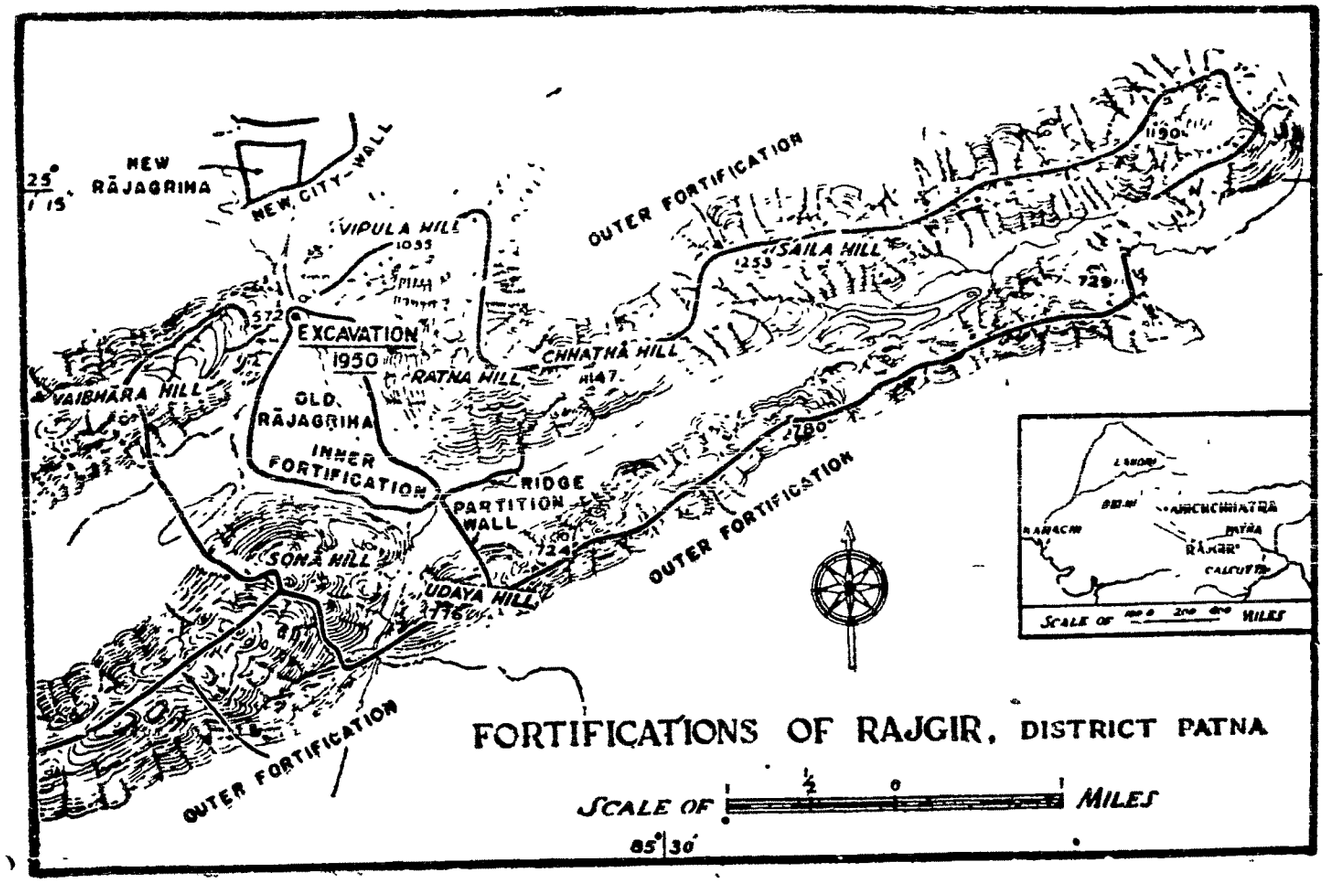

NEW RĀJAGRIHA
NEW CITY-WALL
VIPULA HILL
1055
OUTER FORTIFICATION
1190
SAILA HILL
1253
729
572
EXCAVATION 1950
RATNA HILL
CHHATHA HILL
VAIBHĀRA HILL
OLD RĀJAGRIHA
INNER FORTIFICATION
RIDGE
PARTITION WALL
780
OUTER FORTIFICATION
SONA HILL
UDAYA HILL
776
OUTER FORTIFICATION
FORTIFICATIONS OF RAJGIR, DISTRICT PATNA
SCALE OF MILES
25° 1' 15"
85° 30'

PLATE LXVII

Fortified area of the citadel (mound AB) and cemeteries at Harappā, 1946.

(After Wheeler, Archaeological Survey of India.
Source: G.N.Pant - Studies in Indian weapons and warfare)

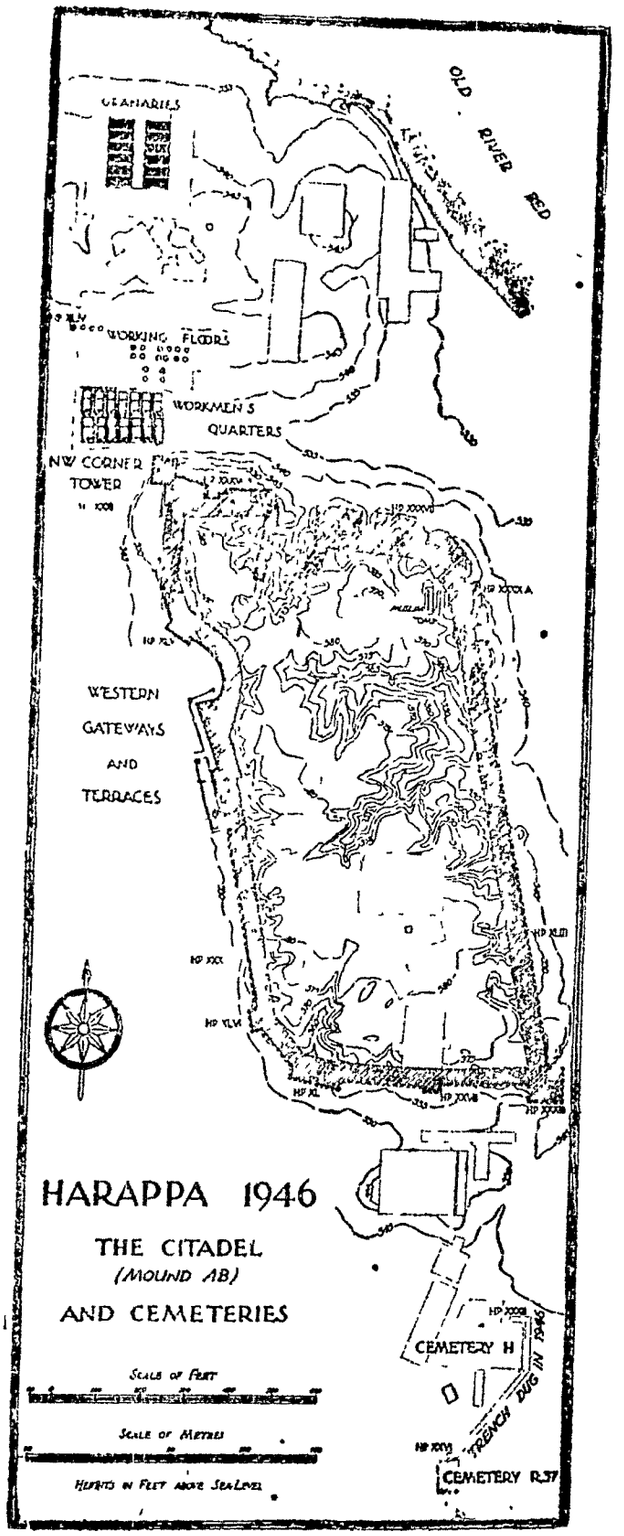

GRANARIES
OLD RIVER BED
WORKING FLOORS
WORKMEN'S QUARTERS
NW CORNER TOWER
WESTERN GATEWAYS AND TERRACES
HARAPPA 1946
THE CITADEL
(MOUND AB)
AND CEMETERIES
CEMETERY H
TRENCH DUG IN 1936
CEMETERY R.37
SCALE OF FEET
SCALE OF METRES
HEIGHTS IN FEET ABOVE SEA LEVEL

PLATE LXVIII

Sketch plan of Gingee fort.

(Source: G.N.Pant - Studies in Indian weapons and warfare)

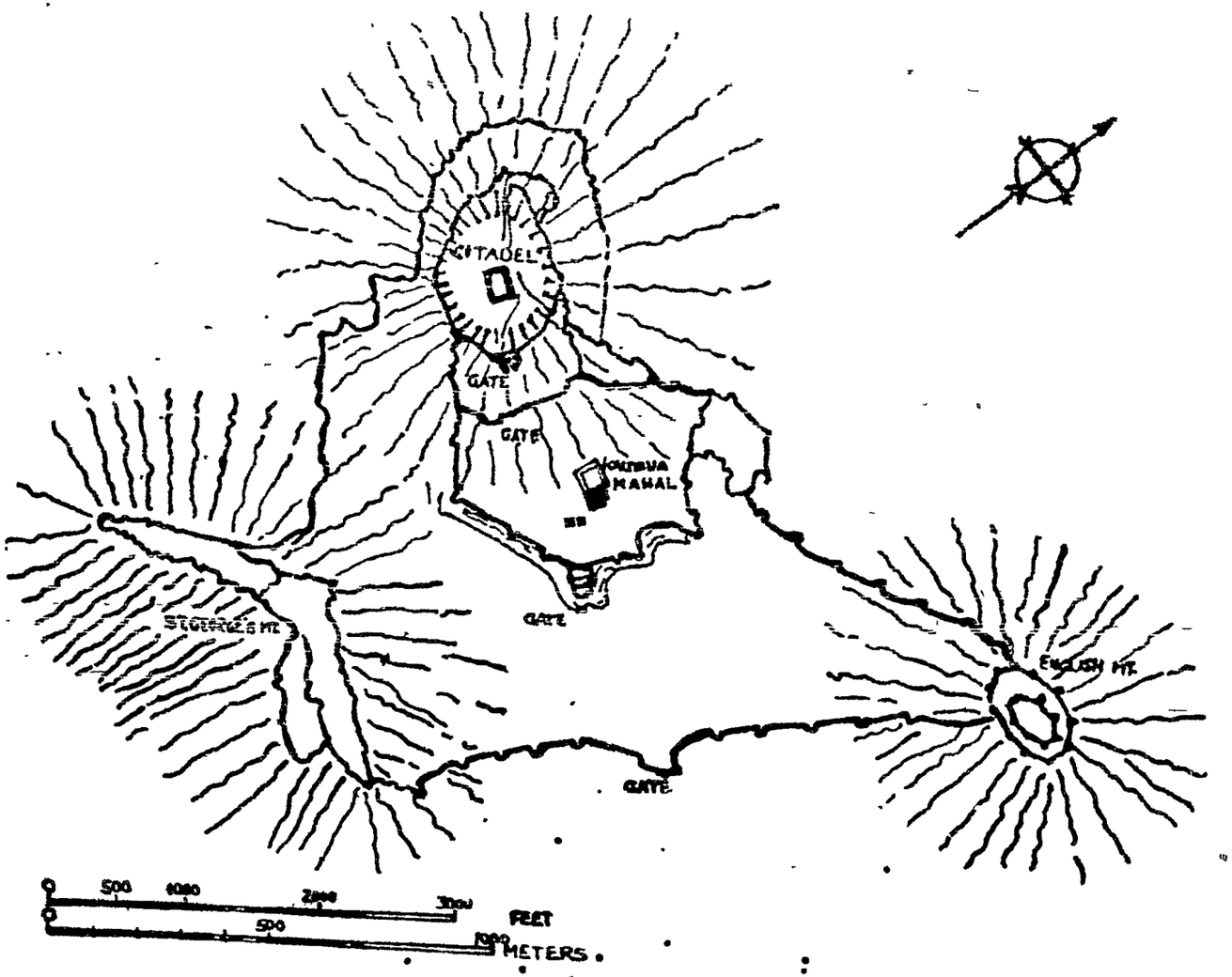

CITADEL
GATE
GATE
GATE
GATE
GATE
ENGLISH HT.
FEET
METERS

PLATE LXIX

Western gateway No. I of Śiśupālgarh, Orissa(1948)

(Source: G.N.Pant - Studies in Indian weapons and warfare)

