THESIS FOR THE PH.D. DEGREE

Submitted to the University of London

FACULTY OF ARTS

by

Arif Husain Mirza, M.A.

Institute of Archaeology.

October 1961.

"MUGHAL JADES AND CRYSTALS; (A BASED ON CATALOGUE RAISONNÉ ~~BASED~~ OF THE COLLECTIONS IN THE NATIONAL MUSEUMS OF LONDON."

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

24.3.68.

CONTENTS

ABSTRACT.

This thesis aims at providing a catalogue and description of the extensive Collections of Mughal jades and crystals in the National Museums of London. Although these Collections are comparatively rich, yet very little attention has been paid to the problems involved in the working of both jade and rock-crystal in India, and little has been published on this subject. An attempt, therefore, has been made to trace the beginnings and development of these arts.

The thesis is divided into two parts, the first consisting of six chapters and the second of a Catalogue of a very wide representative sample of jade and rock-crystal.

The first chapter deals with the superstitious beliefs concerning jade, its chemical composition and the occurrence of the mineral in China, Eastern Turkistan and Burma. An effort has been made to establish that China had once its own jade deposits which became exhausted because of heavy demands made upon them.

In the second chapter the Chinese working of jade is described in some detail, followed by an analysis of the technique of jade working. The Indian working of jade

as observed by European writers and as inferred by study of the Collections, has also, been dealt with.

In the third chapter the constitutents of rock-crystal and its material evidence in various Indian archaeological sites is assembled and a survey of Buddhist reliquaries is made.

The fourth chapter deals with the methods of manufacturing hard stone beads and the advanced techniques employed in making reliquaries.

In the fifth chapter the history of the diamond and the use of the diamond point and dust has been traced. The early Indian evidence is found to be indefinite.

In the final chapter a tentative dating of the Mughal jade and rock-crystal objects has been attempted and an effort has been made to establish that not only rock-crystal but also jade was worked by local Indian craftsmen.

ACKNOWLEDGEMENTS

It is difficult for me to express my gratitude to Professor K. de B. Codrington, Institute of Archaeology, University of London, for his constant help and guidance in the preparation of this thesis. I have benefited a great deal from his detailed knowledge and wide experience. I am very grateful to Mr. H.W.M. Hodges, lecturer, Institute of Archaeology, University of London for his unhesitating help and assistance in going through the chapters, especially those dealing with technology, and making valuable comments. He has, also, very kindly examined the Catalogue.

I am greatly indebted to Dr. F.R.Allchin, lecturer, University of Cambridge for his advice and help and the interest that he took in my work.

I am extremely grateful to Mr. J.C. Irwin, keeper of the Indian Section of the Victoria and Albert Museum, to his staff and to Mr. Douglas Barrett and Mr. Ralph Pinder-Wilson, Dy. keeper and Assistant keeper respectively, of the Oriental Antiquities of the British Museum, for their generous help and co-operation in permitting me to handle both jades and rock-crystals in

their sections.

My thanks are, also, due to the photographic departments of both the B.M. & V. and A. Museums for providing me with the photographs.

I am obliged to the Staff of the libraries of the Institute of Archaeology and School of Oriental and African Studies for their help in providing books and periodicals essential to this work.

Finally, I cannot fail to record my gratitude to the British Council which granted me a Scholarship to complete this undertaking.

ABBREVIATIONS

J.R.A. Inst.	Journal of the Royal Anthropological Institute.
J.A.S.B.	Journal of the Asiatic Society of Bengal.
J.B.B.R.A.S.	Journal of the Bombay branch of Royal Asiatic Society.
J.M.P.I.P.	Journal of the Madhya Pradesh Itihasa Panishad.
T.O.C.S.	Transactions of the Oriental Ceremic Society.
Arch. Surv. of India.	Archaeological Survey of India.

PLATES.

CHAPTER I.

JADE

§ 1. Jade as a substance, and its supposed magical and medicinal properties and its chemical composition.

It is an interesting fact that from the remote past jade has been regarded not only as a semi-precious stone but also as an object with medicinal properties. Jade was also used for a variety of artefacts from the neolithic period onwards, and polished jade hand axes have been found in places as wide apart as Germany and Taxila.

Until comparatively recently a number of nephrite and jadeite objects in worked condition were found in Europe; and Fisher, who did not find any material evidence in regard to the occurrence of true jade, elaborated a theory that all the objects found in Europe, worked as well as rough, came from Central Asia as a result of the migration of the people or through prehistoric commercial intercourse.[1] This view is partly supported by Montelius who is of the opinion "that at all events some of these works are to be attributed to such an importation."[2] However, roughly finished jade objects have lately been found in various districts of Europe

---

1. Bauer, Max. Precious Stones. tr. by Spencer, L.J. p.58.
2. Laufer, B. Jade. p.2.

where formerly well finished implements of jadeite and nephrite had already been discovered and it has been observed that all such objects are mineralogically identical. But it is important to note that they differ materially from the material and products of central Asia.[1] As a result of later researches both Berwerth and Mayer dismiss the conclusions of Fisher, and suggest that all the objects found in the various regions of Europe were manufactured in the neighbourhood of their find spots. While discussing this controversial question Laufer says "In Europe, strata of nephrite were discovered in the eastern Alps in the Sann Valley, near St. Peter, and in the Murr Valley, near Graz. In Switzerland, bowlders of jadeite were sighted on lake Neuenburg; even a sort of nephrite workshop was discovered in the vicinity of Maurach, where hatchets chiseled from the mineral and one hundred and fifty-four pieces of cuttings were found. At the foot of Mount Viso, in Italy, jadeite was met with in situ. Single erratic bowlders of nephrite in diluvial deposits had been signaled in Germany at an earlier date, near Schwemmsal, Potsdam, and Leipzig."[2] Muller, however, is

---

1. Bauer, Max. op.cit. p.458.
2. Laufer, B. op.cit. p.2. Laufer's statement is somewhat obscure. The technique involved will be dealt with later on, but his use of chisel for this material is unfortunate.

of the opinion that "we may rather presume with certainty that at least a greater part of the hatchets mentioned have been imported by commerce from the Orient, whence the knowledge of polishing hatchets is derived. At a somewhat later time, an extensive trade in stone artefacts was carried on within the boundaries of Europe."[1]

In his study of "The Prehistory and Proto-history of Eastern India" Dr. Dani has recorded the limited distribution in India of shouldered hoes, made of a tough dark green stone exceedingly dense in structure. In this region at least these specimens appear to belong to the early historic period. Unfortunately mineralogical identification is not forthcoming, but the discovery of these jadeite implements suggests that the mineral in question was known to India from later pre-historic times.[2]

Wheeler claims that artefacts of jade have been found in the Indus Valley. While discussing the commerce and transport he says that "other material used for

---

1. Laufer, B. op.cit. p.3.
2. Dani, A.H. Pre-history and Proto-history of eastern India. p.98. Dani's work makes it plain that in many parts of India and south east Asia neolithic cultures survived into historic times. The green stone hoes have been found in mediaeval walled city sites and neolithic polished pointed butt axes were found at Bhita and elsewhere in levels as late as the 7th Century.

ornamental purposes by the Harappans includes lapis-lazuli, turquois, jade and amazonite."[1] The occurrence of jade beads in the Valley has been mentioned by Mackay as well.[2] The use of jade in the Indus Valley has also been mentioned by Gordon.[3]

During his excavation at Sirkap, Taxila, Marshall discovered a polished celt made of nephritic jade and he says that "nephrite jade is also found in Rewa State in Central India."[4] However, Wadia says that "its occurrence is not known in India."[5] It is probable that Wadia who had a wide experience of Indian minerals is right.

The refined qualities of jade render it peculiarly suitable for fashioning objects of the most exquisite and delicate kind. In the hands of the Chinese, its importance increased tremendously. Its universal application to commercial and personal uses "its inherent beauty and indestructibility and its supposed talismanic virtues have made it the national gem of China, where it is regarded by all as a symbol of purity and moral worth and reputed by the Taoists to be the food of the immortals."[6]

---

1. Wheeler, Sir Mortimer. The Indus Valley (Cambridge).p.59.
2. Mackay, E.H.J. Further Excavations at Mohenjodaro. Vol. 1. pp. 498, 527.
3. Gordon, D.A. The prehistoric background of Indian Culture. p.74.
4. Marshall, Sir John. Taxila. Vol. II. p.478.
5. Wadia, D.N. Geology of India. p. 323.
6. Hobson, R.L. 'Jade'- The Burlington Magazine. Vol.23. (April to September), 1913. p.3.

"According to the Chinese", says Smith, "jade is the prototype of all gems, and unites in itself the five cardinal virtues, Fin [charity], Gi [modesty], Yu [courage] Kestu [justice], and Chi [wisdom]. When powdered and mixed with water, it is supposed by them to be a powerful remedy for all kinds of internal disorders, to strengthen the frame and to prevent fatigue, to prolong life, and, if taken in sufficient quantity just before death, to prevent decomposition."[1]

As an embodiment of nobility, purity and excellence, jade was considered as a vehicle of communication with super human powers.[2]

The Chinese believed that jade had magical potentialities. They carried with them small pieces of jade; because they believed that through contact with them, the body would absorb some of its secret virtues.[3] It was the emblem of sovereign power, hieratic dignity and was worn not only as a badge of rank but, also as an

---

1. Smith, G.F.H. Gem Stones, revised by Phillips, F.C. p. 431.
2. Hennesy, U.P. Early Chinese Jade. p.17.
3. Kunz, G.F. The Curious Lore of Precious Stones. p.84.

amulet against diseases.[1]

According to the famous philosopher Khivan Ghung, the contemplation of a piece of jade opens to the eyes of a true Chinaman a whole history of poetic visions. In it he sees reflected nine of the highest attainments of humanity. In its glossy smoothness, he recognises the emblem of Benevolence; in its bright polish he sees Knowledge emblematized; in its unbending firmness, Righteousness; in its modest harmlessness, Virtuous

---

1. Since the amulatic use of jade is prominent in all the Chinese occurrences, it is necessary to use the term "amulet" correctly.

"An amulet is a material object worn or carried on the person, or preserved in some other way, for magico-religious reasons, e.g. to cure disease, to give strength, "luck" or general protection to the possessor or to defend him or her from specified dangers or misfortunes." (Encyclopaedia of religion and ethics Vol. 3. pp. 392-393.) From ancient times, the Egyptians used to wear the amulets in the form of necklace. The Greeks used amulets as protective charms and write of "phylactery". The Christians took the use of amulets from the Greek and Roman world because embodying in their amulets the initial contained the Greek word for Jesus Christ, Son of God and Saviour. (Chambers' Encyclopaedia, Vol.I. p. 392). Amongst a number of different kinds of amulets the Chinese held the 'Mouth Jade' in particular esteem because they believed that after it is placed in the mouth of a dead person, its protective power will negative and counteract the effects of those forces which disintegrate and decompose the corpse. (Kunz, G.F. Curious lore of precious stones. p.86).

In Muslim countries the wearing of amulets is very common, both as a curative force and a luck bringer.

It will be interesting to mention here that Lord Rosebery had on his person a jade amulet when his horse 'Cicero' won the Derby, and that Lord Rothschild was also wearing such an amulet when his horse, 'St. Amand' carried his colours to victory. (Kunz, G.F. The magic of jewels and charms. p.362).

action; in its rarity and spotlessness, Purity; in its imperishableness, Endurance; in the way in which it exposes its every flaw, Ingenuousness; in the fact that though of surpassing beauty, it passes from hand to hand without becoming sullied, Moral Conduct; and in the circumstances that when struck it gives forth a note which floats sharply and distinctly to a distance, Music.[1]

Chemical Composition.

Jade is a general term that probably includes two distinct minerals, nephrite and jadeite, which are very similar in appearance but, nevertheless, differ in their mineralogical composition. Although both nephrite and jadeite are tough and compact in character, the former is composed of short interlocked and matted fibres and the latter usually appears in granular to columnar or somewhat fibrous aggregates. This distinction sometimes is detected by means of a hand lens or even by the unaided eye.[2]

But the term jade is also wrongly applied to other minerals which have somewhat similar appearance such as saussumite, californite, bowenite, plasma, massive grossular and verdite.[3] It may, however, be said that the

---

1. Fernie, W.T. Precious Stones. pp. 285-6.
2. Clarke, J.W. & Merill, G.P. "On nephrite and jadeite". pp. 128-9. Proceedings U.S. National Museum, Vol.XI, 1888.
3. Smith, G.F.H. op.cit. p.431.

third term,Chloromelanite,was introduced later on to distinguish a variety of jadeite, rich in iron and often blackish green in colour.[1] These three minerals, nephrite, jadeite and chloromelanite,are sometimes collectively referred to as 'Nephritoids'.[2]

The Chinese term 'Yu' as an equivalent to jade frequently occurs in the oldest texts and is said to have been known to the legendary Emperor Huang-ti (alleged B.C. 2704).[3] But the word jade was introduced into Europe after the discovery of America by Columbus in 1492 and it was Sir Walter Raleigh who acquainted England with the stone in 1595.[4] The word jade, however, does not actually occur in English literature until a considerable time after the death of Raleigh. The word actually derived from the Spanish term 'Piedra de hijada' (Colic stone) used by Monardes, a physician of Seville as early as 1565.[5] These stones were worn by the natives of Central and South America as a means of protection against the renal diseases.[6] They were also termed alternatively 'piedra

---

1. Hansford, S.H. Chinese Jade Carving. p.3.
2. Bauer. op.cit. p.457.
3. Hirth, F. The ancient History of China. p.15.
4. The word 'Jade' appeared in the English language for the first time in 1727. Shorter Oxford English Dictionary. p.1057.
5. The Bishop Collection; Investigations & Studies in jade. Vol.I. p.1.
6. It is noteworthy that South America produces both nephrite and jadeite and these minerals were used in the early pre-Columbian period.

de los rinones' (stone of the kidney).[1] It is clear that their amuletic use became popular in the later half of the 16th century for curative purposes.

Nephrite as a geological term was introduced by A.G.Warner in 1789 and is derived from the Greek word Νεφρος (kidney). In the course of time the Spanish term 'Piedra De Ijada' was condensed to the modern term of jade. Behind the modern French "le jade", also, lies "pierre de l'ejade".[2]

The specialised term, jadeite, does not seem to have appeared in any literature until 1863, when Damour,[3] an eminent French scientist, worked on a specimen of jade brought to Paris as part of plunder from the Summer Palace near Peking. After a detailed analysis and careful study of the material he demonstrated that the common term jade actually consisted of two quite different minerals. To distinguish one from the other, he used, in addition to the old term "nephrite", a word of his own coinage, "jadeite". At the same time he also showed that nephrite in chemical composition is close to tremolite and, therefore, on the basis of the result of his experiments, he put it in the amphibole group. Jadeite, in which he

---

1. Needham, J. Science and Civilization in China. Vol.3. p. 663.
2. Goette, J. Jade lore. p.24.
3. Bushell, S.W. Chinese Art. Vol.I. p.120.

found properties resembling those of diopsid, he described as a member of the pyroxene group. His conclusions, however, were much disputed until 1881 when Des Cloizeaux[1], after further research, conclusively proved that jadeite does indeed belong to the pyroxene group. Both these substances, nephrite and jadeite, are very similar in their physical structure but are substantially dissimilar in so far as their chemical constituents are concerned.