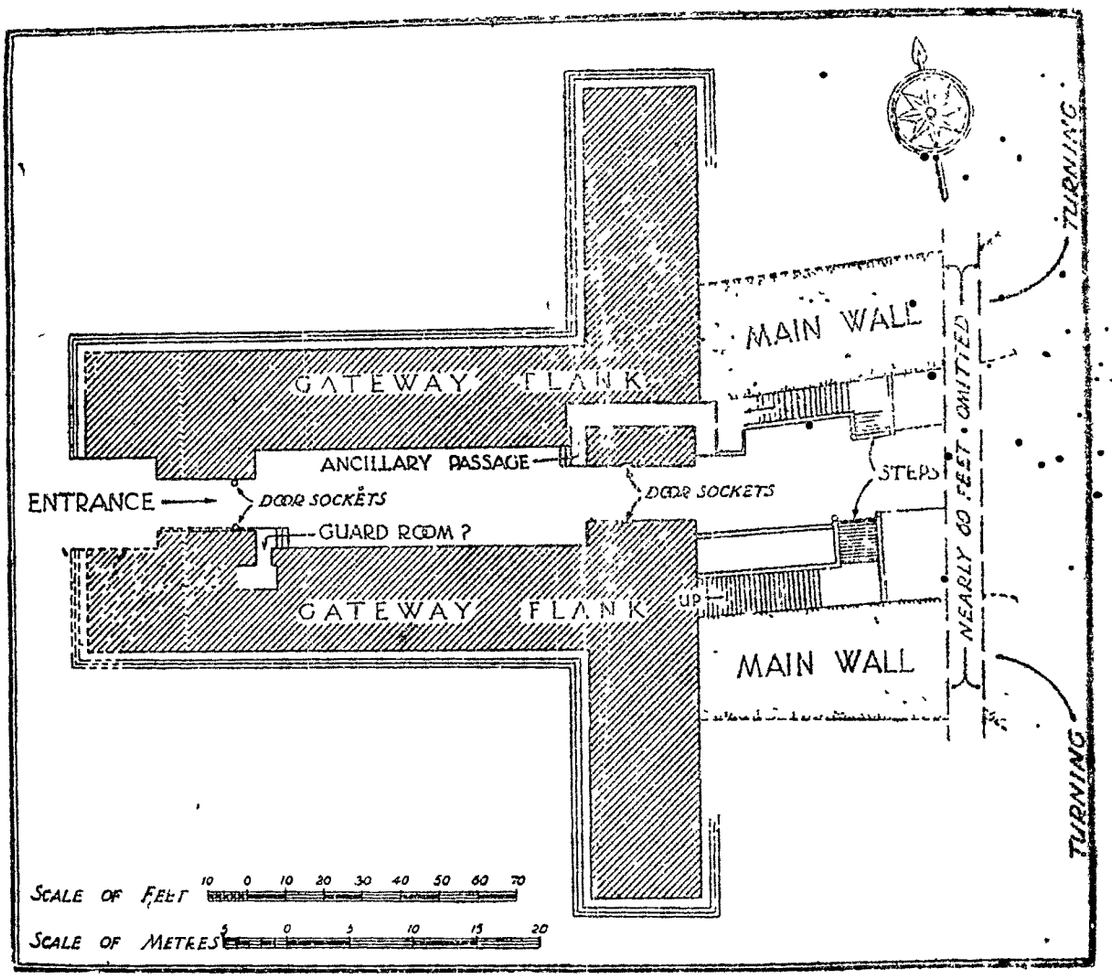

GATEWAY FLANK
MAIN WALL
ANCILLARY PASSAGE
ENTRANCE
DOOR SOCKETS
DOOR SOCKETS
STEPS
GUARD ROOM ?
GATEWAY FLANK
UP
MAIN WALL
TURNING
NEARLY 60 FEET OMITTED
TURNING
SCALE OF FEET 10 0 10 20 30 40 50 60 70
SCALE OF METRES 5 0 5 10 15 20

PLATE LXX

South face of Mangalore Fort when beseiged in 1783-84.

(Source : Brigadier Rajendra Singh P.S.C. —
The Grenadiers - A regimental history,1962)

SOUTH FACE OF MANGALORE FORT WHEN BESEIGED IN 1783-84

A FEW FORMS OF BATTLE-FORMATIONS (VYŪHAS)

Plates LXXI to LXXVIII depict some of the battle-formations used in the Kurukshetra war. In a museum of war materials, the gallery showing the models and charts of various battle-formations used and deployed in different operations of historical importance since early days in India must give some insight about the tactical conduct of battles. If animated models can be prepared to show attacks and defences in different formations then this gallery will surely be very popular to the visitors.

THE LEGENDS

A commander on the chariot

Chariot

Elephant

Horse

Foot-soldier

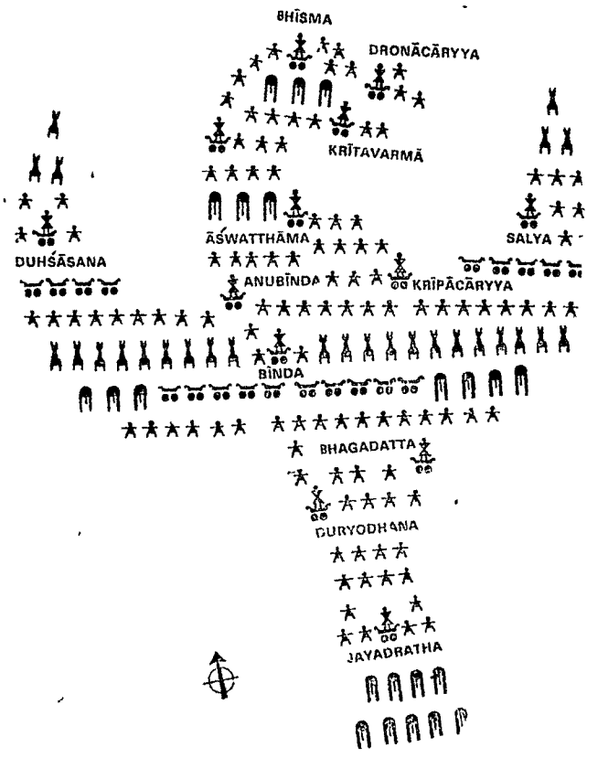
The arrow-head indicates the general line of approach

PLATE LXXI

Top : Garura-vyūha - The figure depicts the formation adopted by Bhiṣma on the third day of the Kurukṣhetra battle.

Below : Cakrasakata-vyūha - The figure depicts the outline and the position of the royal gentries as indicated in the narratives of the Mahābhārata:

(Source: Major P.Sensarma - Kurukṣhetra War - A Military Study)


BHĪSMA
DRONĀCĀRYYA
KRĪTAVARMĀ
ĀŚWATTHĀMA
SALYA
DUHŚĀSANA
ANUBĪNDA
KRĪPĀCĀRYYA
BĪNDA
BHAGADATTA
DURYODHANA
JAYADRATHA

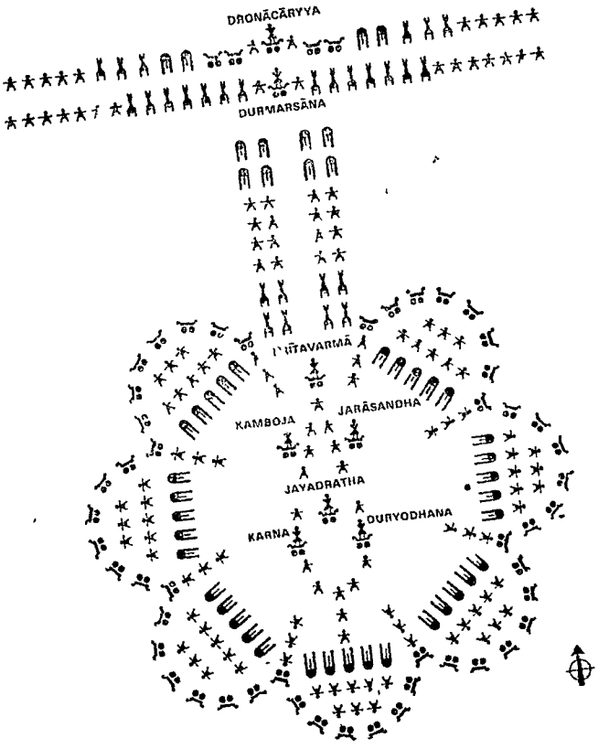
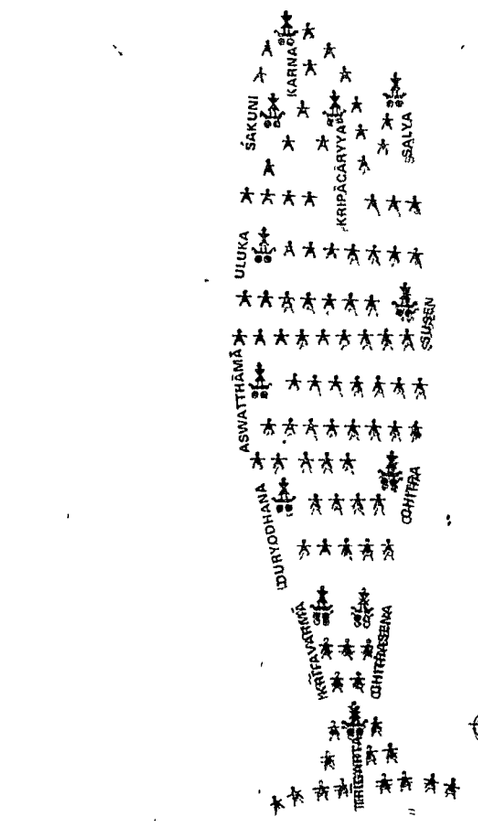

DRONĀCĀRYYA
DURMARSĀNA
KRĪTAVARMĀ
JARĀSANDHA
KAMBOJA
JAYADRATHA
DURYODHANA
KARNA

PLATE LXXII

Top : Makara-vyūha - The figure depicts the formation adopted by Karṇa on the 16th day of Kurukṣhetra battle.

Below: Kraunca-vyūha - The figure depicts the formation adopted by the Pāṇḍavas on the 2nd day of Kurukṣhetra battle.

(Source : Major P. Sensarma - Kurukṣhetra War - A Military Study)


ŚAKUNI
KARNA
KRIPĀCĀRYYA
ŚALYA
ULUKA
ŚUŚEN
ASWATTHĀMĀ
DURYODHANA
CHITRA
CHITRASENA

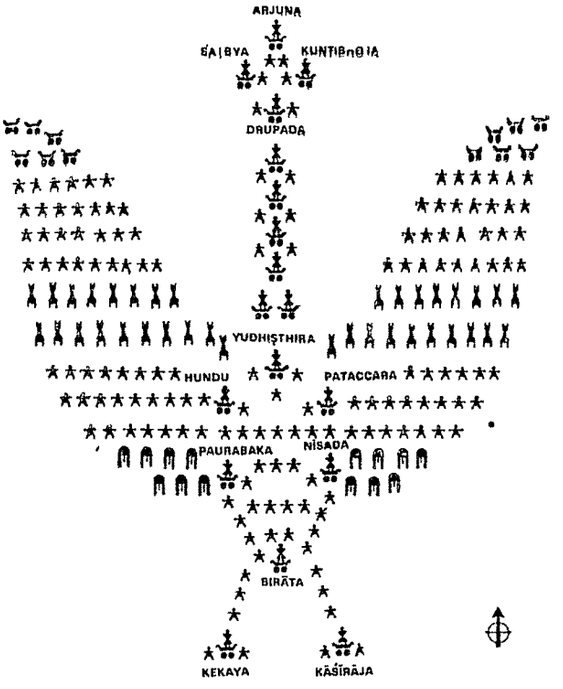
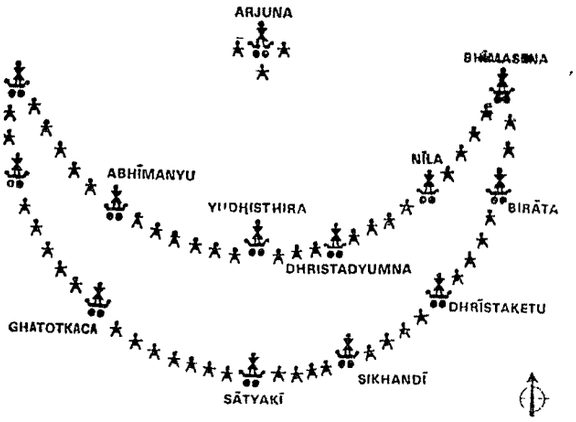

ARJUNA
SAHADEVA
KUNTIBHOJA
DRUPADA
YUDHIŞTHIRA
HUNDU
PATACCARA
PAURABAKA
NISADA
BIRĀTA
KEKAYA
KĀŚĪRĀJA

PLATE LXXIII

Top : Ardhacandra-vyūha - The figure is based on the description given in Mahābhārata about the position of the royal gentries only.

Below: Kraunca-vyūha - The figure depicts another form of Kraūnca-vyūha formation adopted by Bhisma on the 6th day of Kurukshetra battle.

(Source: Major P.Sensarma - Kurukṣhetra War - A Military Study)


ARJUNA
BHĪMASENA
NĪLA
ABHĪMANYU
BIRĀTA
YUDHISTHIRA
DHRISTADYUMNA
DHRĪSTAKETU
GHATOTKACA
SIKHANDĪ
SĀTYAKĪ

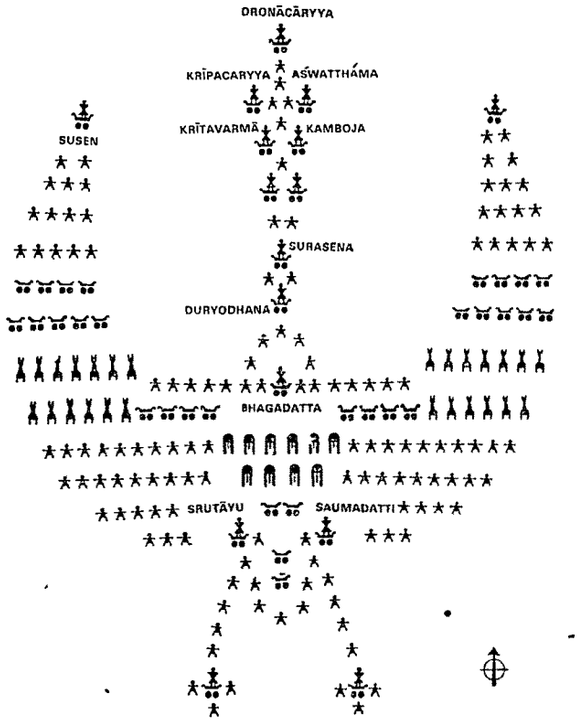
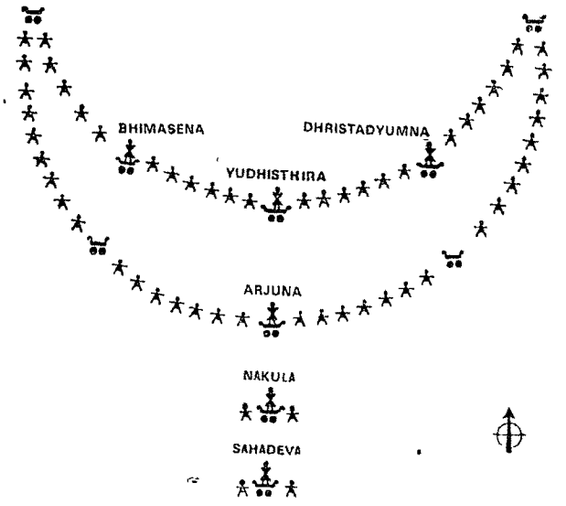

DRONĀCĀRYYA
KRĪPACARYYA
AŚWATTHĀMA
KRĪTAVARMĀ
KAMBOJA
SUSEN
SURASENA
DURYODHANA
BHAGADATTA
SRUTĀYU
SAUMADATTI

PLATE LXXIV

Top : Ardhacandra-Vyūha - The figure is the another form of Ardhacandra-vyūha formation based on the available description in the Mahābharata about the position of the royal gentries only.

Below : Syena-vyūha - The figure depicts the formation formed by the Pāṇḍavas on the 5th day of Kurukshetra battle.

(Source: Major P.Sensarma - Kurukṣhetra War - A Military Study)


BHIMASENA
DHRISTADYUMNA
YUDHISTHIRA
ARJUNA
NAKULA
SAHADEVA

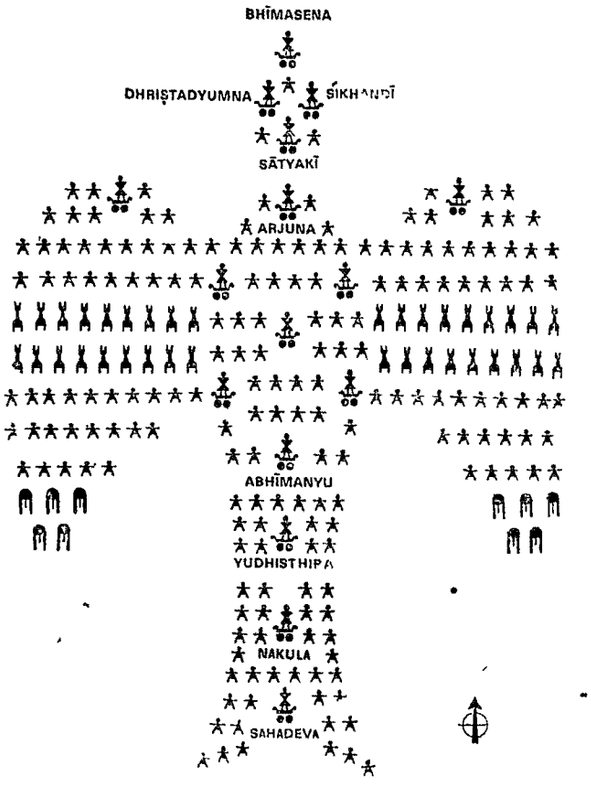

BHĪMASENA
DHRIṢTADYUMNA
ŚIKHANDĪ
SĀTYAKĪ
ARJUNA
ABHĪMANYU
YUDHISTHIRA
NAKULA
SAHADEVA

PLATE LXXV

Top : Sakaṭa-vyūha - The figure depicts the formation adopted by Dronācāryya on the 11th day of Kuru-kṣhetra battle.

Below: Ocean like vyūha - The figure depicts the formation organised by Karṇa on the 17th day of Kurukṣhetra battle.

(Source : Major P.Sensarma - Kurukshetra War - A Military Study)

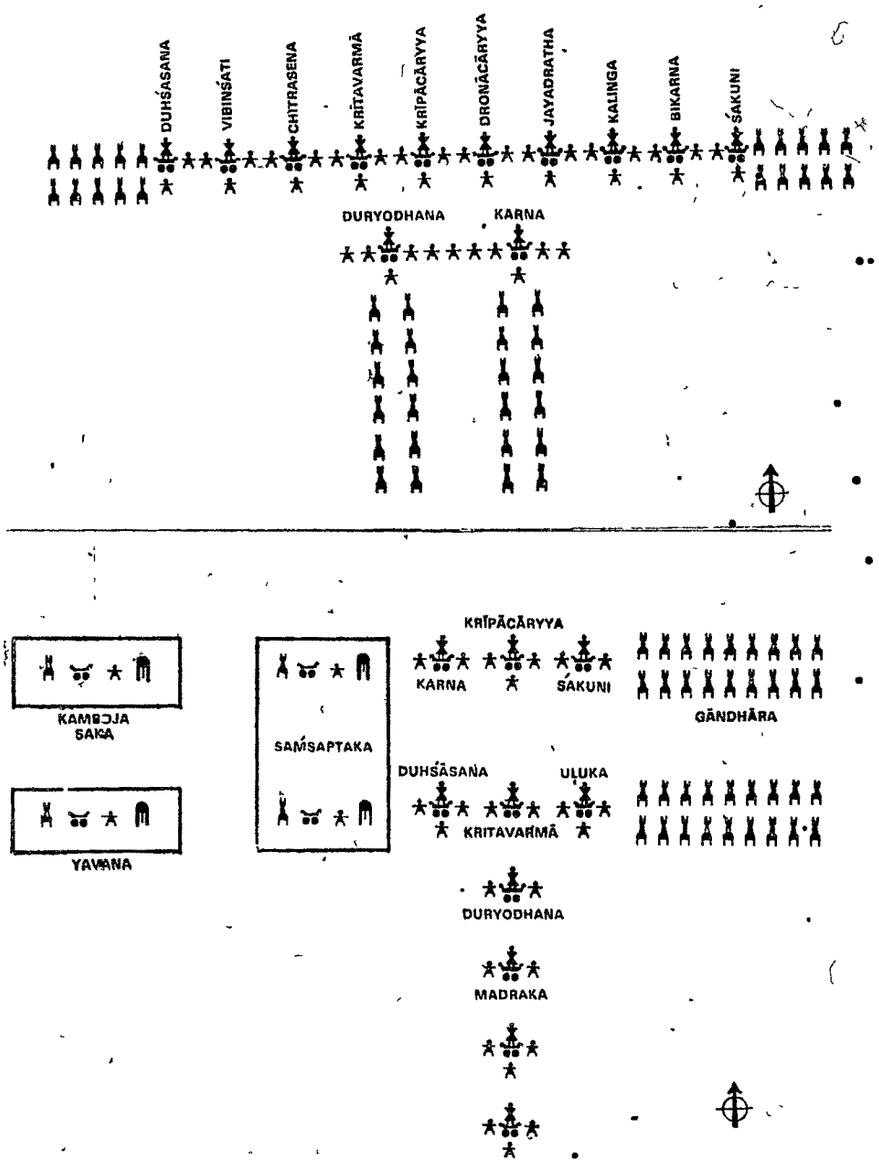
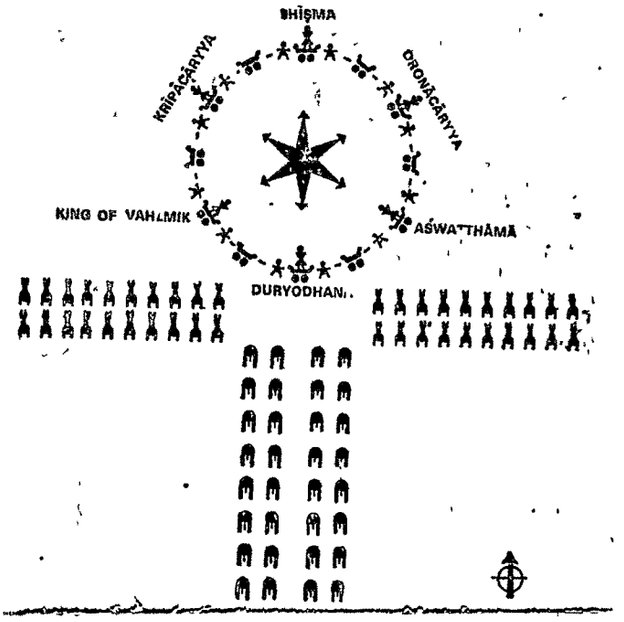

DUHŚĀSANA
VIBINŚATI
CHITRASENA
KṚITAVARMĀ
KṚĪPĀCĀRYYA
DRONĀCĀRYYA
JAYADRATHA
KALINGA
BIKARNA
ŚAKUNI
DURYODHANA
KARNA
KAMBOJA
SAKA
YAVANA
SAṂSAPTAKA
KṚĪPĀCĀRYYA
KARNA
ŚAKUNI
GĀNDHĀRA
DUHŚĀSANA
ULUKA
KRITAVARMĀ
DURYODHANA
MADRAKA

PLATE LXXVI

Top : Sarbatomukha-vyūha - The figure is based on the available description in the Mahābhārata.

Below : Bajra-vyūha - The figure is based according to the description available in the epic. It is also known as Acala-vyūha.

(Source : Major P.Sensarma - Kurukshetra War - A Military Study.)


BHÎŞMA
KRIPÂCÂRYYA
DRONÂCÂRYYA
KING OF VAHLMIK
AŚWATTHÂMÂ
DURYODHANA

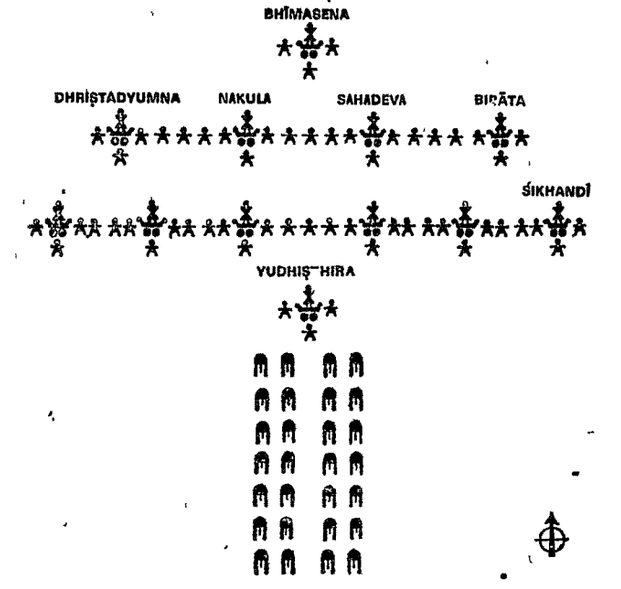
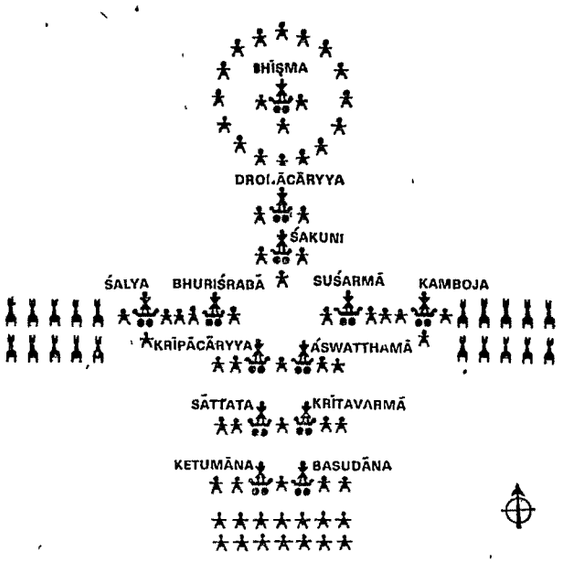

BHÎMASENA
DHRIŞTADYUMNA
NAKULA
SAHADEVA
BIRĀTA
ŚIKHANDÎ
YUDHIŞTHIRA

PLATE LXXVII

Top : Sarbatomukha-vyūha - Another form of Sarbatomukha-vyūha organised by Bhiṣma on the 2nd day of Kuru-kṣhetra Battle.