Both nephrite and jadeite have their own peculiar distinguishing qualities. They are, indeed, composed of dissimilar elements. Nephrite is a silicate of calcium and magnesium, in principle $Ca_2 (Mg\ Fe)_5 (OH)_2 (Si_4O_1)_2$, and consists of dense minute fibres of the minerals tremolite or actinolite which gives nephrite its white and green colours respectively. Nephrite almost invariably contains iron (ferrous oxide, FeO) varying in amount, the ferrous ions of which impart a green colour to the mineral. Specimens with a larger quantity of iron constituents exhibit a darker colour but those with a whitish or light colour generally have a lower iron content. Nephrite fuses with some difficulty at a temperature of more or less 1,000°C to a greenish glass

---

1. The Bishop Collection, op.cit. Vol. I. p.73.

and is not decomposed by hydrochloric acid (HCL). It exhibits a splinter fracture. Its constituent crystals are of monoclinic symmetry showing under the microscope two perfect cleavages mutually inclined at an angle of 124°, mutually inclined at angles exceeding 120°. Its specific gravity and refractive indices are 3.0 to 3.1 and 1.6 to 1.5 respectively. Its hardness is 6.5.

Jadeite, which is related to spodumene, is an aluminium silicate, its composition being in principle $Na\ Al(Si\ O_3)_2$. It consists of a mass of granular crystals of monoclinic symmetry, showing under the microscope two sets of cleavage approximately at 90°. It may contain up to 10% of iron (ferric Oxide, Fe_2O_3), the metallic ions of which give the mineral a red brown colour, plus a small quantity of calcium and magnesium. It fuses readily to a transparent glass at a temperature below $1,000^{\circ}C$. The sodium, which it contains in substantial amount gives a bright yellow flame under the blow pipe. It is only decomposed by hydrochloric acid (HCL) after it has been fused. Its specific gravity and refractive indices are 3.3 to 3.36 and 1.65 to 1.66 respectively. Its hardness is 7 and almost equates with quartz.

Structurally both nephrite and jadeite consist of an aggregate of minute interwoven fibrous crystals. The crystals of jadeite are comparatively bigger than those of

nephrite and are thus recognisable with the aid of a microscope under a handlens and can be studied by holding a thin translucent and well polished specimen against the light. On the other hand, the crystals of nephrite, which are finer in substance, are arranged parallel to each other as well as irregularly and are difficult to observe without the help of a lens.

Physically tough and compact in character, neither nephrite nor jadeite can be hammer dressed or chiselled, but are amenable to lapidary techniques using the wire-saw and attrition. The resulting work is often intricate and detailed. While in principle it may be possible to cut freshly mined nephrite and jadeite with a steel or knife, such a practice would, nonetheless, require such frequent tempering of the blade as to render the mode of working impracticable. As art material, they are unsurpassed for the purposes they are used for in China. Both are tough and capable of resisting high pressure. The material is, indeed, so tough that a pressure of fifty tons was applied to a piece only one cubic inch in size to crush it.[1] Because of its being harder than nephrite, jadeite can scratch polished nephrite.

---

1. Goette. op.cit. p.30.

Both nephrite and jadeite are translucent. It may, however, be mentioned that translucency almost invariably depends upon the physical structure as well as colour of individual specimen. Pieces of all colours when unpolished are generally dull and opaque but their translucency will be visible in very thin splinters. However, if the coarse surface of the mineral is polished, it will be seen to be translucent, that is to say, permeable to light. Light coloured specimens of nephrite and jadeite are mostly sub-translucent. Some of the white jadeites are almost opaque but at the same time in some of the coarser grained varieties transparent crystals of considerable dimensions may be seen embedded in the translucent matrix. However, a green jadeite has the characteristic of being translucent, especially the emerald green jadeites which are in most cases perfectly translucent. Nephrite, whose degree of translucency more or less depends upon its thickness and colour, is comparatively more translucent than jadeite. Some of the green specimens represent a good standard of translucency. Semi-translucent nephrites and perfectly translucent specimens are termed 'precious nephrite'.[1]

---

1. The Bishop Collection, op.cit. Vol.I. p.77.

Both nephrite and jadeite will take a good polish but they exhibit varieties of lustre[1] when polished. An important point to note is that while nephrite possesses an oily or greasy lustre, jadeite has a vitreous one, though freshly fractured specimens exhibit a dull and waxy type of lustre. Both are opalescent but this property varies in degree. Nephrite quite frequently shows a marked sheen while jadeite does not.

Both nephrite and jadeite exhibit a great variety of colours. It is interesting to note that the colour range found is so wide that it is difficult to define exactly and so give a complete scale of colours. "No single person in the last four thousand years has been privileged to look upon its myriad colours, and any compilation of them would be lacking, possibly as much as twenty-five per cent, in the complete gamut."[2]

Both nephrite and jadeite when pure are white. The colour of each individual specimen is accounted for by the presence of various metallic ions in the compounds.

---

1. By a lustrous surface we generally mean that the surface, seen at some angle or angles will reflect light. When light is reflected in such a way that there is a tendency for the white light to be broken up into its constituent colours - the colours of the spectrum - the surface is often referred to as greasy or oily, since this is how greasy and oily surfaces will reflect light. Glasses do not normally break up white light on reflection, and surfaces that behave similarly are said to have a vitreous lustre.
2. Goette. op.cit. p.97.

A most interesting scientific account of the colours of jade has been given by Clarke.[1]

The predominant colours in nephrite are white, leaf green, emerald green and dark green,[2] which are commonly present in the dark shades. Although white nephrite is difficult to obtain, it is not as uncommon as white jadeite. White nephrite, streaked with dull greenish, bluish and grayish shades, is comparatively not as rare as pure white jadeite. Grey nephrite also is rare, but dark grey with inky black nuances is generally easily obtainable. Nephrite may also be olive green, sage-green golden emerald green, spinach green, light green, dark sage green and dark green to greenish black. The seaweed greens are the characteristic colours of nephrite. The rich transparent emerald green of the fei-ts'ui jadeite is not found in nephrite but only in jadeite. The most highly prized variety of nephrite is, however, mutton fat jade.

Jadeite also possesses a substantially wide range of colours and exhibits in an immense variety of shades white, green, pink, lilac, mauve and brown.[3] Its commoner colour

---

1. The Bishop Collection; op.cit. Vol.I. p.75.
2. Webster, R. The gemmologist. p.78.
3. Ibid. p.65. compendium.

is grayish, greenish, bluish or yellowish with white tones. Its most distinctive colour is pale-lavender, though the emerald green variety is considered to be one of the most precious and prized varieties by the Chinese. The emerald green specimens of jade (for the colour of which chromium is responsible) and those pieces showing tomato-red surfaces due to oxidation, are invariably jadeite; for these two colours are totally absent in nephrite.

The vast array of colours and shades is basically the product of traces of chromium, manganese or iron. Amongst these three, iron plays a vital role while manganese is relatively less important. The presence of chromium imparts to jade a range of shades varying from black to grey. Manganese on the other hand, simply modifies and weakens the colours produced by the various oxides of iron. The situation is somewhat similar to the 'killing' of the greens and yellows in glass which are due to the presence of ferrous and ferric ions. Generally manganese is added in small quantities, and this, giving a mauve colour, counteracts the colours due to the iron present. The presence of iron oxides are clearly the most important factors responsible for the production of astonishing varieties of colours found both in nephrite and jadeite. The presence in jade of ferric compounds (ferric hydroxide and ferric silicate) gives yellows and

browns, and in sufficient quantity, blacks. Ferrous silicate on the other hand, gives greens. The Chinese taste appreciates and values some of the colours of jade more than others. The following account evaluates the Chinese attachment to certain special colours.

"Jade is of several colours. White, yellow and green are considered valuable. Creamy white ranks first and oily white or white with snow flowers next. In yellow a shade like that of the kernel of a cooked chestnut is called sweet yellow, scorched yellow being inferior. In green the dark variety is considered superior and spotted or light follows. There are also reds such as the cock's comb, which is very rare and valuable; green, similar to cabbage leaf, which is thought inferior, and black which is inexpensive."[1]

The colours of jade are permanent and unchangeable provided they are not attacked by natural agencies such as weather and fire which decompose them and cause deterioration. The environments detrimental to the original mineralogical structure of jade accelerate the

---

1. Kimpei, T. 'The Chinese appreciation of Jade' pp.14-5. Burlington Magazine, Vol.23. April to Sept. 1913. Jade with stains is named 'blood-old' or 'corpse old' and is very valuable. The Chinese idea is that the blood of the corpse with which the jade has been entombed, has been gradually absorbed into the jade itself.

speed of disintegration which all rocks show as the result of weathering and,as time passes, the stone consequently becomes soft. Examples of this process are noticeable in the ancient burial pieces of the Chou and Han dynasties.[1] A natural staining may be the result of the infiltration of oxide of iron or other substances while the jade is still in the bedrock,or when it is being rolled along in the bed of a river after being detached from the bedrock, or while buried in the ground.[2]

§ 2. Jade - in China.

To begin with,it is necessary to admit that there is a controversy amongst authorities as to whether jade is found on the Chinese soil. One school is of the opinion that jade was never found in China in its natural state while the other school believes that China had its own deposits of jade, which, due to tremendous demands for the material, were exhausted, being supplemented and finally supplanted by Khotanese nephrite. Later, Burmese jadeite was used.

Professor Hansford has ably surveyed the whole problem and comes to the following conclusion that:

---

1. Laufer. op.cit. p.27.
2. Bishop Collection; op.cit. Vol.I. p.76.

"the belief that deposits of jade-stone exist or existed at places in China rests on no foundation of ascertained fact but may be accounted for by loose terminology and the false identification of other stones with nephrite."[1]

The second school of thought is represented by such authorities as Rocher, Hörth and Laufer. Rocher, an authority on the Province of Yünnan, has there identified many places producing jade, though he does not distinguish between nephrite and jadeite. According to him the West part of the Province produced a standard quantity of jade. He writes: "Shun-ning" and "Yun-Chou" are said by the natives to be the places where it is most common."[2] Hirth is convinced that Khotanese nephrite never travelled across the western borders of China before the end of the second century B.C. Discussing the benevolent rule of Huang-ti (2704-2595 B.C.), he points out that the Emperor not only regulated the religious and commercial practices of his country, but also showed keen interest in the development of other branches of administration and among other things jade too received his attention.

"It must also be admitted," he says, "that jade or jadeite may in the course of time have come to China from

---

1. Hansford. op.cit. p.55.
2. Rocher, E. La Province Chinoise du Yün-Nan. Vol.II.p.260.

quarries from other countries, if not from Khotan, without the Chinese having been aware of its origin. But it is not likely that this industry existed on a very large scale previous to the Han dynasty. The jade quarries of Khotan, which have ever since the Han dynasty had the lion's share of the trade in that precious material as far as China is concerned, were not known to the Chinese before the end of the second century B.C."[1]

Laufer with argumentative force tries to prove that ancient temporal as well as spiritual objects were made of indigenous materials. He substantiates his arguments by saying that "the jade used in the period of Chou, and most of those of Han dynasty, were quarried on the very soil of China proper, as we know from the accounts of the Chinese, and as we can ascertain from the worked jade pieces of those periods which in quality and colour are widely different from any produced in Turkistan and Burma."[2]

Ferguson's views are almost identical to those of Laufer. He thinks that ancient nephritic objects are made out of Chinese jade. He believes that in the passage of time the local deposits of jade were exhausted and China

---

1. Hirth, F. The ancient history of China. pp.12, 91. It is interesting that he does not mention alluvial pebble jade but only quarried jade.
2. Laufer. op.cit. p.23.

was compelled to import Khotanese nephrite. In support of his arguments, he quotes Ch'ien Han Shu, a history of the former Han dynasty which records that jade was obtained from Hsi-an in the Shansi Province.[1] Wong mentions that the practice of honouring the nobles with jade by the Chinese Emperors existed as early as 2272 B.C.[2] During the excavations at Yin-Hsu and An-yang a large number of specimens of a variety of hard stones belonging to the Shang period were unearthed and Dr. Li-Chi selected as many as sixty pieces from amongst them in order to determine their mineralogical qualities. As a result of his detailed research, he found out that these specimens cover a wide range of colour with green and white predominating. Other colours were yellow, black and blue. The hardness and specific gravity of these specimens ranged from 3 to 9+ and 2.49 to 3.18 respectively. A number of these specimens are almost similar both in hardness and specific gravity to nephrite which has a hardness of 6.5 and specific gravity 2.9 and 3.10. Dr. Chêng is of the opinion that the correlation of the

---

1. Ferguson, J.C. Survey of Chinese Art. pp.63-4.
2. Wong, K.C. The antiquity of jade. The China Journal of Science and Art, pp.363-4.
   All such dates are derived from arguments based on Chinese literature which abounds with problem.

hardness and the specific gravity of these jades indicate that these pieces may well be nephrite.[1] Yet, Professor Hansford has attempted to establish that jade never existed in situ in China and puts his case in detail. He refers to a statement from Shih-Chi, a history of the second century B.C., that Khotan produced an abundance of jade but he fails to mention that the same book records that "intercourse of China with the western regions commenced in the time of the Emperor Woo-te (B.C.140-87).[2]

During the first half of the second century B.C. the annals record for the first time the exchange of goods between the Chinese Empress-Dowager and Hiung-nu Khan Mehteh, the Khan of the Huns (209-173 B.C.)[3] This is mentioned as a purely diplomatic transaction. In 140 B.C., however, frontier 'fairs' and even contraband trade are recorded. During this period the nomads used to bring horses and other beasts for sale. The 300 miles a day or blood sweating horses of KoKand being highly prized.[4]

However, Chang-Ch'ien, the first explorer of the western countries, (an envoy of the Chinese Emperor Wu-ti,

---

1. Chêg-Te-K'un. "The Carving of jade in the Shang Period" T.O.C.S. 1954-55. pp. 13-27.
2. Wylie, A. "Notes on the western regions"; translated from the Tseen Han Shoo (Book 96. Part I). J.R.A.Inst. Vol.X. (1881) p.20.
3. Parker, E.H. China. p.45.
4. Ibid. p.45.

who returned to his country in 126 B.C.), is generally regarded as the pioneer of the routes from China to the neighbouring countries to the west, and the general opinion of the authorities is that he opened up the way into those regions.[1] In the report of his mission, he mentions Khotan and points out that "the country contains much jade-stone."[2] It is interesting to note that the importation of a great many plants and animals from the west to China has been attributed to Chang-K'ien, but jade is not mentioned in this context. Both Chang-K'ien and the Shih-Chi referred to by Hansford in his book only mention the deposits of nephrite of Khotan casually. Since Chinese jades exist which are dated centuries before this period, it would seem that the Khotanese deposits were of little economic importance at the time, China having her own resources.