Below : Bajra-vyūha - This is another variety of Vajra-vyūha.

(Source : Major P.Sensarma - Kurukṣhetra War - A Military Study)


BHĪṢMA
DROḶĀCĀRYYA
ŚAKUNI
ŚALYA
BHURIŚRABĀ
SUŚARMĀ
KAMBOJA
KRĪPĀCĀRYYA
AŚWATTHAMĀ
SĀTTATA
KRĪTAVARMĀ
KETUMĀNA
BASUDĀNA

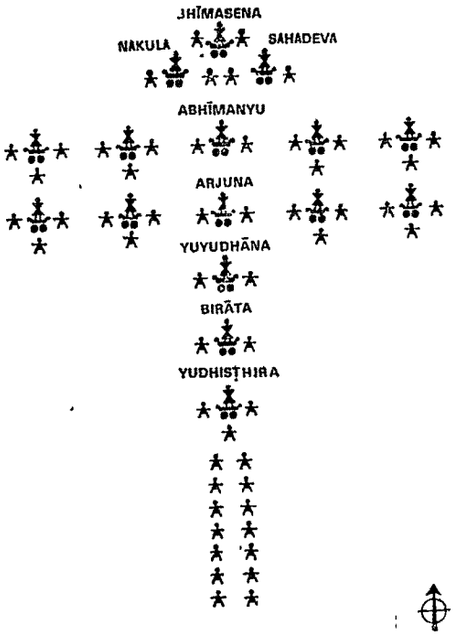
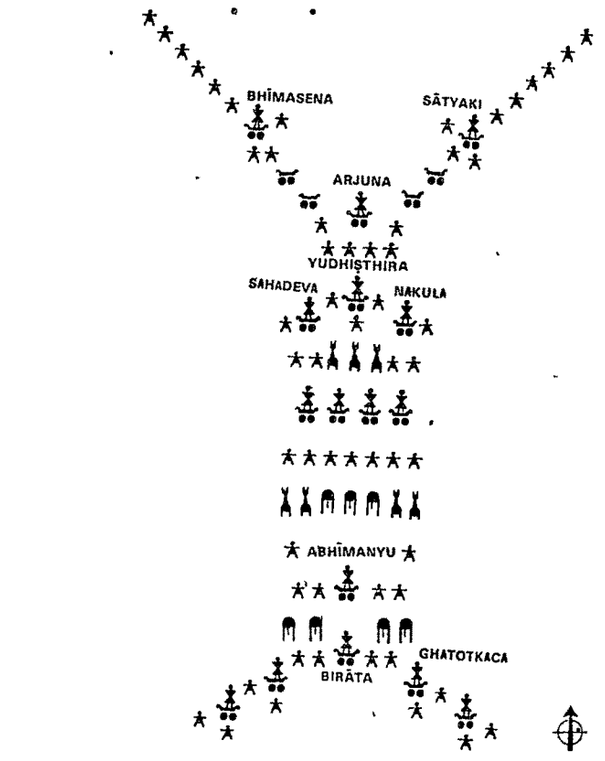

JHĪMASENA
NAKULA
SAHADEVA
ABHĪMANYU
ARJUNA
YUYUDHĀNA
BIRĀTA
YUDHIṢṬHIRA

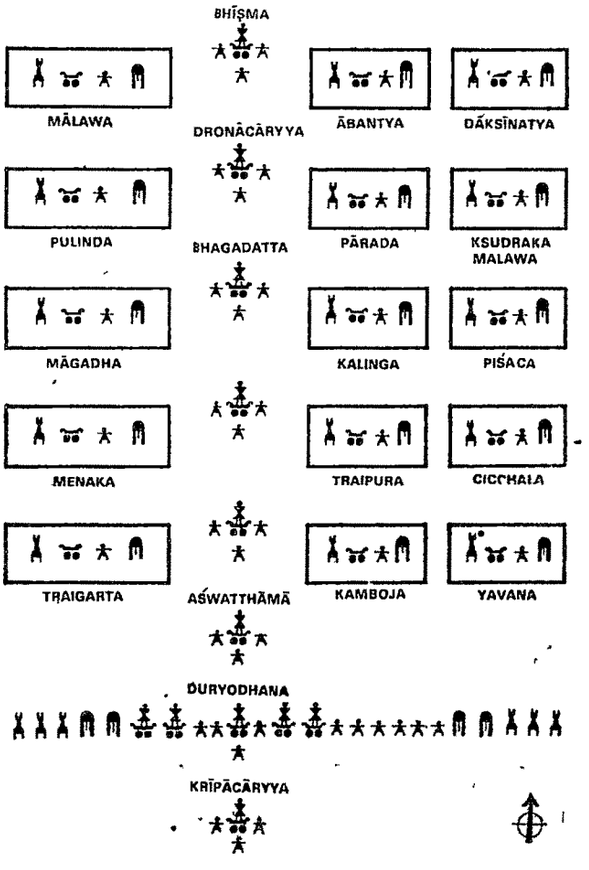
PLATE LXXVIII

Top : Sringaṭa-vyūha - The figure depicts the position of the royal gentries as described in the Mahā-bhārata.

Below : Ocean like vyūha - It is another variety of Ocean like vyūha. This formation was organised by Bhiṣma on the 8th day of Kurukṣhetra battle.

(Source : Major P.Sensarma - Kurukṣhetra War - A Military Study)


BHĪMASENA
SĀTYAKI
ARJUNA
YUDHIṢTHIRA
SAHADEVA
NAKULA
ABHĪMANYU
GHATOTKACA
BIRĀTA


BHĪṢMA
MĀLAWA
ĀBANTYA
DĀKṢĪNATYA
DRONĀCĀRYYA
PULINDA
PĀRADA
KṢUDRAKA MALAWA
BHAGADATTA
MĀGADHA
KALINGA
PIŚĀCA
MENAKA
TRAIPURA
CICCHAIA
TRAIGARTA
AŚWATTHĀMĀ
KAMBOJA
YAVANA
DURYODHANA
KṚĪPĀCĀRYYA

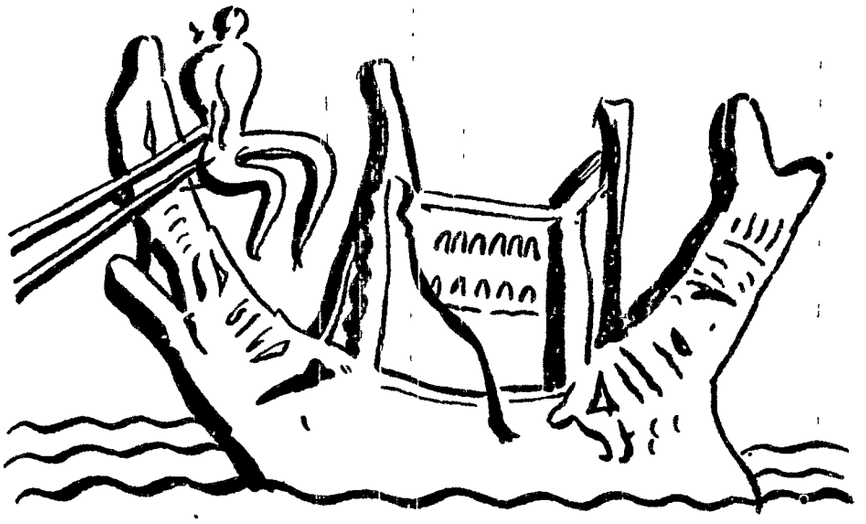
SOME INDIAN BOATS AND SHIPS

The plates LXXIX to LXXXVIII depict some Indian boats and ships of different periods. In a museum of war materials boats and ships of different periods can be shown by preparing models and cutout models from available descriptions in books and records, photos, drawings, paintings, sculptures, coins etc. The charts and diagrams will also be useful to show the names of different parts of these objects, their gradual evolution due to advancement of science and technology, materials used for their preparation, the fuel used and other interesting informations if any.

PLATE LXXIX

Mohenjo-dāro boats (c.3000 B.C.)

(Source : R.K. Mookerji - A history of Indian shipping)



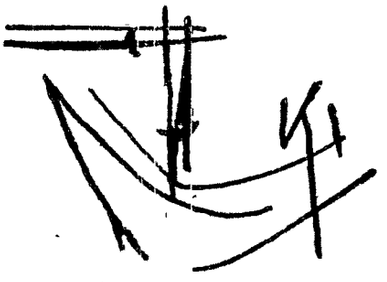


PLATE LXXX

Boats from Ajantā paintings.

The plate depicts the landing of Vijaya in Ceylon
(c.543 B.C.)

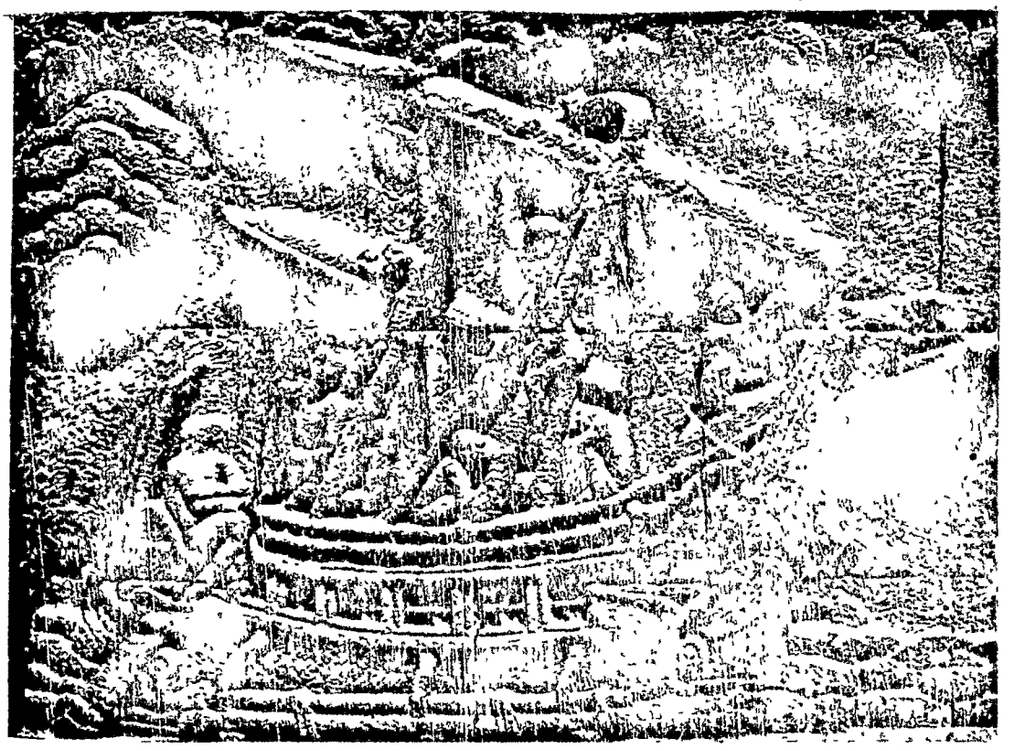
(Source : R.K.Mookherji - A history of Indian shipping)

PLATE LXXXI

Boats from sculptures

The plate depicts Indian Naval adventures as depicted on the sculptures of Barabudur.

(Source : R.K.Mookerji - A history of Indian shipping)



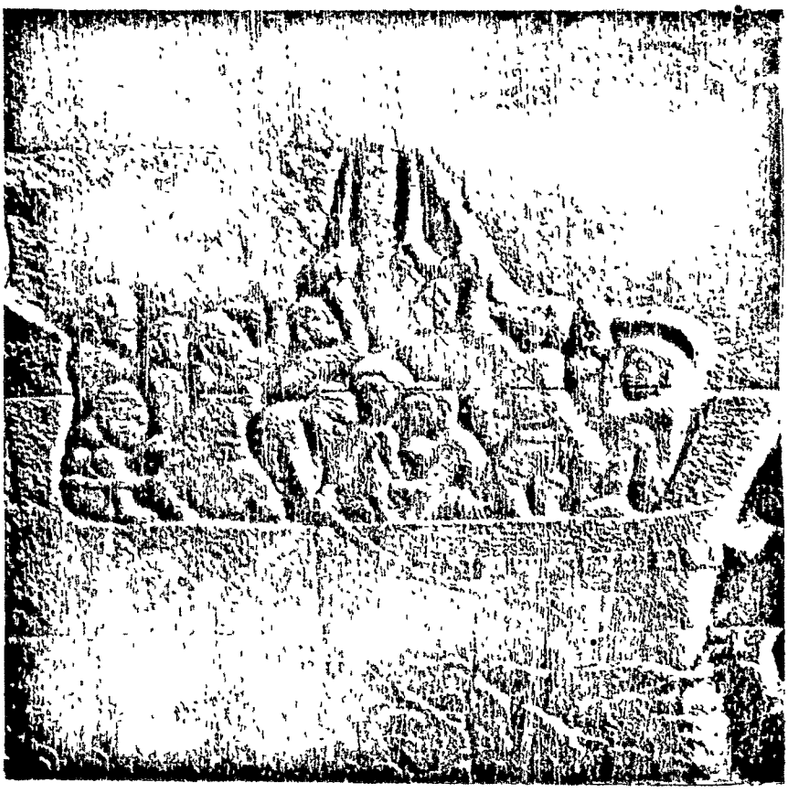


PLATE LXXXII

Boats from sculptures

The figures depict the boats as represented on the sculptures from the Sānchi Stupas.

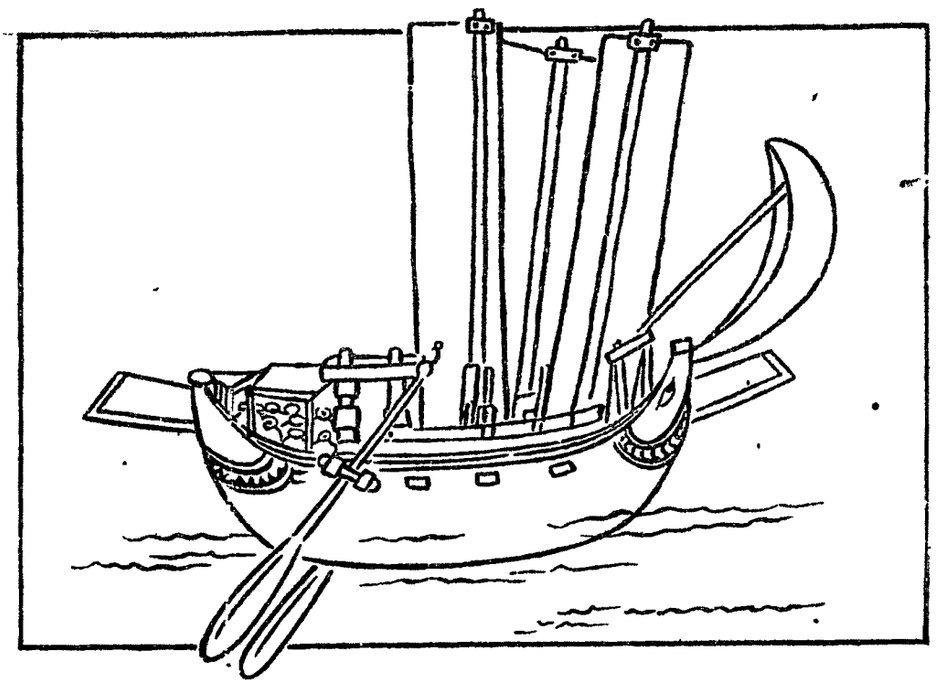
(Source : R.K.Mookerji - A history of Indian shipping)

PLATE LXXXIII

Top : A sea-going vessel from Ajantà paintings.

Below : The royal pleasure-boat from Ajantā paintings.

(Source : R.K. Mookerji - A history of Indian shipping)



A SEA-GOING VESSEL

THE ROYAL PLEASURE-BOAT

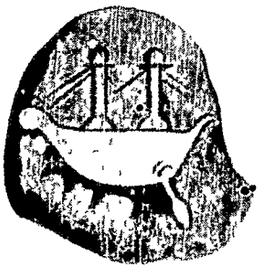
PLATE LXXXIV

Boats as represented on Indian coins.

The figuress depict some Andhra Ship-coins (c.2nd century A:D.)

(Source : R.K. Mookerji - The history of Indian shipping)

No. 1



No. 2

No. 3

No. 4

PLATE LXXXV

Mughal boats from Bābarnāmā (1597 A.D.)

(Collection : National Museum, New Delhi)

PLATE LXXXVI

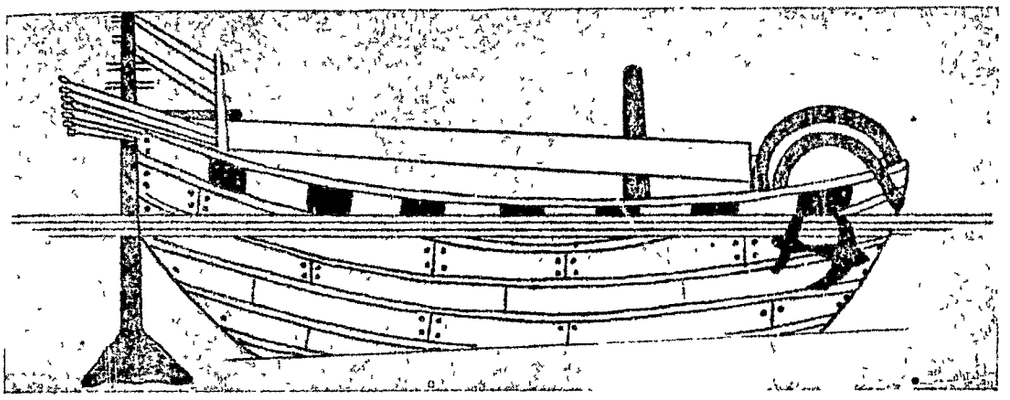
Some Indian boats of 17th century A.D.

Top : Patella - This is a great flat-bottomed vessel of Bengal and is very strongly built. Each such boat can carry about 5000 maunds of load. (1 md = 38 Kgs. approximate).

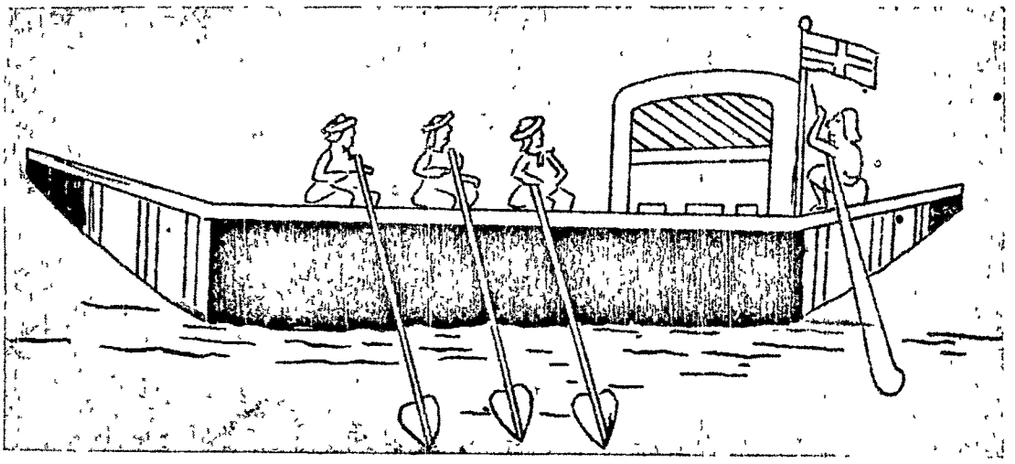
Middle: Oloako - This type boats are rowed some with four, some with six oars and ply for a fare.

Bottom: Budgaroo - It is a pleasure boat for royal gentries.

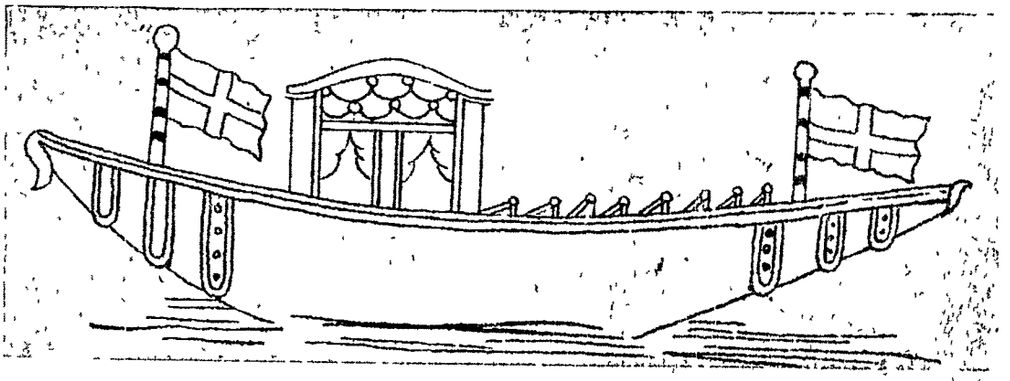
(Source : R.K.Mookerji - The history of Indian shipping)



PATELLA



OLOAKO



BUDGAROO

PLATE LXXXVII

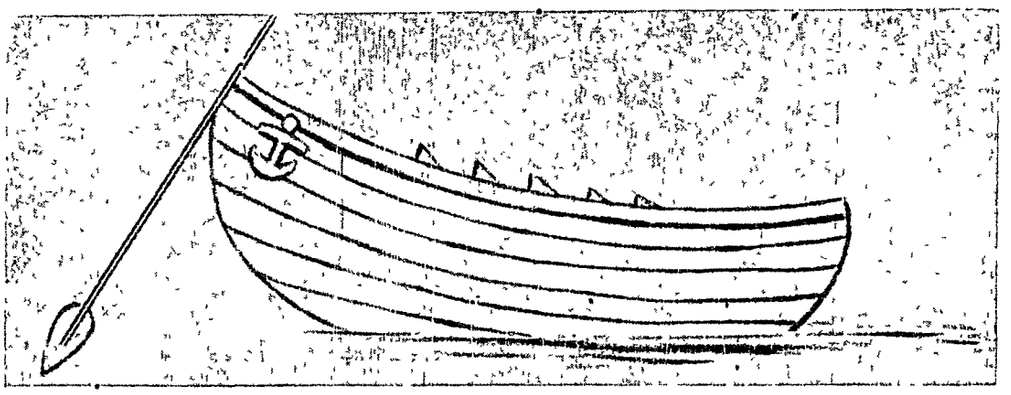
Some Indian boats of 17th century A.D.

Top : Purgoo - Purgoos were used for loading and unloading ships. They were reverine boats and were seen for the most part between Hugli, Pipli and Balasore.

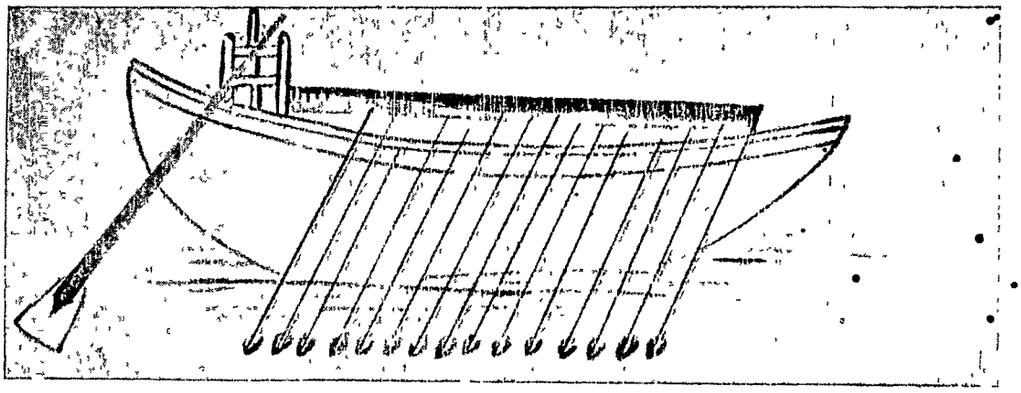
Middle: Boora : This was very floaty, light boat, rowing with twenty or thirty oars. Booras were used in rivers of Bengal and also served as tow-boat for the ships bound up and down the river.

Bottom: Man-of war prow - These boats were used in the Malaya Archipelago.