It was during the same Emperor's long reign (Woo-te 140-87 B.C.) that China came into contact with Turkistan when the Chinese armies entered the country[3] and attacked the hostile tribes to the west, conquering the valley of

---

1. Hirth, F. China and the Roman Orient, p.137.
2. Hirth, F. 'The Story of Chang K'ien,' Journal of the American Oriental Society. No. XXXVII. 1917. p.95.
3. MacGowan, J. A History of China, p.98.

the river Ili and Kokand.[1] From this time onwards it is possible to say with certainty that the commercial relations between China and Turkistan were brought into existence and were greatly extended.

It is surprising to note that throughout his discussion on the subject, Professor Hansford has omitted these historical facts. It was the well established hostile barbaric power of the Huns which thus obstructed and delayed the intercourse between China and Turkistan until this date.

It is clear that jade has for centuries been an article of religious significance to the Chinese. It played an integral part in Chinese religious ceremonies as well as in funerary rituals. Such being the Chinese attitude to jade, it is reasonable to assume that practically every Chinese, irrespective of his being poor or rich, should have aspired to the possession of jade objects. It must be remembered that communications were full of difficulties and dangers, and that the import of jade from Khotan - a place thousands of miles away from China - must have been expensive. At all times, jade in China must be regarded as precious and thus it can only

---

1. Parker, E.H. China. p.47.

have been commonly available to men of standing and wealth. The administrative hierarchy of the Chinese Empire, however, provided a class to whom jade as a luxury was available.

Thus there is ample reason to believe that the Chinese entered into trading relations in nephritic jade with Eastern Turkistan after they had penetrated into Khotan and established governmental control over the country. The routes so opened up must have been in the first instance military, but trade undoubtedly followed the establishment of garrisons. As a result of the military development it is clear that supplies of Khotanese nephrite were made available to China, and, when in the course of time local Chinese deposits were worked out, Khotan became the main source of nephrite, being later supplemented by the Burmese jadeite imported through Yunnan.

In this connection it may be mentioned that in many places in Europe worked and un-worked objects both of nephrite and jadeite of the prehistoric period have been discovered. It has been inferred by some scholars that these objects came from an Asiatic source. This is Fisher's opinion. But later geological researches by Dr. Arzuni of Berlin detected differences in the

microscopic structure of the nephrite implements found in Switzerland and of the nephrite of Turkistan, disproving the identity of the Swiss and Khotanese nephrites.[1] Moreover, Traube of Breslau has discovered nephrite in situ near Jordansmuhil and Reichenstein in Silesia.[2]

Apart from nephrite, jadeite has also been located in situ in Europe "Jadeite in situ", says Bauer, "undoubtedly exists at a few places [bedded] in the crystalline schists of the Alps themselves, for example at Mount Viso in the Astola Valley and at San Marcel both in piedment. These occurrences are only important in as much as they show that jadeite does actually occur in situ in Europe."[3] About Britain, in conversation Dr. W. Cambell Smith expressed the view that as regards jade axes found in Britain they are nearly all of jadeite, very few of them being of nephrite. In his opinion, it is not possible to point to any known occurrence of jadeite in situ which can be regarded as the probable source of the material for these axes; nor is suitable material known to exist as boulders. However, he is of opinion that the material of the nephritic jades is different from that of East

---

1. Rudler, J.W. 'On the sources of jade used for ancient implements in Europe and America.' J.R.A. Inst. Vol.XX, p.338.
2. Ibid. p.339.
3. Bauer, op.cit. p.46.

Turkistan.

In view of the above facts, it seems logical to conclude that deposits which once produced jade, in the course of time were exhausted due to the great demands made upon them. It, therefore, seems probable that systematic scientific research would locate jade stone in situ in Europe. It would seem that, as in Europe, the heavy demand for the material throughout Chinese history has led to the sites mentioned in the annals being exhausted.

§ 3. Eastern Turkistan nephrite.

Eastern Turkistan is famous for its plentiful supply of nephritic jade. But in all its area of 400,000 sq. miles nephrite is actually found only in the rivers and mountains lying south of Khotan.[1] Subject to the historical analysis here put forth, three methods seem to have been used to obtain nephrite from the Khotanese rivers and mountains.

The first and the most interesting method by which nephrite was obtained from the rivers is romantically

---

1. Goette. op.cit. p.36.

called in Chinese "fishing for jade". This process has been beautifully described by Kuang-Yi in the report of his mission to Khotan. He says "every year in the fifth and the sixth months a swollen torrent of water rushes down, and jade flows with the current, its quantity depending upon the size of the flood. The water receeds during the seventh and eighth months, and it can then be collected, the jade being fished for, as the natives say, according to fixed rules made by the State". He continues "When the time comes for collecting them, an official takes up his station some distance from the bank, and a military officer is posted close to the river. Native Mohammadans who understand the work having been levied, they walk in rows of 30 or 20 shoulder to shoulder stretching across the river with bare feet over the stones, when they come to a jade-stone, the Mohammadan knows it by the touch of his foot and stoops down to pick it up."[1]

The nephrite pebbles so obtained from the rivers vary in size as well as in weight. A Manchu author in his description of Yarkand says that "there is a river in its territory in which are found jade pebbles, the largest one as big as round fruit dishes or square peck-measures,

---

1. The Bishop Collection; op.cit. Vol.I. p.44.

the smallest/the size of a fist or a chestnut, and some of the boulders weigh more than five hundred pounds."[1]

It is commonly admitted that the Yurungush river and the Karakash river are famous for nephritic jade. These rivers are, indeed, known respectively/as the river of white jade and the river of black jade.

In his description of Khotan, Chang-Kuang-Yi amplifies this statement and says that "the place where jade is obtained in this country is called Jade River, which runs outside the walled city of Khotan." He goes on to say,"It divides into three rivers. The first, called White Jade River, is 30 li to the east of the city; the second called the Green Jade River, 20 li to the west of the city, the third, called Black Jade River, being 7 li west of the Green Jade River."[2]

Marco Polo, the first European traveller who passed through Khotan on his way to China in the 13th Century says that "there are rivers in this country in which quantities of jasper and chalcedony are found."[3] An Arab historian of Timur, also, speaks about the river deposits of Khotan. Like Marco Polo, he identifies jade with jasper

---

1. Bushell. op.cit. Vol.I. p.124.
2. The Bishop Collections; op.cit. Vol.I. p.44.
3. Yule, H. The Book of Ser Marcop-olo. p.191. By jasper and chalcedony Marco Polo means jade.

and refers to two rivers of the city as their sources.[1] Grenard remarking about the quality of Khotanese nephrite says that "better nephrite was obtained from the upper basins of Karakash, the black jade river, and the Yurungkash, the white jade river."[2] "The principal rivers", says Bushell "regularly 'fished' for jade pebbles are the upper waters of the Yarkand Daria and the Yurungkash 'White Jade' and Karakash 'Black Jade' Rivers of Khotan."[3]

In the second method, a pit is sunk through the surface gravel of the dried up beds of rivers and nephrite is obtained at varying depths according to the deposit. In his account of the Khotanese industry, Hedin says that "the ground is cut by trenches, six or seven feet deep, a few feet broad and at most 30 feet long, although varying somewhat as regards size according to the amount of work done in them. The material which is thrown up out of the trenches, consists of round polished stones, sand and clay. It is amongst these stones that the jade is found."[4]

A similar picture has also been drawn by Stein. He says that "usually a square or oblong cutting is made through the layer of gravel and river sand. At a depth

---

1. Bishop Collections; op.cit. p.24.
2. Grenard, F. Mission Scientifique Dans La Haute Asie. p. 187.
3. Bushell. op.cit. p.124.
4. Hedin, S. Through Asia. Vol.I. p.74.

from ten feet downwards, strata of rubble are reached, and in these search is made for the pieces of jade that the river once washed down."[1] However, nephrite was also quarried in the mountains where it occurs in lenticular masses in Schistose rocks. In this process, to begin with the face of the mass of nephrite is cleaned by hand and is then heated with large fires built up against the face of the rock. After it is substantially heated, cold water is poured over it to cool and crack it, the angular fragments of nephrite being then separated from the country rock and collected.

It is interesting to note that a Manchu author, who visited Khotan writing in 1777, says that "the precipitous mountain sides are here entirely made of jade."[2] The mountains situated "on the upper waters of Tisnab river"[3] are said to consist of three series of strata and the middle series is famous for its jade. They are, therefore, called jade mountains. During his travels in Central Asia Bosshard also noticed jade producing areas and says that "there were plenty of jade quarries, above one hundred galleries, which followed a vein from the slope into the

---

1. Stein, Sir M.A. Sand Buried Ruins of Khotan. pp.233-6. The description makes it clear that the pebbles and boulders of nephrite are found in typical stream deposits.
2. Bushell. op.cit. Vol.I. p.123.
3. Ibid. p.123.

pit. The place resembled a gigantic mole-hill. These were blackish-green, white-green and lemon coloured stones."[1]

§ 4. Burmese jadeite.

Burma is famous for its deposits of jadeite, and it is generally believed that the discovery of this rock was accidental. Warry who visited the jadeite mines in 1888 states that "the discovery that green jade of fine quality occurred in Northern Burma was made accidentally by a small Yunnanese trader in the thirteenth century. The story runs that, on returning from a journey across the frontier, he picked up a piece of a stone to balance the load on his mule. The stone proved to be jade of great value, and a large party went back to procure more of it. In this errand, they were unsuccessful, nobody being able to inform them where the stone occurred. Another attempt, equally fruitless, was made by the Yünnan Government in the fourteenth century to discover the stone; all the members of the expedition, it is said, perished by malaria, or at the hands of hostile hill tribes. From this time onwards,

---

1. Bosshard, W. Hazards of Asia's Highlands and Deserts. p. 40.

for several centuries, no further exploration in the jade country seems to have been undertaken by the Chinese. Small pieces of the stone occasionally found their way across the frontier, but the exact source of the supply continued unknown. The year 1784 marks the final termination of a protracted series of hostilities between Burma and China and from this time dates the opening of a regular trade between the two countries."[1]

While the story as told by Warry may be apocryphal, there seems to be no evidence for rejecting it out of hand. Presumably the Burmese deposits of jadeite were known before 1784. The fact that this jadeite was not exploited before this date is a reflection of the Sino-Burmese wars, and the inaccessibility of the deposits. The facts seem to be that small fragments of jadeite found their way into China in the 13th Century, but that Burmese jadeite was not worked in China in any quantity until the 18th Century. It is, however, interesting to note that both Hanny (1836)[2] and Griffiths[3] (1837) do not mention this incident in their account of jadeite, and in the absence

---

1. Scott, J.G. Gazetteer of Upper Burma and the Shan States. Part I. Vol.II. 1900. pp. 278-80.
2. Hanny S.F. Journal of the Asiatic Society of Bengal, 1837. Vol.VI. pp.245-278.
3. Griffiths, W. Journal of travel in Asam, Burma, Bhutan, etc. Calcutta, 1847. p.

of such a tradition in Chinese sources, Professor Hansford is not inclined to associate the appearance of Burmese jadeite in China with this romantic tale.[1]

Improved Sino-Burmese relations in 1784, must have paved the way for the discovery of actual sources of Burmese jadeite and it became known that these sources lay on the right bank of the Uru river, a tributary of the Chindwin. However, the trade once again was hampered and came to a standstill following the war between Britain and China in 1841 and the Taiping and Panthay revolutions in 1850 and 1857 respectively.

"There was little improvement", writes Penzer, "in the jade trade until 1861, when the first Cantonese merchant arrived in Mandalay and conveyed by sea to China the old stocks of jade which had been accumulating for years. This example was followed by other Cantonese and the jade trade once more revived."[2]

In earlier days such quantity of jadeite must have been transported to China over the mountain roads.[3] These overland routes were only used in the 19th Century when on the resumption of regular trade, the Burmese established a military guard in Mogaung to maintain order and protect

---

1. Hansford, op.cit. p.44.
2. Penzer, N.M. The Mineral Resources of Burma. p.44.
3. Hansford, op.cit. p.47.

the traders.[1]

The jadeite deposits lay between latitude 25° and 26°N and longitude 96° and 97°E. It is commonly said that, in ancient times, Hsima, Mossa, Mopang, Tamakan and Sanka produced abundance of jadeite but in the course of time these deposits were completely exhausted due to the great demands made upon them and, as a result of this, these sources lost their commercial importance and value, and were forgotten.

At the time of Bleeck's travels in Burma, the jadeite producing centres were Momien, Hweka and Tawamaw. The three methods, applied in Eastern Turkistan to obtain jade were found by him in Burma. At Momien, a place in the Kachin hills, Bleeck says that "the mineral is found in the shape of boulders in the alluvial deposits of the Uru Chaung as well as in the bed of the river itself. Many years ago jadeite boulders were found all along the upper reaches of the Uru as far as Sanka. All these workings, however, have been abandoned with the exception of those in the neighbourhood of Momien."[2]

At Hweka jadeite pebbles occur in beds of

---

1. Scott, J.G. Burma, a handbook of practical information. pp.246-50.
2. Bleeck, A.W.G. 'Jadeite in the Kachin Hills, Upper Burma.' Records of the Geological Survey of India. Vol.XXXVI, Part I. Nov. 1907.

conglomerate. At this place, though jadeite boulders do not occur plentifully, occasionally large blocks of jadeite are obtained. In Tawmaw, the mineral has been found bedded in situ. The mines are situated approximately 8 miles to the west of Sanka on the top of a high plateau about 1,600 feet above the Uru river. "Here", says Noetting, "it forms a vein of considerable thickness in an igneous rock of blackish green colour." He goes on to say that "the jade vein is separated from the black rock by a band of a soft and highly decomposed argillaceous mineral. The strike of the vein is approximately north to south and dips at about an angle of 20^{o} varying considerably towards east."[1] Here jadeite is obtained by building fires at the surface of the rock and cooling it substantially with cold water. This method of breaking down hard rocks is of course not unique to the mining of jade. This method generally known as

---

1. Noetting, F. Preliminary report on the economic resources of the Amber and Jade mines area in Upper Burma. Records of the Geological Survey of India. Vol.XXV. 1892. p.134.

fire-setting has been reported widely in time and space.[1] After the blocks are separated from the parent rock, they are broken into pieces with large iron hammers. It may, however, be mentioned that according to all old records the gathering of river water rolled pebbles of jadeite is of far greater antiquity than this process of fire setting which dates back to only fifteen years ago and until within the last few years all the jade came from the river.[2] It is interesting that the Tawmaw's jadeite deposits are worked only during three months (from March till May) and during the rest of the months the entire process is suspended due to heavy rains. At Hweka, however, the season of work is a bit longer than at Tawmaw.