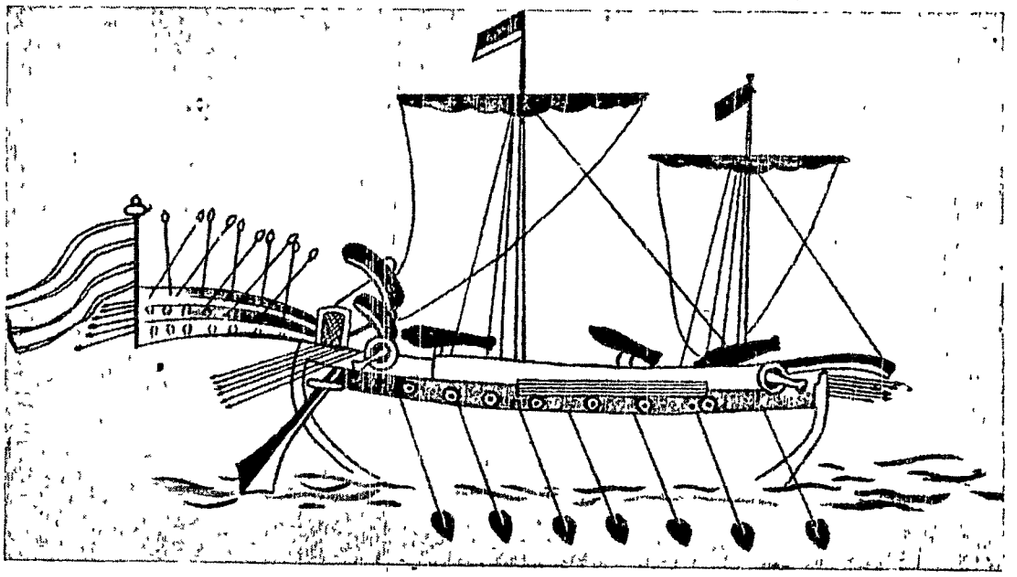
(Source: R.K.Mookerji - The history of Indian shipping)



PURGOO



BOORA

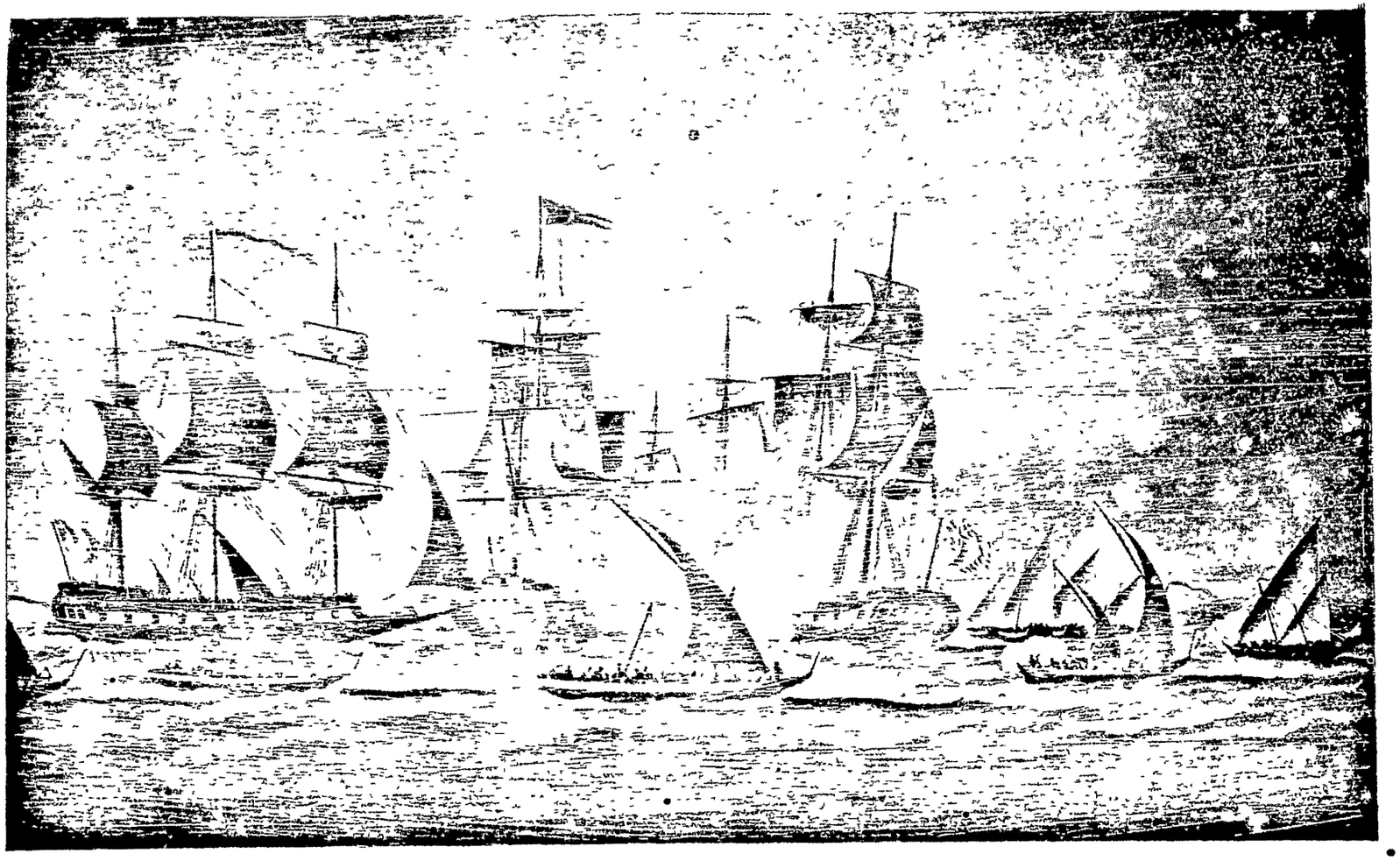


MAN-OF-WAR PROW

PLATE LXXXVIII

Maratha Grabs and Gallivats attacking an English ship.

(Source : R. K. Mookerji - The history of Indian shipping)



THE BILLETS

Plates LXXXIX and XC represent the camp lay-out and a few types of tents used during the time of emperor Akbar. In a museum of war materials different types of living accommodations, cook-houses, dining-halls, stores, latrines etc. used by Indian soldiers through ages, during peace time and in field areas can be shown with the help of charts, diagrams, photos and models to give an idea about the mode of living and way of life of the soldiers.

PLATE LXXXIX

The Imperial camp lay-out of emperor Akbar

a,b,c,d, are the main roads and f,g, are the bazars. The main bazar is laid out into the form of a wide street, running through the whole extent of the army, now on the right, now on the left of the private audience hall (Dewāni-khās).

1. The Imperial Hārem.
2. Open space with a canopy (Shamyana).
3. Private Audience Hall (Diwān-i-khās).
4. The great camp light (Ākas-diyā)
5. A turret on the top of which the band plays (Nāqquārākhānā).
6. The place where the saddles were kept (Zin-khānā)
7. The imperial stables (istābal)
8. Tents of the superintendents and overseers of the stables.
9. Tents of the clerks of the elephant stables.
10. Imperial office (Daftar).
11. Tents for Palkis and carts.
12. Artillery tents (Top-khānā).
13. Tent where the hunting leopards were kept (Citā-khānā)
14. Tents of Ākbar's mother, Humāyun's sister and prince Dauyal.
15. Tent of Jāhāngir, to the right of the imperial Hārem.
16. Tent of Sultān Murād, to the left of the imperial Hārem.
17. Store-houses and workshops (Buyutai).
18. Tent for keeping basins (Aftabci-khānā).
19. Tent for the perfumes (Khusbu-khānā).
20. Tent for storing mattress (Tosok-khānā).
21. Tent for the tailors etc.
22. Wardrobe (Kurkyaraq-khānā).
23. Tent for the lamps, candles etc.(Ciragh-khānā)
24. Tent for keeping holy Ganges-water (Abdar-khānā).
25. Tent for preparing Sarbat and other drinks.
26. Tent for storing Pan leaves.
27. Tent for storing fruits (Mewā-khānā).
28. Tent for Imperial plates (Rikāb-khānā)
29. The Imperial kitchen (Matbakh)
30. The Imperial bakery (Nanba-khānā)
31. Storeroom for spices (Hawej-khānā).
32. The Imperial guard.
33. The arsenal (Qur-khānā).
34. Women's appartment
35-41. Guard-houses.

Round about the whole area the nobles and mansabdārs with their contingents pitched their tents.

(Source : Blochmann - Āin-i-Ākbari)

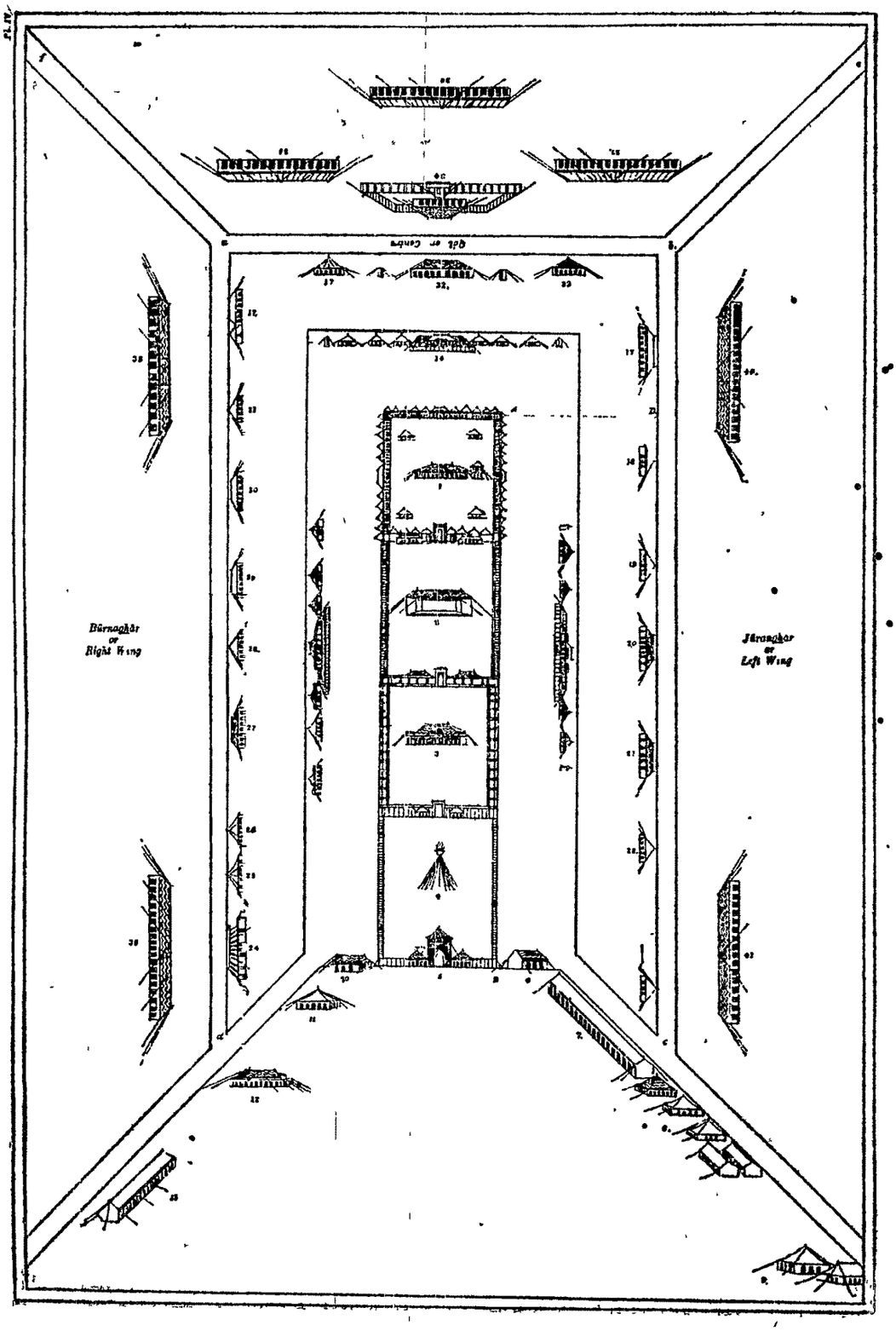

Bürnaghär
or
Right Wing
Järnaghär
or
Left Wing

PLATE XC

The Imperial tents.

1. Baragh : It is as large to accommodate more than 10,000 men. It takes a thousand farrashes, a week time to erect with the help of machines. There are generally two door poles fastened with hinges.

2. Do-ashiyana Manzil : It is a two storied house raised upon 18 pillars, 6 yards in height, which support a wooden platform; and into this pillars of 4 cubits in length are fixed with bolts and nuts forming the upper storey.

3. Chubin-rewati : It is raised on ten pillars. They go little into the ground and are of equal height, except two, which are a little higher, as the cross-beam rest upon them. The pillars have, above and below, a triangular piece of wood (dasa) fixed into the angle formed by the vertical beam and the cross-beam, to keep them firm, and several rafters pass over the dasas and the cross-beam, the whole being kept tightly together by clamps, bolts and nuts. The walls and roof consist of mats. There is one door or two.