---

1. Singer, C. & others. History of Technology. Vol.I. p.565 and Vol.II. p.8.
   The ancient Egyptians followed the following quarrying method. To begin with oblong holes of considerable size, varying from 3 inches to 5 inches in length, 2 inches in width and 1 inch or more in depth were sunk into the rock face at regular intervals. In these holes pieces of wood were hammered and then saturated with water. The wood, as a result of its being wet, would expand and split the rock. This method was experimented by Messrs. John Freeman, Sons & Co. of Perryn, Cornwall and was found to work.
   Platt, A.F.R.'The Ancient Egyptian methods of working hard-stones,' Proceedings of the Society of Biblical Archaeology. Jan. to Dec. 1909. Vol.XXXI. pp.172-184.
2. Scott. op.cit. p.278.

CHAPTER II

§ 1. The Chinese Working of Jade.

It will be understood from the discussion already given of the properties of jade that such a tough fibrous material provides special technological problems. It is necessary always to keep in mind that jade is not amenable to hammer and chisel. The tools used must work through a grinding action. It is clear that a wire saw supplemented on occasions by plate saws is used for the first shaping of jade pebbles. This shaping process is carried further by the use of large lapwheels. Grinding wheels of various sizes are then brought to play and small lap-wheels and various kinds of drills are used to finish the work. Owing to the complexity of these processes it seems best to give at length a complete account of the work which is available to us. In describing these it will be necessary to comment in footnotes upon certain of the technological terms used so as to achieve a measure of technological standardization. Finally with these accounts before us it will be possible to review the various processes and tools used.

The four chief sources of information with regard to Chinese methods available to us are:-

(1) Chinese Jade Carving by Professor H.S.Hansford.

(2) 'Chinese methods of cutting hard stones'
by W.L.Hildburgh.
Journal of the Royal Anthropological Institute,
Vol. XXXVII, 1907.

(3) Chinese Art. [Vol.II.] by S.W.Bushell.

(4) The Bishop Collection: Investigations and Studies in Jade.

From very early times, the art of cutting hard stone was known and practised in different parts of the world. But "in none has this craft", says Professor Hansford, "been pursued with such skill, ingenuity and success as in China."[1] The Chinese from remote antiquity have greatly appreciated and admired jade and employed it

---

1. Hansford, H.S. Chinese Jade Carving, p.57.
This statement may perhaps require some qualifications; for the techniques of hard stone working developed at a remarkably early date in Egypt and the Middle East, and once established, they persisted there. The evidence is that the techniques employed in this work (Lucas, A. Ancient Egyptian Materials and Industries, pp.83-93 and Platt, A.F.R. 'The Ancient Egyptian Methods of working Hard Stones', Proceedings of the Society of Biblical Archaeology, Vol.31, 1909, pp.172-186) are clearly related to those which are found in India. Thus while from the point of view of stylistic traditions and of the objects produced, the Chinese stone-carving is unique, from the viewpoint of general technology this can scarcely be maintained. Again Hard stone working can rarely produce more remarkable creations than certain Aztec pieces, notably the crystal skull in the British Museum.

extensively for personal decoration and for fashioning a variety of objects in artistic style and design. The working of jade depends entirely upon the use of simple tools of different shapes and sizes and the almost constant use of abrasive, a mixture of sand and water, the biting power of which cuts this intractable material. It takes a tremendous amount of patient industry before a crude lump of jade is turned into a most exquisite and delicate piece of art. The tools of this craft, as the Chinese say, owe their efficiency and ability to cut the jade to an abrasive with which they are anointed. Professor Hansford found the following kinds of abrasive in use in Peking in 1939.

(1) Quartz sand. "yellow sand".

(2) Crushed almandine garnets. "red sand".

(3) Crushed black corundum, or emery. "black sand".

(4) Carborundum. "black sand" an artificial product, crystallized carbide of silicon.

(5) Diamond. It is used to point the diamond-drill.

(6) Pao Yao. This is the name of a material by which final polish is imparted to a jade object. It consists

of fine-grade carborundum,[1] diluted with a calcareous silt or with loess.

Before these abrasives are made and used, they pass through a number of stages of pounding, grinding, and sifting, and are made into pastes with water.[2] Describing a method of turning corundum into an abrasive Hildburgh says that the mineral is "pounded in an iron mortar with an iron pestle, and the crushed material graded by washing through several sieves, and for the finest sizes, by settling. A valve of the fresh-water pearl shell is used for stirring, and to dip out the finest sand, for finishing before settling."[3] According to Professor Hansford the

---

1. Carborundum (silicon carbide) is a later addition to the modern industry and is imported into China from Japan, Sweden and the U.S.A. (Hansford, H.S. Chinese Jade Carving. p.69.) According to Bushell, "Pao Liao" which he translates as "the jewel dust" (Bushell, S.W. Chinese Art, Vol. I. p.129.) was the medium employed for the final polishing of the jade objects. Professor Hansford disagrees with Bushell and says that "the belief that pao yao or pao liao" was jewel dust may have arisen from the fact that pao-shih means precious stones or jewel dust or the name may have been bestowed to encourage such a belief. Rubies and sapphires are, of course, respectively red and blue corundum of gem quality, but the very costly expedient of crushing such material would not produce a better abrasive than would the crushing of commercial black corundum, or emery. It is reasonable to presume that the earlier pao yao differed from that of the present day only in that the abrasive element was finely elutriated corundum instead of carborundum." Hansford, op.cit. p.72.
2. Bushell, S.W. Chinese Art. Vol.I. p.129.
3. Hildburgh, W.L. 'Chinese methods of cutting hard-stones' J. of the R. Anth. Int. Vol.XXXVII, 1907. p.190. Both mortar and pestle would have to have been of cast iron. Big stone mortars are also used for pounding the abrasives. Hansford, op.cit. p.69.

corundum crystals "are broken up by pounding in big stone mortars which causes them to split up along their natural lines of cleavage, and the fragments are then milled and sifted."[1]

In order to fashion an object, to begin with, a suitable piece of crude jade is selected and "sawn round with a four handed toothless iron saw worked by two men, to "strip off the peel".[2] But in his description of the working of jade in the Bishop Collection, Bushell mentions the use of both the metal plate as well as the wire saw. This account runs as follows; "The piece of big crude jade is first sawn apart by two men working with a four-handed toothless saw, the plate being a plain strip of thin iron which is kept at full tension, or it is sawn through by hand with piano wire, strung tightly across a bent piece of wood under the action of water constantly dripping from a vessel hung above the block. To assist the process fine sand is strewn on the stone where the wire saw works."[3]

However, Professor Hansford found only a wire saw in use for the purpose. Describing the details and working of the

---

1. Hansford. op.cit. p.69.
2. Bushell, op.cit. p.129.
3. The Bishop Collection, op.cit. Vol.I. p.202. The use of piano wire is obviously a recent innovation. There is no reason why the Chinese should not have used their own drawn wire before this.

wire-saw, he says that it consists "of a single strand of wire in tension between the ends of a bamboo frame, is held by two apprentices, who pull it backwards and forwards across the block of stone, while the man holding the ladle keeps the cut wetted with a mixture of "black sand" and water. The mixture flows into a bowl below the saw and is used repeatedly until it has become too finely pulverized."[1]

The Lap-Wheel.

After the lump of jade is trimmed it is further shaped by means of the lap wheel ground to a knife edge varying "from about a foot in diameter to a fraction of an inch, the larger ones serving for deep straight cuts, the smaller for finer work, for engraving and for finishing."[2] The smaller lap-wheels are shaped "like small flat-headed nails, and are consequently called 'nails' by the Chinese lapidary."[3] "Since the steel disc is too hard to penetrate its surface easily and retain a hold, as it does on the softer iron tools, the disc is scored at its rim to assist

---

1. Hansford, op.cit. p.79. In his account of the "Chinese methods of cutting hard stones" Hildburgh does not mention what type of implement was utilized for sawing the jade. (Hildburgh, op.cit. pp.189-195. 1907).
2. Hildburgh, op.cit. p.191.
3. Bushell, op.cit. p.129.

the sand to adhere."[1] At the time of use the most suitable lap-wheel is firmly fixed with Shellac[2] to the end of the wooden shaft. The workman holds the piece in his right hand against the edge of the disc at its under side. In his left hand he holds a handful of wet sand which he applies to the edge a little higher up, and as he rotates the disc by means of the treadles, the abrasive is carried into the cut and will slowly bite its way through the jade.[3]

---

1. Hansford, op.cit. p.80. Since steel was being produced for the making of arms by the cementation of the wrought iron, there seem to be no grounds on which the statement can be refuted. Bushell, however, considered these small discs to have been made of iron.
2. Hansford, op.cit. p.79. It seems unlikely that China employed Indian lac to fix the lap-wheel or grinding wheel to the spindle at an early date. Neither Bushell nor Hildburgh mention the method of fixing either the lap-wheel or grinding wheel of any size to the spindle with shellac. But according to the account given in The Bishop Collection "the axis of ring is mounted with a thick slab [sic] of bamboo, with a depression in the centre into which the wooden axle-rod is stuck with red-glue. (The Bishop Collection, op.cit. see description of illustrations.) Bushell, however, says that the small "lap-wheels, which are little iron discs like small flat-headed nails, and are consequently called 'nails' by the Chinese lapidary, are hammered into the hollow end of a light iron spindle which is kept in motion by a leather strap worked by the treadles. (Bushell, op.cit. p.129). Hildburgh's account differs from those of both Bushell and Handford. He says that "generally the tools are detachable from their shafts, being simply held rigidly in place by cement, but sometimes the whole tool and shaft is made in a single piece". (Hildburgh, op.cit. p.191). By the term "cement" Hildburgh probably means simply some unknown mastic. Presumably he is using the word in this generic sense. Naturally a cement of gypsum or lime base would not be satisfactory for this purpose.
3. Hansford, op.cit. p.79.

The rotary motion is communicated to the lap-wheel by "a shaft worked by a pair of loosely hung treadles, to each of which one end of cord is attached. A strap is given a few turns around the shaft, and is fastened to one of the treadle-cords at each end. As either treadle is depressed the strap pulls the shaft around, and raises the second treadle, which latter, being in turn depressed, rotates the shaft in the opposite direction, and raises the first pedal. Thus, the tool receives a reciprocating rotary motion, not a continuous rotary motion. Each treadle has, at the end opposite to that to which the cord is attached, a peg on its under side, by which it hangs from a rung of the workman's chair."[1] Professor Hansford describes the details of this machine as follows:- "most of the carving processes are carried out on rough wooden benches or lathes. Each bench supports in wooden bearings a horizontal shaft of wood, for use with tools of large diameter, or of iron for the smaller tools. The shaft is rotated by the action of bamboo treadles operated by the craftsman's feet. The treadles are attached at the back to the stretcher [sic] of the stool on which he sits. In front they hang from the ends of a cord which has been

---

1. Hildburgh, op.cit. pp.190-191.

wound several times around the shaft, if it is a wooden one: if an iron shaft is in use, the treadles hang from the ends of a leather driving belt. By pressure applied to each treadle in turn the shaft is rotated, first in one direction and then in the other."[1] "When a heavy object is being worked, it is suspended from a steelyard alongside the bench with a counterpoise at the other end of the arm, so that the operator is relieved of the weight, and has only to press the jade against the cutting edge."[2]

But according to Hildburgh, large pieces are "suspended by a long cord from a flexible piece of wood, relieving the workman of its weight, whilst leaving it free to be held in any position by the left hand."[3] The machine

---

1. Hansford, H.S. op.cit. p.78. The treadle was not developed in the west until the sewing machine was developed.
2. Ibid. p.80. The steelyard has been referred to in The Bishop Collection; (see the description of illustrations) and has been repeated by Hansford. Strictly the steelyard is a balance, used for weighing, consisting of a lever with unequal arms which moves on a fulcrum; the article to be weighed is suspended from the shorter arm, and a counterpoise is caused to slide upon the longer arm until equilibrium is produced. (Shorter Oxford English Dictionary. p.2011). From the technological point of view the word does not seem to serve the main purpose for which it has been used. Conceptually the term "gantry" as used by engineers would seem more appropriate.
3. Hildburgh, op.cit. p.193.

is remarkably simple but its component parts are "so arranged that the spindle carrying the disc can be shifted to the most convenient position, numerous holes for that purpose being pierced in the movable block of wood which upholds the end of the spindle. The spindle is supported at a second point by a small, flat block of wood, in a hollow of which it rests."[1]

After the lump of jade has been roughly worked by means of the lap-wheel, the grinding wheel is used to remove projecting irregularities so as to make the surface smooth. The grinding wheel plays an important role in the shaping of objects worked in hard stone. "There is a series of them," says Professor Hansford "ranging from three inches down to half an inch in diameter, and having tracks of different widths."[2] It should be noted that the grinding wheel differs from the lap-wheel which is knife-edged. At the time of use the grinding wheel is "turned on a wooden axle"[3] and spun precisely in the same manner as the la- wheel is rotated. Presumably by this is meant rotating on a wooden axle to which the wheel is fixed. After the piece is trimmed and its irregular angles and surface ground down, a desired design is either first drawn on paper and copied

---

1. Hildburgh, op.cit. p.191.
2. Hansford, op.cit. p.82.
3. The Bishop Collection; See the description of the illustrations.

subsequently on to the stone in Chinese ink or is sketched out freehand on to the stone using suitable tools. This method of sketching out with fine tools is often used by the modern glass-cutter.[1]

To hollow out the object, the Chinese lapidaries use both the lap-wheel and the tubular drill. Professor Hansford has given a beautiful illustration of a bowl being hollowed by means of the lap-wheel. Describing the method by which the bowl is hollowed he says that with "a cutting disc, somewhat smaller in diameter than the bowl-shaped mass of stone, the craftsman makes a deep incision into the middle of it. He makes others parallel to the first at intervals by a millimeter or two, and then breaks off, one by one, the thin leaves of jade left standing between the cuts. Other cuts are made at right angles to the first ones until the whole of the block is hollowed. The interior is then rubbed down with the grinding wheels."[2]

In order to make vases, bottles and other cylindrical objects, tubular drills consisting "of a piece of sheet

---

1. Manson, P. Glass. p.124.
2. Hansford. op.cit. pp.82, 83. He does not mention the nature of the method used to do away with the parts left behind as a result of the action of the lap-wheel. Hildburgh has also omitted to mention how the unwanted material is removed from the parent piece. He simply says that "cuts, separated by from a tenth to a twentieth of an inch or less are made to the proper depths, and the slices are afterwards broken off." (Hildburgh, op.cit. p.193).

steel bent into the shape of a tube"[1] are employed.

They are operated both by treadle lathe and by the string bow. In the former case it "is mounted on the same light iron spindle as the lap-wheels"[2] and rotated precisely in the same manner as the lap-wheels are spun. But in the latter the specimen "is firmly lashed in position on the bench, and the end of the tube is held under pressure against the part to be drilled. The tube is kept filled with sand and water and rotated by a bow, the string of which passes round the tube, and is worked to and fro by a small boy. When the jade has been drilled to the required depth a hammer and chisel are used to remove the core by striking a sharp blow against its edge. Considerable dexterity is required to cause the core to break off near its base. Should it break higher up, laborious drilling on the lathe will be necessary to remove the part left behind."[3] In the Bishop Collection it is also mentioned that the core is dug out by means of a steel chisel and hammer.[4] In this connection it should once again be stressed that jade cannot either be chiselled or hammered. The unwanted parts are fractured and not cut. The distinction should be made between (a) a clear cut

---

1. Hildburgh, op.cit. p.82.
2. Bushell, op.cit. p.130.
3. Hansford, op.cit. p.82.
4. The Bishop Collection. See description of the illustrations.

line - impossible with a chisel - and (b) a fracture, deliberately made where it is wanted - quite possible in this instance - but which leaves roughness that must be ground away.

After this process, the interior of the object is enlarged by means of gouges."[1] While describing one of the types of this tool he says "it consists of three strands of iron wire bent to the shape which the interior of the vessel is to take. The straight ends of the wire are bound together and fixed into the iron shaft. The shaped ends are passed, under compression, through the neck of the vessel and expand against the inner wall. The gouges revolve in the usual mixture of sand and water."[2]

The method described by Professor Hansford for hollowing and enlarging the interior of vases, bottles and objects of similar nature differs from that explained by Hildburgh. "In making a bottle", he says, "the exterior is

---

1. Hansford, op.cit. p.82. These tools have been frequently referred to by a number of writers as "gouges". Literally "gouge" means a concave bladed chisel used for carpentry and surgery (The Concise Oxford Dictionary of Current English. p.529). "Gouge" therefore, does not apparently seem to be a correct word applicable to tools used for hollowing of the vessels of hard-stones. These tools can conveniently be called and referred to as "hooked-twisted bits" because this term is not only appropriate but also illustrates and explains the details of the tools in question in comparatively more precise and accurate manner. Hildburgh calls these tools as "hook". Hildburgh, op.cit. p.195.
2. Hansford, op.cit. p.82.

first shaped, in order that any imperfections in the stone may be revealed, and removed, or utilized in the ornamentation, and the decoration is completed."[1] Then a circular hole is drilled "through the neck, to the depth of the cavity to be made, through which all the tools subsequently used are introduced. This hole is gradually enlarged to the shape of a flat wedge, by simple straight tools held at an angle to the axis of the bottle, which widen it at the bottom. Then tools of a special shape are introduced, and run at high speed in like manner to a drill. These tools, of soft iron wire, up to an eighth of an inch in diameter, are of various shapes, and are fed with a mixture of sand and water within the bottle. They may be described as hooks, mostly very long in comparison with their widths, and twisted out of a flat plane. The wear comes on the back of the hook, not on the point, and the cutting surface is generally about a sixteenth of an inch wide. Only one bottle is cut[2] at a time, it being held in the left hand, and its axis and that of the cutting tool being kept as nearly as possible in the same plane though the inclination of the axis to each other is

---

1. Hildburgh, op.cit. p.194.
2. Sometimes bottles are made double, consisting of two separate bottles side by side, and joined externally but not internally. Others are made, to outward appearance, single, with two orifices and two separate compartments. ibid. p.195.

constantly changing. The longer tools are used for the sides, and the shorter for the upper parts and the corners."[1] As already pointed out in the foregoing pages, jade, owing to its peculiar chemical composition, is not amenable to hammering and chiselling. By using both these tools to remove the core left behind as a result of the action of the tubular drill, the workman, as Professor Hansford himself says, will run a risk and endanger the safe finish of the specimen on which the craftsman has been working so conscientiously and industriously. The method described by Hildburgh will avoid any possibility of damaging and breakage of the object and will not need the use of any tools to remove the unwanted parts as they are needed in the method explained by Professor Hansford. Under the circumstances, it seems quite likely that a majority of Chinese lapidaries may be following the method described by Hildburgh rather than the one mentioned by Professor Hansford which is likely to cause harm to the specimen and result in a total loss of the patient and continuous hard efforts of the craftsman.

Hollow drills are also used in the making of bangles, rings and the quoit-shaped pieces for ear-rings, etc. Describing the method Hildburgh says "A piece of jade, for

---

1. Hildburgh, op.cit. p.195.

example, is cut by a large disc [practically a toothless saw] to a level surface. Upon this are marked the outlines, in ink, of the various pieces to be cut from it, arranged so as to secure the fullest utilization of the material, with regard to colour [which is generally unevenly distributed] and to the minimisation of useless scraps. A hollow drill cutting, say, the outer circumference of a bangle, is prepared, and is set vertically in a multiplex drilling machine, while a thick block of wood of the exact circumference of the interior of the drill, is cemented firmly to the area whence it is purposed to cut the bangle. The jade, having been levelled, so that the edge of the drill is in full contact with its surface, the circular block acts as a guide for the correct starting of the cut. Other stones are set in position beneath the other spindles of the machine, each drill is surrounded by wet sand, and the cutting, for which strength, not skill, is required, and for which boys are often used, is commenced. The multiplex machines, used particularly in Canton, a centre for bangles, ear-rings, etc., consist each of a number of verticle spindles, generally about ten, which, operated simultaneously from one pair of treadles, will make one circular cut per spindle. The number of drills used depends principally

upon the sizes of the cuts; only when these are small, as for ear-rings, is the free capacity of the machine utilised. The cut being finished, the various cylinders are removed from their blocks. Of them, the smaller will be worked into rings, ear-rings or stoppers for snuff bottles, or, if sufficiently long, perhaps into feather holders for officials, or mouth-pieces for smokers. The small, irregular pieces remaining become beads, settings or embellishments for jewellery, seals, the tiny carvings used as additions to pendants. The wooden block first fastened to the cylinder intended for bangles is replaced by a smaller one, of the diameter of the interior of the bangle, and the cylinder is placed, in a multiplex machine, beneath a drill cutting a hole of that size. Upon completion the hollow cylinder is cut transversely by a disc, into two or three short cylinders, whilst its cone is worked into rings etc. The short cylinder passes to a workman who cuts, with a disc, an encircling groove near each end, afterward breaking the part with a hammer, so that the bangle is roughly rounded. The shaping is continued with a broad convex grinding wheel, and is finished on a narrow concave-rimmed wheel which gives a uniform curve to the outside. Finally the piece is polished by wheels, the first of iron, with fine wet sand, the next of wood, with finer wet sand and the last of wood

with a little nearly dry sand."[1]

Cylindrical perforations of varying diameters are also made by tubular drills.[2] In carrying out this process, the holes "are almost always drilled from both the ends of the tube and the two holes do not meet perfectly. The section of the hole made in this manner is bi-conical."[3] Sometimes the tubular drills are not used for actual perforations but are used to leave their circular impressions substantially ostensible on the surface of the specimens which may be referred to as surface decoration.[4]

When smaller holes and openwork are wanted to be carried out, the diamond drill is used.[5]

As described by Professor Hansford the diamond "drill consists of a piece of bamboo cane, six inches long, into the lower end of which a short steel wire is fixed. Two

---

1. Hildburgh, op.cit. pp.191-2.
2. Dr. Chêng in a personal conversation said that tubular drills with the diameter as large as four to five inches were commonly used in ancient China.
3. Cheng Te K'un Dr. "The Carving of Jade in the Shang period. Transactionsof the oriental Ceramic Society, 1954-55, p.54.
4. Jenyns, S. Chinese Archaic Jades in the British Museum. See plates VIII & IX.
5. The diamond is not an essentially required and indispensable means for jade carving (Hansford, op.cit. p.108) but, nevertheless, it has been widely utilized for making holes of smaller sizes and engraving inscriptions and characters. Since the diamond is a useful means to the working of intractable material, it will be worthwhile to deal with its historical background in a separate chapter.

small diamond splinters are set in a slot at the end of the wire, which is then filed down until the points of the diamonds protrude beyond it. The upper end of the bamboo is shod with iron, and rests in a little porcelain cup held by the craftsman in the palm of his left hand. With his right he operates a bow, similar to that used with the tubular drill, to rotate the tool with a rapid reciprocal motion. The object to be drilled is firmly held on a wooden slat below the surface of a tubful of water, which keeps the stone and metal cool."[1]

According to Bushell the diamond drill is used in two different ways. In one case "the cup-shaped head-piece of the drill is fixed above to a horizontal bar, on which a heavy stone weight is hung as a counterpoise to give the necessary pressure."[2] The diamond drill is operated by means of the string bow worked with the right hand while the object being bored is held in the left hand. The other method is similar to that explained by Professor Hansford. In this case the objects "are floated upon boat-shaped supports in a bamboo tub of water while they are being bored; the cup-shaped head-piece of the drill is now resting in the left palm of the craftsman, who keeps it pressed down as he works the string bow with his right hand."[3]

---

1. Hansford, op.cit. p.84.
2. Bushell, op.cit. p.130.
3. Ibid. 130

Prof. Hansford has illustrated a variety of drills carrying burr at their business end. These drills are familiarly known as "nails" in China and "the work in high relief, the undercutting, and much of the actual shaping of the small objects is executed with these drills."[1] "It is through repeated and sustained application of drills of different sizes and shapes, at carefully chosen points, that a movable ring-handle emerges from the mass of half worked jade. Week after week the craftsman persists, till at last the ring is free to revolve on its own axis, while still inseparable from the vessel of whose design it remains an integral part."[2] Hildburgh does not mention the diamond drill but refers to three different types of drills, smaller, and larger. "The smallest drills, operated by a pump or bow mechanism, are frequently worked without sand. They are formed of a piece of strong, hard wire held in the end of a bamboo stick, and sometimes have a stone tip.[3] For the drilling of the small holes in the very thin pieces used in jewellery, for which the small drills are mostly employed, the wire is short, and the objects drilled by

---

1. Hansford, op.cit. p.83. It may be mentioned here that smaller lap-wheels have been, also, referred to as 'nails' by Bushell.
2. Ibid. p.83. Hansford neither illustrates nor explains clearly how these movable rings are actually worked out.
3. Hildburgh does not say what kind of stone he means. The stone in question, must invariably be harder than jade, otherwise it will not only fail to create any impression on jade but will also fail to stand the action of attrition.

them are held upon pieces of wood, under water. Larger drills are used to cut the holes for the saw wires,[1] in the making of fretwork, pendants, pieces for decorative application, and open-work carving. Still ones[2] are used in the cutting and finishing of high relief, their ends being pointed, squared, rounded, truncated, etc."[3]

After the perforation is done, it is "enlarged and shaped by the wire saw. This consists of a bow of bamboo with a wire connecting the two extremities. One end of the wire is detachable, so that it may be passed through the perforation. The saw is worked to and fro with the right hand, while the wet sand is applied to the wire with the forefinger of the left."[4] According to Hildburgh it "consists of a bow of wood, about one end of which a number of turns of wire are taken, the wire then passing to a small nail or hook at the opposite end of the bow, where it is easily fastened or released. - A somewhat similar arrangement, for enlarging long holes, consists of several stiff brass wires, laid together and fed with sand, upon which the stone is rubbed forward and back. In operation,

---

1. Bigger holes do not seem to be necessary for the use of the wire-saw. Even smaller perforations can conveniently accommodate wire-string and provide enough space for it to cut jade.
2. Should read still larger ones.
3. Hildburgh, op.cit. p.192.
4. Hansford, op.cit. p.84.

holes are drilled at the points where sawing is to begin, and the wire is passed through one and fastened to the nail at the end of the bent bow, which, expanding, straightens and tightens it. The workman places the stone against the front upper edge of his table, holding it, with a lump of wet sand behind it, in his left hand. The saw is driven with the right hand, the position of the stone being changed as becomes necessary, while the saw-wire remains in contact with the table edge."[1]

Before final polish is given to the specimen, it is rubbed down with a tool similar to the large grinding wheel but moulded of a mixture of shellac and fine-grade carborundum. It is spun on the wooden spindle and does not require the application of any kind of abrasive.[2] For imparting polish to the object, Professor Hansford says that "the tools are smeared before use with a paste of the polishing medium, pao yao, and water, so that both the craftsman's hands are free to manipulate the jade. The surface is first gone over thoroughly with a wheel made of turned sandal-wood. A series of leather buffing wheels, are then brought to bear on the object. The larger ones measure from four to eight inches in diameter and consist of from six to twelve layers of cowhide, sewn together with

---

1. Hildburgh, op.cit. pp.192-3.
2. Hansford, op.cit. p.84.

hempen thread. The smaller wheels are cut from a single thickness of stout leather. To polish the interstices, still smaller wheels and minute plugs are cut from a gourd, to be fixed in the hollow end of the iron shaft. By such means and by diligent application it is contrived to impart a brilliant polish to the most inaccessible parts of a complicated carving."[1] According to Bushell, "the polishing tools are made of fine-grained wood, dried gourd skin, and ox leather, and are charged with the ruby-dust paste, the hardest of all. For polishing the surface there is a graduated series of revolving wooden wheels, from fifteen inches in diameter downwards, which are mounted upon a wooden spindle and worked upon the reciprocal treadle lathe. For searching out the deeper interstices of the carved work there is a selection of wooden plugs and cylinders of varied size and shape fitted to hold the abrasive, down to the smallest points, which are cut out of the rind of the bottle gourd. The revolving wheels which give the final polish are bound round with ox leather stitched together with hempen thread."[2]

---

1. Hansford, op.cit. pp.84-5.
2. Bushell, op.cit. pp.130-1.

§ 2. The Indian working of jade.

In dealing with the working of Indian jade, the following sources have been consulted:

(1) Official descriptive and illustrated Catalogue of the Great Exhibition, Vol.II, 1851.

(2) 'Bead making in ancient Sind' by E. Mackay, Journal of the American Oriental Society, No.I. Vol. 57.

(3) 'Cambay and the bead trade' by A.J.Arkell, Antiquity Vol.X, 1936.

In India the art of cutting hard stone is traceable from as early as neolithic times, when pointed butt axes were polished with the aid of abrasive, using intractable igneous rocks. The art was further developed during the Indus Valley civilisation, which provides a number of beads of a variety of hard stones including jade and crystal. Here the material had first to be sawn out and reduced to the desired size and was then fashioned through the process of flaking, grinding, drilling and polishing.