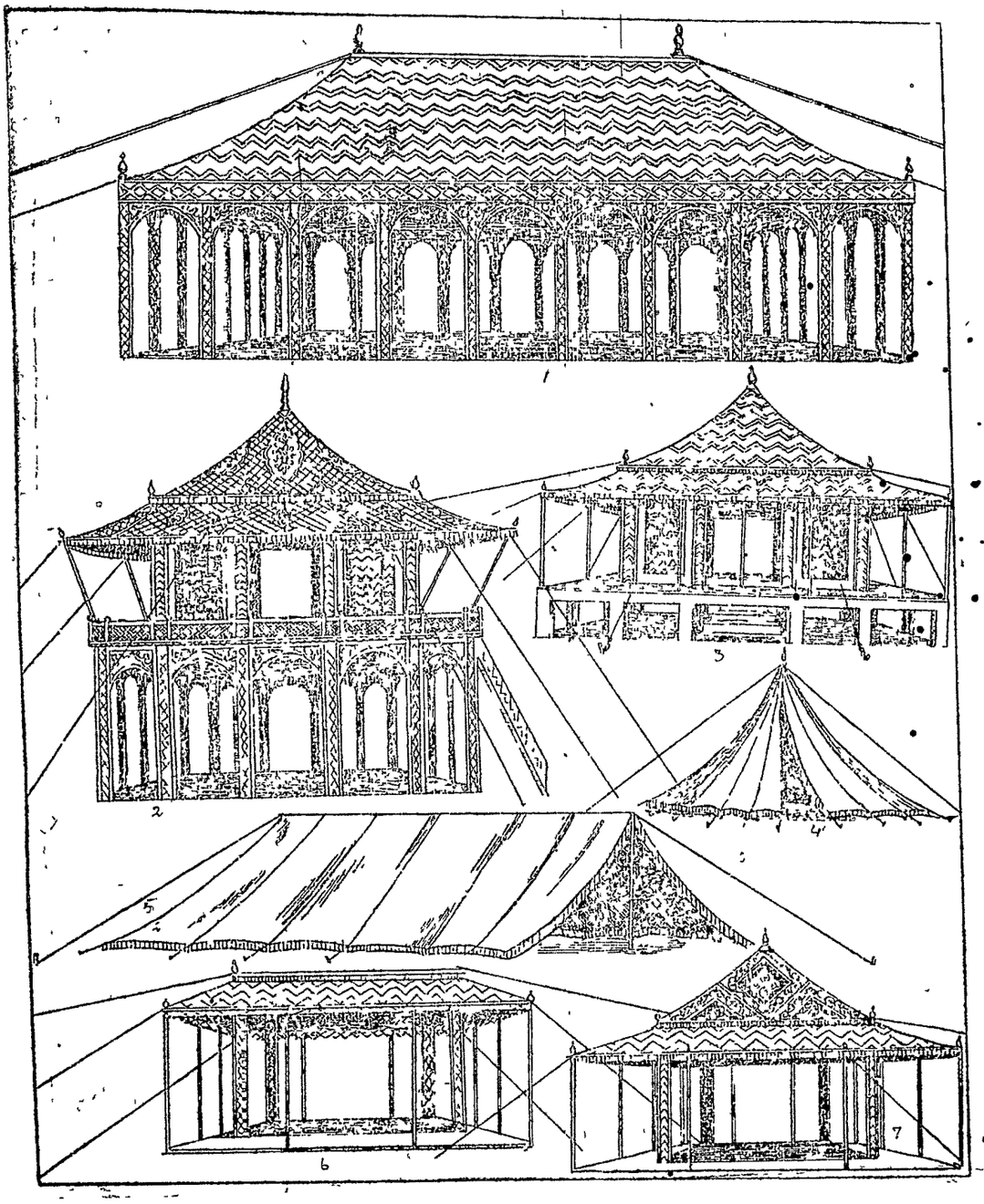
4. Zamindāz: The common conical tent with one centre pole tied to pegs (wooden or iron) in the ground.

5. Dusurugha : It is the Zamindaz with two poles.

6. Mandala: This tent is composed of five awnings joined together, and is supported by four poles. Four of the awnings are let down so as to form a private room.

7. Ajaibi: It consists of nine awnings on four pillars. Five of the awnings are square and four tapering; sometimes they make it so as to contain one division only, supported by a single pole.

(Source : Blochmann - Āin-i-Ākbari).


1
2
3
4
5
6
7

MAPS OF INDIA

Plates XCI, XCII and XCIII show the areas under the control of different rulers in India during 18th and 19th century A.D. In a museum of war materials similar other maps can be shown describing the occupied areas in India by different rulers since early days. The maps, relief-maps, charts, models, paintings etc. can also be used to show and describe important battles and campaigns, physical features of the terrain, road-ways, railways, water routes, telegraphic lines, climatic peculiarities, objects of military importance etc. This gallery will be very helpful to study military strategy and geography including its history.

PLATE XCI

India 1795

The map depicting the East India Company's territory and British protected States.

(Source : Brigadier Rajendra Singh P.S.C. — The Grenadiers — A regimental history)

INDIA
1795
Herat
Kabul
Jalalabad
Indus
Ghazni
Kelat
Kandahar
Afghans
HIMALAYA MTS
Sikhs
Amritsar
Lahore
Ruper
Quetta
Multan
Sutlej
Hissar
Hansi
Georgegarh
Delhi
Meerut
Bareli
Anupsheher
Koil
Aligarh
ROHILKHAND
Caswari
Mutra
OUDH
Rajputs
Jaipur
Deig
Agra
Lucknow
Ajmer
Bhurtpore
Jumna
Cawnpore
Jodhpur
Jats
Jaisgarh
Chambal
Gwalior
Kalpi
HINDUSTAN
Kotah
Chandherri
Udaipur
Chitorgarh
BUNDELKHAND
MAHRATTA
Mehidpur
Ujjain
Indore
Bhopal
Hills
Narbada
Dhar
Mhow
Broach
Tapti
Asirgarh
Nagpur
Cuttack
Argaon
CONFEDERACY
Assyer
Godavari
Bombay
BOMBAY
WESTERN CONCAN
MAHRATTA
Poona
Satara
NIZAMS
DECCAN
DOMINIONS
Krishna
ARABIAN SEA
BAY OF BENGAL
Goa
(Portuguese)
GHATTS
MYSORE
Madras
Seringapatam
MALABAR
BARAMAHAL
Pondicherry
(French)
Negapatan
(Dutch)
CEYLON
East India Company's Territory
British Protected States

PLATE XCII

India 1850

The map depicts the East India Company's territory in the year 1850.

(Source : Brigadier Rajendra Singh P.S.C. - The Grenadier — A regimental History)

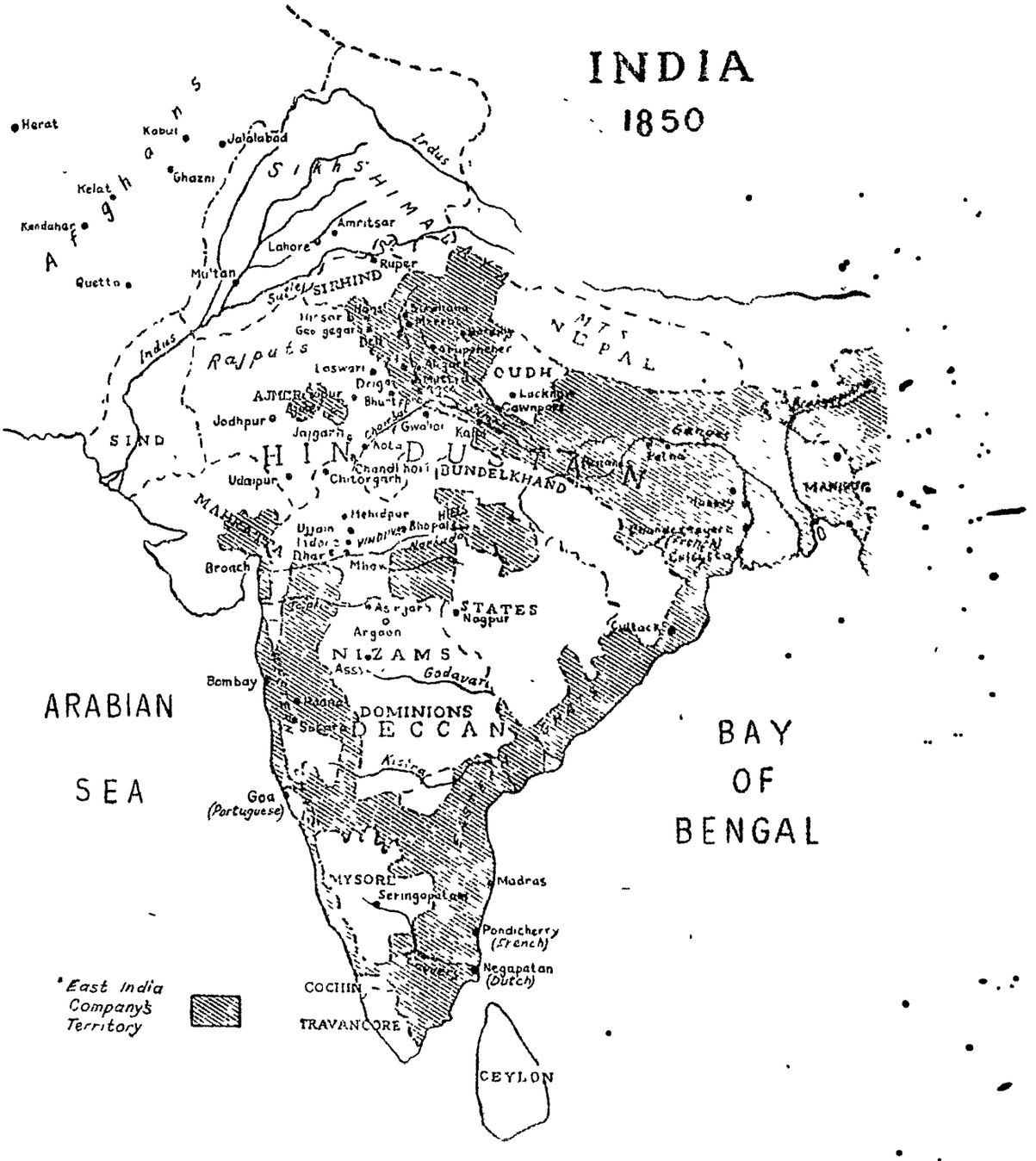
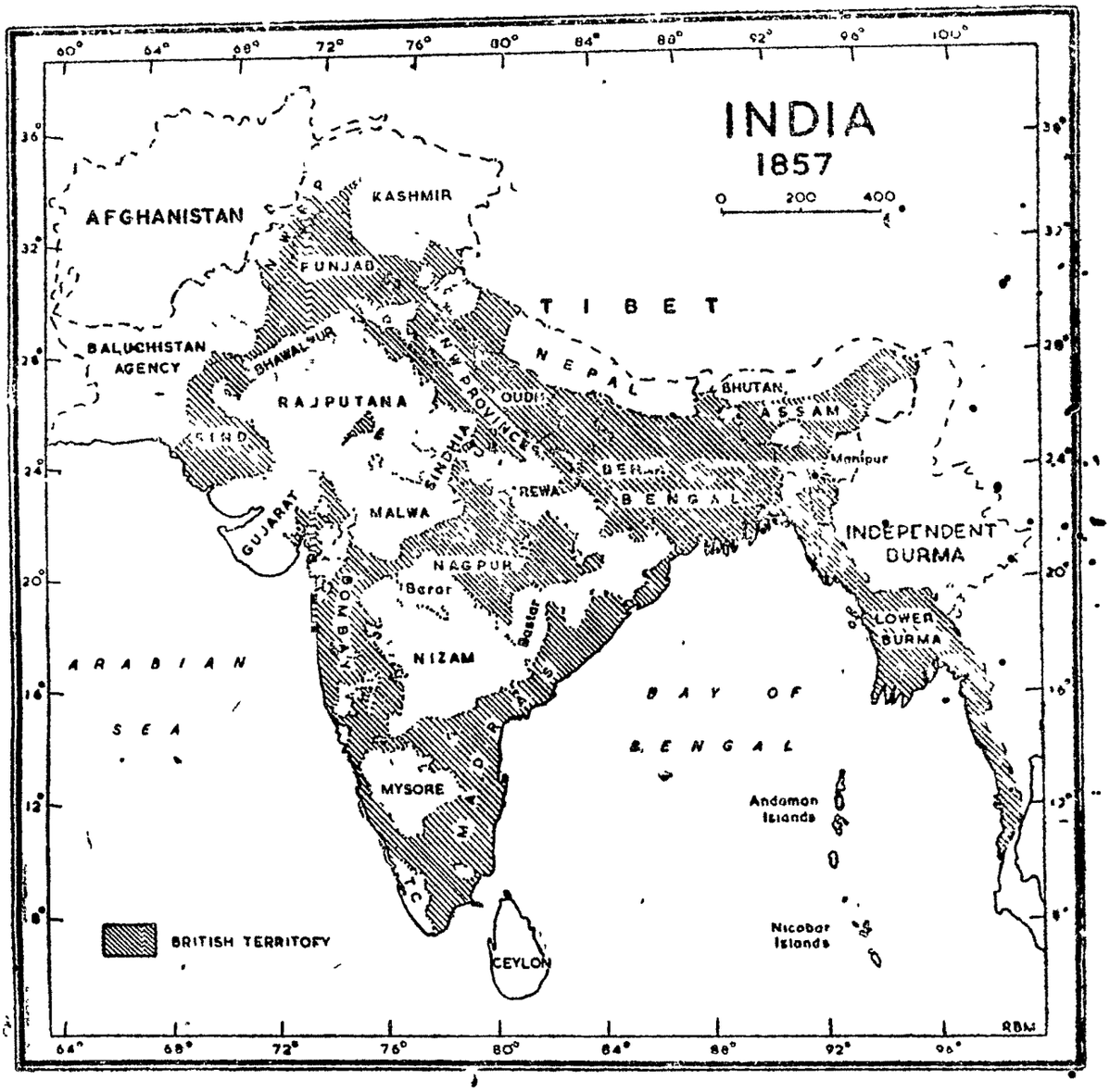

INDIA
1850
Herat
Kabul
Jalalabad
Ghazni
Kelat
Kandahar
Quetta
Afghans
Multan
Lahore
Amritsar
Ruper
SIKHS
SIRHIND
Indus
Rajputs
SIND
AJMERE
Jodhpur
Udaipur
Jaisalmere
Chitorgarh
Chandlhori
Jaigarh
Kotah
Gwalior
Agra
Delhi
Meerut
Loswari
Driga
Bhurtpore
OUDH
Lucknow
Cawnpore
Benares
Patna
BUNDELKHAND
MALWA
Ujjain
Indore
Dhar
Mhow
Hindpur
Bhopal
Nerbudda
Broach
Surat
Asirgarh
Argaon
Nagpur
STATES
NIZAMS
DOMINIONS
DECCAN
Godavari
Cuttack
Bombay
Poona
Satara
Goa
(Portuguese)
MYSORE
Seringapatam
Madras
Pondicherry
(French)
Negapatan
(Dutch)
COCHIN
TRAVANCORE
CEYLON
NEPAL
MANIPUR
ARABIAN
SEA
BAY
OF
BENGAL
East India
Company's
Territory