In India jade did not play any significant part except during the Mughal period when its aesthetic merits were greatly admired and appreciated. Its use appears as a luxury craft centring on the court. Jade objects were

manufactured in the Imperial workshop for Imperial use. They were never introduced into the common life of the people. "The introduction of jade", says Professor Maskelyne "or at least its use as a material for artistic workmanship in India, dates almost from yesterday since it belongs to the time of the early Moghal Emperors of Delhi." He goes on to say, "Akbar, Jahangir and his son Shah Jahan seem to have taken pleasure in jade cups and ornaments, and the art of inlaid work that found such exquisite expression in the Taj Mahal was copied under the magnificent auspices in the most precious materials, rubies and diamonds and other precious stones being inlaid in jade of various colours which were cut in delicate open work and adorned with enamels in the production of which India is still unrivalled."[1] This point of view warrants some correction. The inlaid semi-precious stone decoration of the Taj Mahal is the Italian craft of Pietra-dura and has nothing to do with the history of jade working in India. But it is true that later on, probably in Shah Jahan's reign, jade vessels were set, not inlaid, with precious stones, a gold bed being used to set them. The jewels used were chiefly rubies and white topaz, cabochon polished, not cut after the European fashion. The introduction of enamelling into

---

1. A letter from Professor Maskelyne to The Times. Dec. 30, 1879.

Mughal India and Safavid Persia is again the result of fresh European influence.

India does not possess jade of its own and it is accepted on all hands that it derives its supplies from Central Asia, a source upon which China also, depended after its local deposits were exhausted due to the great demands made upon them. This means that early Indian jades are almost always of nephrite. Jade is a material which is not easily worked, as has been pointed out. To start with, it cannot be hammered and chiselled. Besides a tremendous amount of industry, it requires the employment of a variety of abrasives before it can be worked out to the desired shape. The tools owe their efficiency to the biting power of an abrasive, a fact with which the Indians were fully acquainted. Hard igneous rocks were ground down to form the plentiful pointed butt axes of the Indian neolithic period. Beads were manufactured in Harappan times in the same manner, the wire-saw[1] and a variety of drills being used in the final process. In early times ordinary silica sand or sedimentary stone rubbing blocks seem to have been the probable media used. It is probable

---

1. Wire-drawing is indeed an ancient craft. Draw Plates are known from the European Bronze Age. Antiquity, Dec. 1960. The process is still to be seen both in European and Indian metal workers' shops today.

that the sand used was passed through different kinds of sieves or even elutriated, a fine abrasive being necessary for the final polishing stages of the manufacture. Throughout the process the abrasive was moistened in the earlier stages with water and in later stages possibly with an oil. It seems that during the Mughal period all those abrasives which are used in China (except Carborundum[1] which is a late addition to the industry) were employed to fashion the jade objects. Both rock-crystal and corundum are available in India in abundance and it is quite understandable that the people of the time knew how to utilize the minerals as an efficient abrasive. However, a selected variety of ordinary silica sand seems to have been a common medium widely used in the working of objects of hard stone including rock-crystal and jade. In order to impart final polish to jade objects, dust of semi-precious stones seems to have been used, although the possibility of the use of black corundum or emery, which are equally good polishing agents, cannot be ruled out.

There is no account available to tell us precisely how the entire process of jade working was carried out

---

1. Carborundum is a man-made mineral, silicon carbide, first manufactured in the U.S.A. late in the 19th. century.

during the Mughal period. There is, thus, no reliable evidence to connect the working methods of the Indian jade-worker with those of China. Furthermore there existed a long tradition of working precious and semi-precious stones in pre-Mughal India. The techniques used were fundamentally simple, and were common wherever stone working had developed along specialised lines. There seems, therefore, no prior reason to connect Chinese and Indian jade-working in more than the most tenuous way.

Since the Central Asian nephrite most commonly occurs as pebbles, it may be assumed that the material was imported into India in pebble form. It would be necessary, therefore, to begin with, to select a pebble of convenient size for the object it was intended to make. The selection of the new material having been made, it appears that it was first sawn by means of a toothless metal plate operated by one or two persons, abrasive being constantly applied to the moving cutting edge. This simple device is still in use in India to cut hard stone and for beads. Writing in 1850, in the official catalogue of the Great International Exhibition 1851, Augustus Summers, a senior apothecary in Bombay, gives the following account of the process. He confines it to the preparation of semi-precious stone such as Agate or Chalcedony and the

manufacture of such objects as slabs, paper cutters and paper weights. These "are cut by means of a toothless saw made of iron and the cut is fed with emery[1] dust and water. When the stone is small, the saw is worked by one man, when large by two men. The stone to be operated upon, is attached to a large wooden frame which is itself a fixture partly in the ground. The cement consists of a coarse description of beeswax with the fine fibres of raw cloth, by means of which the stones are firmly attached to the wooden framework. Several men in a row are at the same time employed cutting through different pieces of stone".[2] Eighty-six years later in 1936 in answer to Mr. A.K.Arkell, with regard to the identification of some carnelian beads, Messrs. Ranchodhal Girdhurlal & Co. of Bombay, lapidaries of considerable experience, report almost the same description of the manner in which they cut semi-precious stones. "When a stone is to be sawn", the letter runs, "it is firmly fixed in a strong frame composed of two uprights, joined at the foot by a bar, the cement holding the stone being made of beeswax and cloth fibres. The saw is a thin, toothless iron plate, one edge of which is fixed in a light wooden frame and according to

---

1. A form of Corundum.
2. Official descriptive & Illustrated Catalogue of the Great Exhibition, 1851, Vol. II, pp.862-3.

the size of the stone is worked backwards and forwards by one or two men. A mixture of ground emery, fine sand and water is kept dropping into the cleft gradually made by the saw and these materials assist in cutting through the stone."[1] It is also probable that the wire-saw, tightly fitted across a bent piece of wood, which was used comparatively recently in Sind to saw Agates,[2] may also have been employed to cut jade.

After the block was saw[n], the trimmed lump of jade was further shaped by means of the lap-wheel, consisting of a circular iron disc of varying diameter, ground to a knife edge, similar to those used by the Chinese in the working of jade. The Chinese, as said above, operate these discs on the treadle lathe worked by feet. In India, however, this medium does not seem to be in use today and it is doubtful if it was ever used during the Mughal period. Instead the bow-driven wheel, which is commonly used practically throughout the Indo-Pak sub-continent, appears to have been the device employed by the lapidaries of the Mughal court. The Indian machine does not differ basically in form from the Chinese treadle lathe and the two devices have much in common. The difference, however,

---

1. Arkell, A.J. 'Cambay and the bead trade', Antiquity, Vol.X. 1936, p.297.
2. Mackay, E. 'Bead making in ancient Sind', Journal of the American Oriental Society, Vol.57, No.1. p.4.

lies in the means of revolving the lap-wheel. In India, this is carried out by means of a wooden bow, the string of which passes several times round the horizontal wooden spindle, the bow being operated by hand, backwards and forwards, giving the cutting disc a reciprocative motion. The work is carried out by sitting on the ground cross legged and pulling the bow back and forth with the right hand while the left hand holds the lump of jade against the edge of the rotating lap-wheel.[1] An excellent account of the Indian lapidary wheel and its working was described in the columns of the Bombay Times, the description being quoted by Summers in the Official Catalogue of the Great Exhibition of 1851. The account runs as follows: "The Wheel consists of a strong wooden platform, sixteen inches by six, and three inches thick. In this are two strong wooden uprights; between these is a wooden roller, eight inches long and three inches in diameter, fastened into a head at the one end; this works on an iron spindle or axle at each end. On the one end the axle is screwed and fitted with a nut, by which the cutting or grinding wheel can be made fast. The lap-wheels consist of two circular discs or cakes of lac with ground korund, coarse or fine,

---

1. Quite beside the point, this appears to be the method most suited to people who are naturally left handed.

according to the work; of a copper disc for polishing the very hard, and a wooden one for polishing the softer description of stone. These are spun backwards and forwards by a bow, the string of which passes round the roller. The lapidary sits on his hams, steadying the wheel with his foot and holding on the stone with his left hand, while he works the bow with his right."[1] The movement of this lap-wheel is precisely the same as that of its Chinese counterpart but, nevertheless, it has two obvious defects. Firstly, that the spindle is screwed in and cannot be transferred to another place; secondly, the operation has to be stopped for a while to apply abrasive to the cutting edge, the right hand being employed for this purpose. This might take a considerable time before the object is roughly shaped.

After the cutting process was completed by means of the lap-wheel, the grinding wheel was then employed to clean uneven angles and remove projecting irregularities in order to make the rough surface smooth and even. The grinding wheel plays a vital role in the fashioning of objects worked in hard stone. In India, steel circular rotary discs were not used to grind down objects of hard stone. Instead, it appears that the Indian grinding

---

1. Official descriptive and illustrated catalogue of The Great Exhibition, 1851, Vol.II, p.863.

wheels "were made of copper, wood or emery mixed with seed lac."[1] The emery was ground into a variety of sizes to make it suitable for use according to the nature of the work. These wheels seem to have consisted of a variety of diameters with cutting-widths of graduated sizes, like those of the Chinese steel grinding wheels. It is difficult to see how such a substance can be fixed to a metal spindle, and it seems reasonable to assume that a wooden spindle for the operation of such wheels was used. In carrying out the grinding process, it seems that a suitable grinding wheel was mounted on to the wooden spindle by the workman. He would then, while squatting on his hams, revolve the spindle and with it the grinding wheel, to an alternate direction by means of a bow, the string of which passed round the spindle several times. He would hold the specimen being ground down in his left hand, press against the outer surface of the wheel, remove the unwanted parts, and make the surface clean, even and smooth. After finishing this part of the work, it appears that the craftsman of the Mughal court then employed tools

---

1. Arkell, op.cit. p.297. Here it is said that the emery was mixed with seed lac. It seems that powdered emery was compounded with the melted lac. This would set sufficiently hard to form a small grinding wheel or burr, just as in industry today - the grind-wheel is most commonly made of carborundum compounded with an adhesive.

of different denominations to make the specimen hollow.

In China, the jade objects are hollowed both by means of the lap-wheel and tube-drill, enlargement often being made with the hooked bit or curved needles. There is, however, no evidence to show if these tools were used by the craftsmen of the Imperial Court for hollowing jade objects. In his account of the non-metallic mineral products, Summer explains the method current in those days for hollowing objects of hard stones, and it seems that the lapidaries of the Mughal court may have followed the same method for jade objects also. His account runs as follows: "The cavity is formed by the diamond-tipped drill to the depth of one fourth of an inch all over the [upper] space until it exhibits an honey-combed surface, the prominent places round the holes are then chipped away; and this process is repeated until the depth and form desired are obtained."[1] The same account has been given in the above letter sent to Arkell in the following words. "To hollow the inside, the diamond-tipped drill is worked to the depth of a quarter of an inch all over the upper surface until it is honey-combed with drill holes. The spaces between these holes are then chipped away till a

---

1. Official descriptive and illustrated catalogue of the Great Exhibition, 1851, Vol.II. p.862.

hollow is formed, and the process is repeated until the desired depth is attained."[1] There is no mention of the lap-wheel's ever being used for the purpose of hollowing the objects like bowls, cups and saucers, but, nevertheless, it is highly probable that since the lap-wheel was used as a means to cut jade, it was also employed to hollow the above vessels. The lap-wheel, on account of its speed and sharp edge, will not only curtail the length of time but, also, finish the job comparatively more efficiently and quickly than the diamond drill. There is no recorded evidence to show if the Mughal craftsmen used the tubular drill to hollow out the objects and hooked twisted bits or curved needles to enlarge their interiors. So far as the use of tubular drill is concerned, some of the huqqa mouth pieces and spouts show that the instrument was used for boring vertical holes. Nos. 705-7, 02538, (pp. 185-212) are perfect examples of this process.

With regard to the tools used in enlarging the body (i.e. the interior space of the objects), it is reasonable to assume that tools similar to those current in China were employed by the lapidaries of the Mughal court. Apart from

---

1. Arkell, op.cit. p.298. It is not mentioned how the diamond drill is operated. We may, however, assume that it is worked by means of a string bow, similar to that used in China.

the tubular and diamond drills, there seems to have been some other drills with a burr on their business end, rounded with a slight depression in the centre to carry the abrasive, and used for a variety of purposes including work in relief and undercutting. A number of such drills in stone with the above descriptions and details have been discovered at Harappa, where they were extensively used for the boring of beads of hard stones such as Agate and Carnelian.[1] In order to operate the drills, the bow or pump drill was used. These drills were in use for the drilling of a variety of beads in ancient India, and they are still currently used both for stone and wood.[2]

After the specimen was hollowed and enlarged to a desired capacity, a suitable grinding wheel was again brought to bear to clear off the interior roughness of the object. Later on, if the object was wanted to be worked into an open work or set with jewels, a decorative design was chosen and probably first drawn on paper with free hand, and copied subsequently on the outer surface of the object. In case of the openwork design, the surface of the vessel was pierced through and through by means of the diamond drill following the pattern of the design, and the

---

1. Mackay, op.cit. pp.1-15.
2. Ibid. p.7

perforation was later on cut and enlarged gradually with the wire-saw and a mixture of water and abrasive. When it was desired to have the specimen adorned with jewels, the holes were drilled from the outer surface of the specimen with the diamond-tipped drill, observing the above principles, but this time the holes were made slightly bigger than the actual sizes of the jewels intended to be set on the surface of the object. The open space was then filled with a fine quality of gold by means of a light stroke of the hammer and the edges subsequently turned over to set the jewels. Light strokes were again given to secure the jewels.[1]

After the specimen had been worked into a desired form and shape, a suitable grinding wheel seems to have again been brought to play to make the surface of the object ready for polishing.

Summer describes the method of preparing the polishing discs in the following words: "The plates or dishes are made of emery [named Korunge and Samadah] a species of corundum of greyish-black glistening lustre, and granular concretion. Its fine powder is obtained by trituration and levigation. This mixed with the seed-lac forms the circular polishing plates, two in number. The

---

1. The Bishop Collection, Vol.I. p.206.

first, or coarse grained, is made in the proportion of three parts of ground emery to one of lac; the second, or finer, is made of two and a half pounds of finely levigated emery to one seer of lac; a third, or finest polishing dish is composed of warry and lac in equal proportions. Warry is the sedimentary deposit of Carnelian in an earthen dish during the polishing process. A copper dish is occasionally used for very hard stone, such as the Ceylon and other precious stones, and a wooden dish, made of deal or other fine grained wood, is employed for polishing the softer description of stone.[1] To operate the disc, it appears that the craftsman of the Imperial Court workshop would first select a suitable polishing disc and then mount it on to the wooden spindle, and while sitting on the ground cross-legged would communicate a reciprocative motion to the spindle and with it to the polishing disc by moving ths string-bow backwards and forwards with the right hand. He would hold the specimen being polished in his left hand and press it against the outer surface of the polishing disc, which being bow-driven, would revolve in alternate directions.[2] After having finished the polishing process the whole cycle of work was complete and the specimen was ready for immediate use.

---

1. Official descriptive and illustrated catalogue of the Great Exhibition, 1851. Vol.II. pp.862-3.
2. Arkell, op.cit. p.297.

CHAPTER III

Rock - crystal.

§ 1. Its Chemical Constituents and Superstitious Beliefs concerning it.

Rock-crystal is one of the many kinds of quartz which are so widely distributed in nature that because of its abundance, it has almost lost its rank amongst the gemstones.

Rock-crystal is one of the easiest of semi-precious stones to identify either by its distinct optical properties or by its hardness and specific gravity.

In ancient times, rock-crystal, amongst other stones, was used for engraving seals. Theophrastus, Aristotle's pupil and successor, points out that there are many other gems used for the engraving of seals as the Hyaloides, which reflects the Images of Things, and is pellucid, the Carbuncle and the Omphax; as also Crystal, and the Amethyst; both which are, in like manner, pellucid.[1] It is interesting that not only in the remote past but even also during the middle ages rock crystal, on account of its

---

1. Theophrastus, History of Precious Stones, pp. 137-9. translated by Hill, Sir J.

whiteness and hardness, was identified with ice. It was believed that water, due to excessive cold on the peaks of the mountains, was solidified to such a degree that it could not be melted or thawed again. However, writing in about 30 B.C., Diodorus Siculus expressing his opinion, says that rock-crystal is the product of water which because of Heavenly Fire has transformed itself into a solid substance. But Pliny the Elder says that crystal is essentially "a substance which assumes a concrete form from excessive congelation". He goes on to say that it is found "in places where the winter snow freezes with the greatest intensity."[1] It appears that this interpretation continued to be used in literature until 1676, when Robert Boyle, the eminent physicist, brought this popular conception to an end.[2]

Rock-crystal, a member of the pheno-crystalline group of quartz, is composed of pure silica[3] and oxygen, in principle SiO_2. It occurs in nature as a colourless, limpid and translucent substance, showing a bright glossy appearance and is the purest form of quartz. However, it is also found in a semi-translucent and opaque state.

---

1. Natural History of Pliny, translated by Bostock J. and Riley, H.T. Book 37. 2.9.
2. Farrington, O.C. Gems and Gem Minerals. p.141.
3. Its impure form may contain clay, oxides of iron and many other metallic oxides.

Rock-crystal belongs to the hexagonal or trigonal system of symmetry and it appears in rhombic, prismatic or pyramidal shapes. Some of the crystals are right-handed while others are left-handed; the one part constituting itself as a mirror reflection to its opposite counterpart. The crystals are usually elongated but vary in proportion. "The smallest", says Bauer, "measure a few millimetres in length and weigh no more than a few milligrams while the largest, which are least common, measure some metres in length and weigh several hundredweights."[1] "In 1719", Goodchild says,"a cavity was found in Zinken, in the Bernese Oberland from which crystals weighing altogether fifty tons were taken and sold for some £60,000".[2]

The hardness of rock-crystal according to Mohs's scale of hardness is 7, and it is comparatively tougher than both nephrite and jadeite. Like nephrite and jadeite, rock-crystals ~~are~~ is also cut and fashioned into varieties of shapes by means of the wire-saw and a refined kind of abrasive - for it resists the abrasive action of ordinary dust.[3] It is also intractable to chiselling and hammering

---

1. Max, B. Precious Stones, translated by Spencer, L.J. pp. 474-475.
2. Goodchild, W. Precious Stones, p.149.
3. Smith. op.cit. p.372.

and cannot be chiselled with the knife point. It breaks conchoidally in crystallised specimens but also shows splintery and flat fracture in some compact and massive varieties.

Its cleavage is not distinctive. Nevertheless, it breaks into smaller crystals if a heated crystal is plunged into cold water.[1]

It is soluble only in hydrofluoric acid and is infusable under the blowpipe but readily fuses in an oxyhydrogen flame and can be drawn into fine threads and in the end volatilizes.[2] It also melts with soda to a clear glass.

In general rock-crystal possesses vitreous lustre but some specimens show a resinous greasy lustre. It is a moderately good conductor of heat. Its colourings, which are accounted for by the presence of metallic oxides, become weak and show ostensible fading when heated, and if the heating process is allowed to continue to a relatively higher temperature the colour disappears completely. The specific gravity and refractive indices of rock-crystal are 2.66 and 1.544 / 1.553 respectively.[3]

---

1. Rothschild, M.D. Handbook of Precious Stones, p.108.
2. Emanuel, H. Diamonds and precious stones, p.152.
3. Rogers, R.J. Dictionary of Gems, Precious and Semi-Precious Stones, p.33.

Rock-crystal, because of its limpidity, brilliancy and water-clearness, has been given locally different fanciful and attractive names, which include "Cornish diamonds", "Irish diamonds", "Bristol diamonds", "Isle of Wight","pseudo-diamond", "Arkansas diamonds", "Bahamian diamonds" and "Boffa diamonds". In the Tanjore district of Madras province it is known as "Vallum-diamond" and as "Mari-diamond" in Sind. In India rock-crystal is found as follows:

(a) Madras: Tanjore district, Vellam,

(b) Godavari district. Here very large prisms of rock-crystal used to be obtained in the bed of the Godavari to the west of Rajahmahendi,

(c) Hyderabad State,

(d) Central provinces; Sambalpur district, Bijkomar,

(e) Punjab; Gurgaon district, Aurangpur, 15 miles south of Delhi and

(f) Bannu and Mari.[1]

As a medicinal substance, powdered rock-crystal was mixed with wine and was taken as a cure for dysentry, constipation, fainting fits and all "cephalick" diseases.[2] According to Pliny, rock-crystal was employed to cauterize

---

1. Ball, V. A manual of the Geology of India, Part III. pp.502-3.
2. Nicols, T. A lapidary or the history of precious stones. pp. 119-120.

any part of the body, when required, by means of rock-crystal balls held against the rays of the sun. The ancient Roman surgeons used the balls to treat and heal sores.[1] On the other hand, the fashionable ladies of ancient Rome used to keep the crystal balls in their hands to cool them in hot weather.[2] This practice is still current in Japan. Rock-crystal is also considered to be a remedy for hemorrhage, which is cured by applying rock-crystal to the bleeding part.[3] The Chinese believe that if a piece of rock-crystal is kept in the mouth it helps to assuage thirst.[4] In ancient times one of the beliefs associated with rock-crystal was that it rendered poisons ineffective and because of this conjectural belief rock-crystal was quite extensively used in the making of cups, goblets and other drinking vessels. Rock-crystal is also regarded as a fortune teller. According to an old conception which has survived even to the modern age, it is believed that images which are seen through spheres of rock-crystal reveal the past of the observer.[5] Dr. Lee, an English astrologer, shared this belief and used rock-crystal for the above purpose.[6]

---

1. Fernie, op.cit. p.159.
2. Goodchild, op.cit. p.150.
3. Farrington, op.cit. p.144.
4. Kunz, G.F. The magic of Jewels and Charms, p.398.
5. Farrington, op.cit. p.142.
6. Burnham, op.cit. p.352.

Rock-crystal was not only worn as an amulet against sickness and to avoid and protect wasting diseases;[1] but also in the form of necklaces to counter the influences of imaginary evil spirits. The Egyptians used to add to necklaces the images of gods and of animals as pendants to reinforce the effect. It is interesting to note that they painted imitations of necklaces and other ornaments, or collars of precious stones with flowers, both on the mummies and mummy cases as pendants.[2]

§ 2. Historical Background.

A number of archaeological sites in India have yielded a fairly large number of beads made of hard-stones including rock-crystal. Their plentiful occurrence makes it plain that beads were extremely popular amongst the common people, who wore them as ornaments, and that the

---

1. Thomas, W. & Paritt, K. The Book of Talismans, Amulets and Zodiacal Gems. p.52.
2. Budge, E.A.W. The Mummy. pp.230-1. A section of Ta-ta-thi tribe in New South Wales, Australia regards rock-crystal as carrying the power to bring rain. For this purpose, ——————→ they wrap a piece of rock-crystal in feathers and throw it up into the sky. When it comes down, they immerse the piece in question together with its enclosure into the water and bury it in the earth or conceal it somewhere.
Cameron, H.L.P. 'Notes on Some Tribes of New South Wales,' J. R. A. Inst. Vol. XIV (1085) p.363.

bead manufacturing industry flourished at all times. At Mohenjo-daro and other sites of the Harappan culture, it appears that short barrel beads were much admired and worn. During his extensive excavations at Mohenjo-daro, Marshall found beads of this type of rock-crystal, though the number of such beads is, however, limited.[1] Mackay, also, reports the discovery of beads of rock-crystal both at Mohenjo-daro[2] and Chanhu-daro.[3] In the early historic period there is an abundance of evidence for the use of rock-crystal. Different types of beads of rock-crystal are recorded by Marshall from Sirsukh, Jaulian and the temple of Jandial (Taxila), though unfortunately he does not enumerate the types.[4]

During the excavations carried out by Sankalia and his colleagues at Nevasa, six beads of rock-crystal were found. These beads do not exhibit a high standard of workmanship and are said to cover a period from the 2nd century B.C. to the 2nd century A.D.[5] Next come as many

---

1. Marshall, Sir J. Mohenjo-daro and the Indus Civilization. Vol.II. p.512. He also found beads of copper, bronze, silver and gold.
2. Mackay, E.J.H. Further Excavations at Mohenjo-daro. Vol.I. p.498.
3. Mackay, E.H. Chanhu-daro Excavations. p.209.
4. Marshall, Sir J. Taxila. Vol.I. pp.220,228, 386. Beck's classification of bead type provides an efficient instrument for recording all forms of beads. Beck, H.C.'Classification and Nomenclature of Beads and Pendants,' Archaeologia, LXXVII, 1937. pp.1-76. Also see his"Beads from Taxila,' memoirs of the Arch. Surv. of India. No.65, 1941.
5. Sankalia, H.D. & others. From history to prehistory at Nevasa, p.351.

as fifteen beads of different types of rock-crystal from Kholapur where archaeological explorations were conducted both by Sankalia and Dikshit.[1] Almost to the same period belong a large number of beads of rock-crystal from Kondapur discovered by Dikshit. The beads from this site are of particularly good workmanship.[2] Some crystal beads including a hexagonal bicone were discovered by Dr. Allchin at Piklihal in levels dating from the 1st - 2nd century A.D.[3] In any case, it is clear that the utilization of rock-crystal was greatly developed in Buddhist India. During the early centuries B.C. rock-crystal, also, became a popular material for making reliquaries, probably owing to its beauty and its reputed talismanic value. These reliquaries were deposited in Buddhist stupas with great pomp attended by religious ceremonies.[4] Processions connected with the deposit of relics are shown on the Bharhut and Sanchi reliefs.[5]

---

1. Sankalia, H.D. & Dikshit, M.G. Excavations at Brahmapuri. p.90.
2. Dikshit, M.G. 'Some Beads from Kondapur', Hyderabad Archaeological Series. No.16. 1952. p.819.
3. Allchin, F.R. Piklihal Excavations, 1961.
4. These ceremonies which seem to be something in the nature of a festival, consisted of honouring and respecting the deceased, not only with garlands and different kinds of perfumes, but, also, singing, dancing and various kinds of instrumental music. (Rhys Davis, C.A.F. & T.W. Dialogues of the Buddha, Part II. pp.175-181).
5. Barua, B. Barhut, Book III, p.312. figures 9a and 17a and Marshall, J. & Foucher, A. The monuments of Sanchi, Vol.I. p.117. Plate 36 c.

During the excavations at the Piprahwa stupa in 1898, Peppé found in a sandstone coffer, two soapstone vases, a vessel, shaped like a lota or battohi, a small soapstone box and "a crystal bowl 3¼ inches in diameter and 3½ inches high, including the cover. The bowl lay at the south end of the coffer, and the cover lay in the centre with its handle downwards. The handle is in the shape of a fish, hollow, and is fitted with granulated stars in gold leaf."[1] These reliquaries contained pieces of bones, "ornaments in gold; gold beads; impression of a woman's figures, one inch long, one gold leaf, the upper part of her body being nude and the lower portion clothed; another smaller figure in gold leaf, nude; a large circular piece of rather thicker gold leaf, two inches in diameter, with scroll ornament; an elephant stamped on gold leaf; several pieces in gold leaf stamped with the figure of a lion, having a trident over his back and the Buddhist Cross (Svastika) in front; seven pieces with the impression of the Buddhist Cross; one piece of solid gold, measuring ¾" x ¼" x ⅛"; and quantities of stars or flowers both in silver and gold, with six or eight petals each."[2] These finds, also, included "beads of various sizes and

---

1. Peppé, W.C.'The Piprahwa Stupa.'J. of the R.A.S. 1888. pp. 573-8.
2. Ibid.573-8

shapes, cut in white or red carnelian, amethyst, topaz, garnet, coral and crystal."[1]

There has been considerable discussion concerning the age of these relics, and both bowl and beads are believed to belong to about the 3rd Century B.C.[2] It may be pointed out that the dating of the Piprahwa Stupa deposit is confused by the assumption that the inscription found scratched on the cover of one of the reliquaries was pre-Mauryan. Recent palaeographic analysis of the script indicates that this is not so. Indeed, the subsidiary finds from the deposit point to a similar conclusion. As Vincent Smith rightly pointed out, there were gold leaf impressions of at least two coins, which can by no stretch of imagination be regarded as pre-Mauryan. Again the gold leaf moulded figure here and, also, in the stupas at Lauriya Nandangarh[3] were without doubt impressions from carved ring stones, as Majumdar himself realized. All available evidence suggests that these ring stones are not pre-Mauryan, but most probably of a time that is well post-Mauryan. Interestingly enough, the same period (3rd century B.C.) has been attributed to the inscription in question by Thomas.[4] This view is

---

1. Peppé. op.cit. pp. 573-8.
2. Sircar, D.C. Select inscriptions, Vol.I. p.84.
3. Majumdar, N.G. 'Explorations at Lauriya Nandangarh,' Arch. Surv. of India(Annual Report.) 1935-36. pp.55-66.
4. Thomas, E.J. The Life of Buddha. p.162.

supported by Sircar. Thus the weight of evidence seems to support a somewhat later date for the Piprahwa casket.