PLATE XCIII

India 1857

The plate depicts the British territory in the year 1857

(Source : Brigadier Rajendra Singh P.S.C. - The Grenadiers — A regimental history)

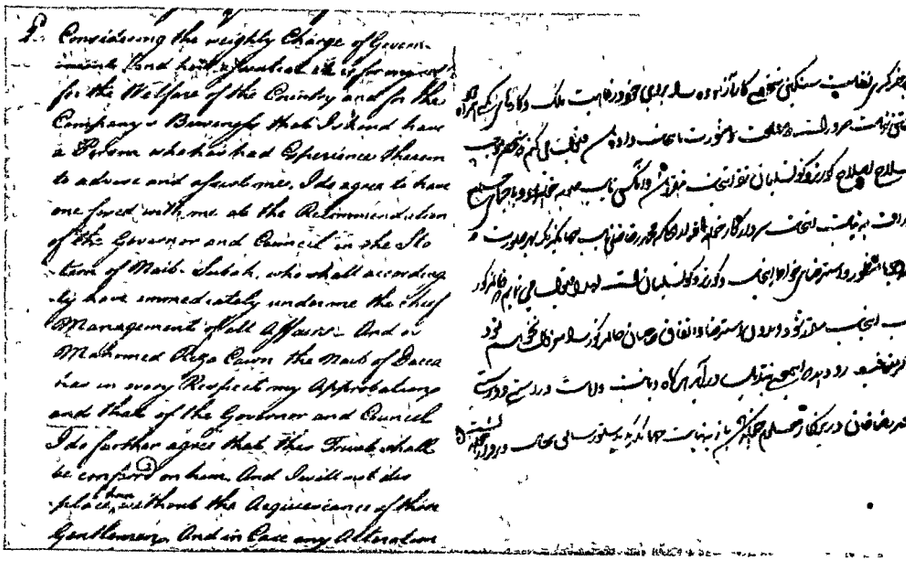

INDIA
1857
0 200 400
AFGHANISTAN
KASHMIR
PUNJAB
TIBET
BALUCHISTAN AGENCY
BHAWALPUR
NEPAL
BHUTAN
RAJPUTANA
OUDH
ASSAM
SIND
SINDHIA
REWA
BEHAR
Manipur
BENGAL
MALWA
GUJARAT
INDEPENDENT BURMA
NAGPUR
Berar
Bastar
LOWER BURMA
BOMBAY
NIZAM
ARABIAN SEA
BAY OF BENGAL
MADRAS
MYSORE
Andaman Islands
Nicobar Islands
CEYLON
BRITISH TERRITORY
RBM

Miscellaneous

PLATE XCIV

Agreement between Nawāb Nājāmuddulā and East India Company.

(Collection : Victoria Memorial Hall, Calcutta).

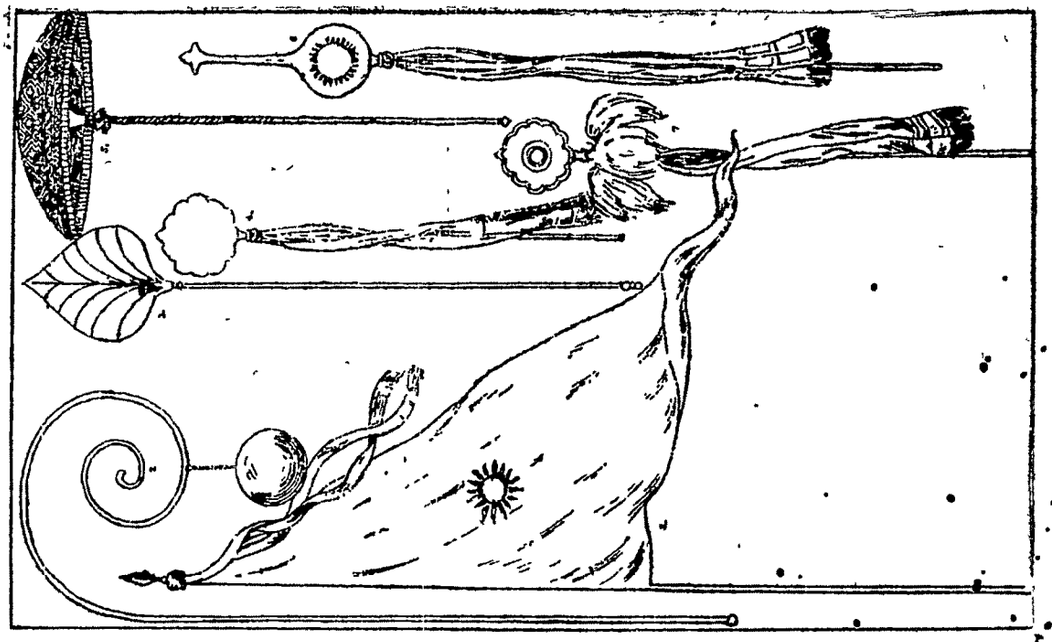


I Considering the weighty Charge of Government and both Humbled at the Honour for the Welfare of the Country and for the Company's Business that I should have a Person who has had Experience thereon to advise and assist me, I do agree to have one joined with me at the Recommendation of the Governor and Council in the Station of Maid-Sudah, who shall accordingly have immediately undertake the chief Management of all Affairs. And as Mahomed Reza Cawn the Naib of Bacca has in every Respect my Approbation and that of the Governor and Council I do further agree that the Trust shall be confirmed on him. And I will not also [illegible] without the Acquiescence of this Gentlemen. And in Case any Alteration

PLATE XCV

Mughal ensigns and war musical instruments,
during Ākbar's reign.

(Source : Blochmann : Āin-i-Ākbari)



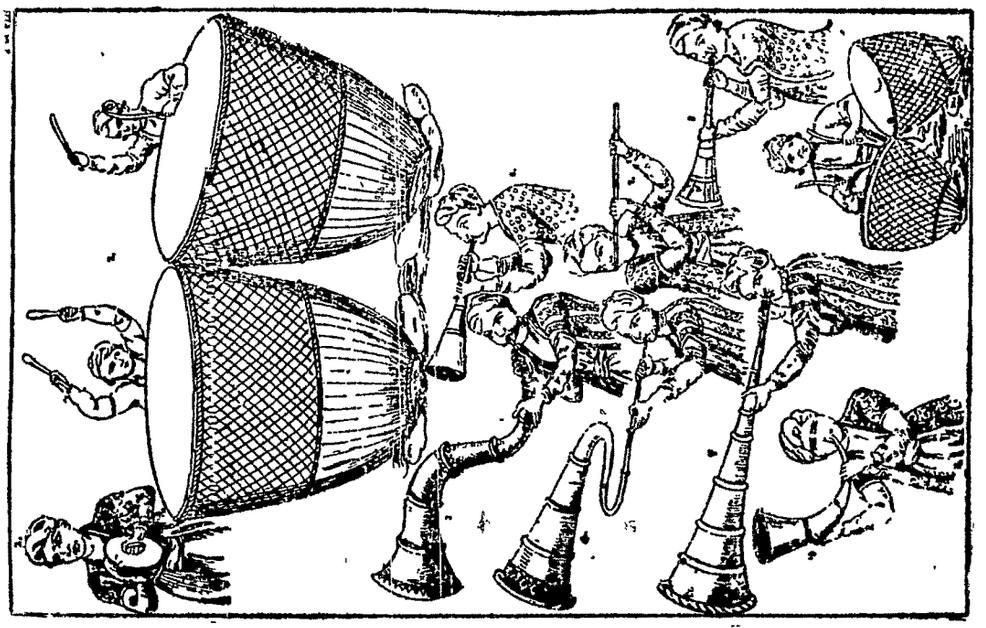


PLATE XCVI

Suggested building plan of a museum of war materials.

In support of and to justify the suggested building plan following points have been considered :

(a) It is obvious that the curator's office at the centre of the building will help much in all round control and command over the museum.

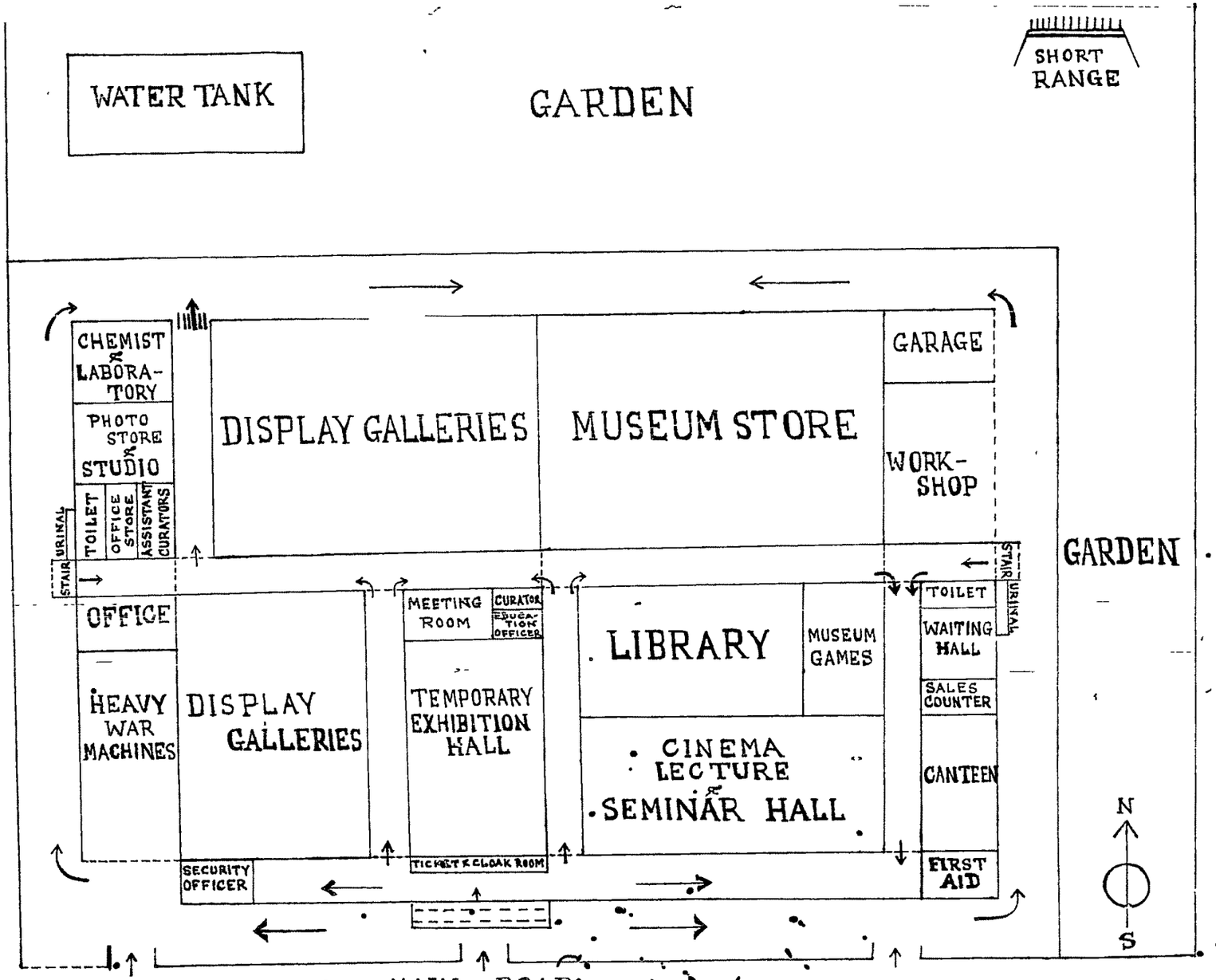
(b) Display galleries and administrative blocks have been separated with separate exit and entrance from the other portion of the building with the idea that when galleries and office will remain close normal public services like lectures, seminers, museum games, cinema shows etc can be performed till late hours.

(c) Space for laboratory, photo stores, studio etc.containing valuable documents and inflammable articles have been allotted at the North-West corner of the building near the water tank as a precautionary measure against accidental fire and to meet other security problems.

(d) The museum store has been placed close to curator's office and the workshop with the idea that the curator will be able to keep close contact with these two departments to facilitate research works and to select materials for exhibitions from the store and fabrication of exhibits in the workshop or use of such materials for any educational programme. Again due to the presence of store in between the workshop and the display galleries the disturbing sound of the workshop will not reach the visitors' ears.

(e) The short range and the open space at the north of the building can be utilised for field-craft training, demonstrations, firing practices etc.

(f) The utilities of canteen and first-Aid post near public services area and the security room near the gallery service area are obvious and need no explanation.



SUGGESTED BUILDING PLAN OF A MUSEUM OF WAR MATERIALS

SCALE 1" = 50'