At Sirkap (Taxila) Marshall discovered "a relic bone; three small pearls; two shell beads; one cylindrical gold bead; eight small pieces of gold; one coin of Apollodotus II (Apollo and tripod type); three coins of Azes II ('mounted king and Zeus Nikephoros'); five fragments of a crystal casket measuring, when intact, about 10.5 in. in diameter by 2.19 in. high. The fragments of the crystal casket are very finely cut and polished, and of a quality which suggests Mauryan workmanship."[1] The casket in fact was discovered in a stupa in Sirkap stratum II and should, therefore, belong to the first Century A.D. This however, as Dr. Allchin has pointed out is merely the date of deposition in this particular shrine.[2] The presence along with the casket of a coin of Appolodotus II, suggests that the broken crystal casket may have been redeposited from an earlier stupa dating from the 1st. Century B.C. But even this does not provide certain evidence of its date of manufacture and it cannot at present be demonstrated that Marshall is wrong in assigning it to the Mauryan Period.

In the relic chamber at one of the Bhojpur stupas,

---

1. Marshall, Sir. J. Taxila. Vol.I. p.144.
2. An unpublished paper submitted to the Kanishka symposium held in London in April, 1960.

Cunningham unearthed "a red earthenware box, 8¼ inches in its greatest diameter, and six inches in height."[1] In this box was found a stupa-shaped crystal casket "with its terrace, plinth, hemispherical dome, square pedestal, and double chatta pinnacle, all complete. The top is pierced with a small perpendicular shaft, to which the pinnacle forms a stopper. The bottom of the shaft is the relic-chamber,"[2] in which minute pieces of bone were found. "In the red earthenware box there were several small pieces of bone, and a series of the seven precious things usually placed along with the relics of an eminent person. These consisted of 4 thin, round bits of gold, weighing altogether only a few grains, one bead of garnet, or Badakshani ruby, one crystal bead, two beads of pale greenish crystal, and some minute fragments of pearl."[3] Cunningham also discovered two crystal reliquaries at Sonari. He describes both of the reliquaries as follows: "The largest of the relic-boxes is a cylinder 4 inches in height and upwards of 8 inches in breadth, covered by a domed lid of the same fine sand-stone having a rise of more than 2 inches. Inside this was a smaller stone box of the same description; but only 5¼ inches in diameter and

---

1. Cunningham, A. The Bhilsa Topes. p.331.
2. Ibid. p.331.
3. Ibid. p.332.

$3\frac{3}{4}$ inches in total height. Inside this, again, there was a third stone box or casket only $1\frac{3}{4}$ inches in diameter, and of a different shape, being nearly spherical with a pinnacled top. Lastly, inside this sphere was a small crystal casket only seven-eights of an inch in diameter."[1] "This little casket", says Cunningham "must once have enshrined some minute portion of bone or perhaps a single tooth of the holy Buddha; but after the most careful search of the chamber, no trace of any relic was discovered."[2] Of the other reliquary Cunningham says: "The relic-casket is a round flat box of crystal, 2 inches in diameter, and six-tenths of an inch in height. As the crystal was too hard a substance to be inscribed, the name and the title of the holy man were carved on a small piece of stone three quarters of an inch long and only half an inch broad."[3] The relics from Bhojpur and Sonari Stupas are dated by Cunningham to the 2nd and 1st Centuries B.C. and these dates have much to recommend them.

During his excavations at the Bhattiprolu stupa, Rea unearthed "three inscribed votive caskets containing inner

---

1. Cunningham, op.cit. p.314.
2. Ibid. p.314.
3. Ibid. p.316. The script on these caskets is not early. The inscriptions in ink on the comparable reliquaries from Andher (ibid. pp.348-9) is particularly interesting. All these inscriptions may be accepted as later then the Heliodoros inscription at Besnagar. D.C. Sircar, op.cit. p.186.

stone and crystal caskets, relics and jewels. They were placed at different levels near the foundations."[1] The first casket contained the following; a globular black stone casket "a copper ring, and several bits of copper; a small bead and two double pearls; two small semi-spherical cups made of a hard brown metal - a hexagonal crystal, with slightly convex sides, pierced with a hole through its axis. On each of the sides is lightly traced or scratched with one stroke for each line of the letters an inscription in a similar character"[2] to that on the main casket. This casket also yielded two trisulas made of thin sheets of pure gold, four eight-petalled flowers, a hollow single and a double gold bead etc. In the globular casket was found "a cylindrical crystal phial 2½ inches in diameter by 1¼ inches in height."[3] Inside the phial was a "flat piece of bone, ½ inch broad; it is smooth on the one side and celled on the other."[4] The second casket also produced "a crystal phial 1⅝ inches in diameter by 2¾ inches high. Its lid is moulded like a dâgoba."[5] The crystal phial was found accompanied with 164 gold flowers, two circular flowers, a two armed figure, and two gold

---

1. Rea, A. 'South Indian Buddhist Antiquities' Arch. Surv. of India, Vol.XV. 1894, p.9.
2. Ibid. p.11.
3. Ibid. p.12.
4. Ibid. p.12.
5. Ibid. p.13.

trisulas. The third and the last casket contained "a crystal phial of the shape of that found in the second casket, but slightly larger. - The phial is 2⅛ inches in diameter by 3 inches high."[1] Together with this reliquary were also found a miniature relic casket made of beryl and three small pieces of bone, two amethyst beads, a yellow crystal bead, a small hexagonal crystal drop of a slightly yellow colour and another flat one of white crystal, and a bone bead.[2]

Although Buhler believed these inscriptions to be in a Mauryan reginal script, yet subsequent writers have doubted their earliness. Indeed, from the inscriptions engraved on these caskets, it may be inferred that the reliquaries in question belong to a similar date as those of Sonari.[3] But once again the date is uncertain and exaggerated claims have been made concerning its antiquity.

From Taxila comes another most peculiar and most interesting rock-crystal reliquary discovered in a circular stone box about 1 foot in diameter and 3 inches in depth by two Zamindars digging the ruins of what was evidently

---

1. Rea. op.cit. p.14.
2. Ibid.p.14.
3. Sircar. op.cit. p.215, suggests a date of not much earlier than 1st. century B.C. But other considerations suggest that the stupa may be somewhat later and that the casket may even be assigned to the 1st. century B.C. or later.

a stupa at a spot 800 yards north east of Sirkap. This was found together with a flat stone omphalos bowl and a gold plate with an inscription in Kharoshthi characters. This bowl may be compared with some other specimens excavated at Taxila in both stone and silver, all coming from Sirkap and not earlier than 1st Century A.D.,[1] while the inscription is regarded (admittedly on no very firm grounds) by Konow as "roughly intermediate" between the Patika Plate and the Takht-i-Bahi[2] inscriptions,-that is to say the 2nd half of the 1st century B.C. The same date is accepted for the crystal casket.

The reliquary which was found in the above box is shaped like a goose (haṁsa).[3] The gold plate 2¾ inches long and approximately 1 inch broad, states that one Sri deposited the relic in the crystal haṁsa regarding it as the disembodied spirits of her parents. She did so with a view to benefit the souls of her deceased parents.[4] The inscription is, however, obscure.

---

1. Marshall, Sir J. Taxila, Vol. II. p.490.
2. Konows, S. Corpvs Inscriptionvm Indicarvm, Vol.II. Part I. pp. 83-86.
3. There is some difference of opinion concerning the creature depicted on this reliquary. Cunningham Arch. Surv. of India Vol.II. p.130 takes it to be a goose. However, Mitra, R.J. A.S. of Bengal. Vol.XXXI, 1862, p.176 partly differs from him and thinks that the head of the reliquary resembles that of a turtle. The later assumption seems to be more precise and accurate.
4. Konows, op.cit. pp.83-86.

Cunningham during his excavations at Manikyala in the Punjab, discovered in one of the stupas "a model stupa of blue clay-slate, 8½ inches in height, and 4½ inches in diameter, which had evidently been turned upon a lathe."[1] "In the tope casket", he says, "there was a small crystal box with a long pointed stopper, which together had the appearance of a pear set up on its broad end. This crystal box contained the relic, which was a very small piece of bone wrapped in gold leaf, along with a small silver coin, a copper ring and four small beads of pearl, turquoise, garnet, and quartz."[2] He, also, discovered two copper coins. Cunningham says that "one of these, which was found inside the chamber of the great stone box, beside the model tope, has a bull on one side and a camel on the other, with the legend Maharajasa Rajadirajasa Kujula Kara Kapahasasa or "coin of the great King, the King of Kings, Kujula Kara Kadphises."[3] The other coin "has a bull on one side with a lion on the other, and the legend Manigalasa Chhatrapasa putrasa Chhatrapasa Jihoniasa, or "[coin] of the Satrap Jihonia, son of the Satrap Manigala."[4] On the strength of these two coins, the relic deposit may be dated to the 1st. century A.D.[5]

---

1. Cunningham, A. Arch. Surv. of India. Vol.II. p.167.
2. Ibid. p.167.
3. Ibid. p.168.
4. Ibid. p. 168.
5. Ibid. and Allchin's paper, already quoted, for Kanishka Symposium.

At Supara, some thirty miles north of Bombay, the site of the ancient city and port so often referred to in the Buddhist texts, Bhagwanalal Indraji found a copper casket with a lid in which were contained, one within another, four caskets of silver, stone, crystal and gold. "Fitting tightly into the stone casket was a crystal casket, about three inches in diameter. It is in two parts, a body and a lid. The body is one and a quarter inches high and deep, and the lid two and a quarter inches high and deep."[1] It is suggested by Indraji that the casket belongs to a period about the middle of the 2nd century A.D. It should, however, be noted that an inscription concerning Yajnasri Satakarni was found in association with it. Indraji attempted to fix the date of the stupa somewhere around the middle of the 2nd century A.D. It may be pointed out here that the eight bronze Buddha figures found in this deposit must be substantially later, perhaps of the 5th-6th century A.D. It is, therefore, not possible to be at all precise about the date of the crystal casket and subsidiary finds. They may well be earlier, or more probably belong to the time of Yajnasri.

Perhaps to the same period belongs a single fragment of an image of crystal from Panigiri, a site in Telingana

---

1. Indraji, B. 'Antiquarian remains at Sopara and Padana.' J.B.B. of R.A.S. Vol. XV 1881-82, p.307.

south east of Hyderabad. The fragment in question, which is about 1½ inches in height, includes the head and shoulders of what has been claimed to be a Bodhisattva. It was found during the excavations carried out there by the Hyderabad Archaeological Department, in a context which suggests that it belongs to the late Satavahana period,[1] and,indeed, such a figure is unlikely to be pre-Kushan.[2]

In 1946, T.N.Ramachandran during his excavations at Salihundam, a site situated on the banks of the river Vamsadhara in the district of Viskhapattanam,discovered three rock-crystal reliquaries each in a stone casket. All these reliquaries are in the form of a stupa, each differing slightly from the other in shape. Ramachandran has described these reliquaries as follows: "The first reliquary which was found in one of the rectangular Karandas [casket] recalls the simple type of the stupa. It is spiroidal [not a hemispherical dome though that was what was meant] and consists of two parts, a big and all-assuming part and a small circular part or base which slips underneath the former so completely as to create the impression that the two are of one indivisible unit. But

---

1. This information has kindly been supplied by Dr. F.R. Allchin.
2. One would expect such a figure to belong to the same period as the first appearance of the Buddha figure at Amaravati which occured during the last quarter of the 2nd. century A.D. Barrett, D. Sculptures of Amaravati in the British Museum. See Appendix

when these two parts thus united, are scanned from above, they reveal a slot of space in the body of the crystal in which rests a gold flower [Svarṇa-pushpa] glittering like burnished gold, which is due to the small slot being rendered free from atmospheric action as in a hermetically sealed chamber. The second reliquary found in the second rectangular casket consists of two parts, a broad and circular receptacle with its ridge raised in the centre, so as to form a cavity within which were found five complete gold flowers and a sixth flower in three bits, and a lid in the shape of a dome with a square pavilion [harmika] and the shaft of the Chhatra superimposed. The third reliquary is the most interesting as it is a perfect representation in miniature of the extant form of stupa construction such as Amaravati; Goli and Nagarjunakonda have revealed to us. It consists of four parts - a broad and circular base [vedika] or receptacle with a cavity of high ridge within which were found two gold flowers in five pieces, a dome [anda], a cubical pavilion [harmika] with four circular holes for each side resembling a nail with cross-bars, upright pillars and coping complete, and a cylindrical part surmounting the harmika which resembles the shaft of an umbrella. Though similar gold flowers found elsewhere are described as "star-shaped", it will be correct to describe them as "flower-shaped" as

they are indeed svarna-pushpa-samarpana."[1] These reliquaries are assigned to the 2nd Century A.D.

At Shah-ji-ki-Dheri Spooner found a relic casket in the form of "a round metal vessel, 5 inches in diameter and four inches in height from the base to the edge of the lid. This lid originally supported three metal figures in the round, a seated Buddha figure in the centre (which was still in position), with a standing Bodhisattva figure on either side. These two figures, as well as the halo from behind the Buddha's head, had become detached (probably at the time when the covering of the chamber collapsed, for the casket evidently had been subjected to some sudden shock from above, as is proved by the way the Buddha figure has been forced downwards, deeply denting the lid of the casket and even breaking the metal at one side), but all three fragments were recovered, one Bodhisattva and the Buddha's halo close to the foot of the casket, and the second Bodhisattva about 2 feet to the north. And these formed the entire contents of the chamber, although it should be noticed here that close beside it was found a single copper coin of Kanishka. The same shock apparently which dislodged the Bodhisattvas loosened the bottom of the casket also, so that this dropped out as the upper part

---

1. Ramachandran Sir. T.N. "An inscribed pot and other Buddhist Remains in Salihundam". Epigraphia Indica Vol.28. pp.133-7.

was lifted off the slab. And on this bottom was found a six sided crystal reliquary measuring about 2½" by 1½", and beside it a round clay sealing which had been partially dissolved by the infiltration of water and had become detached from the crystal, but which still preserved traces of its original device, namely, an elephant standing to the right, which we may assume was the impression of the king's seal. This seal had originally closed the small round orifice which had been hollowed out to a depth of about an inch in one end of the six sided crystal, and within which the sacred relics were still tightly packed. These consist of three small fragments of bone, and are undoubtedly the original relics deposited in the stupa by Kanishka which Hiuen-Thsang tells us were relics of Gautama Buddha".[1] In view of the above facts, there does not seem to be any reason for disagreeing with Spooner with regard to the dating of the casket. It may be dated by the general probability of its context to the time of Kanishka, that is, early 2nd century A.D.

Cousens found at Kahu-jo-daro, in the Mirpurkhas district, in a small stone casket, a small crystal "a number of offerings consisting of 63 coral beads, 7 crystal beads,

---

1. Spooner, D.B.'Excavations at Shah-ji-ki-dehri,' Arch. Surv. of India. 1908-9. p.49.

drilled and un-drilled, 2 small crystals cut to simulate diamonds, each about half the size of a pea, 30 very small seed pearls, most of them not much larger than a pinshead, and all drilled, 4 gold beads, two being ribbed and melon-shaped, and about three-eighths of an inch in diameter, one small gold wire ring, 10 copper coins, some small lumps of charcoal, a few grains of wheat and some other small beads and chips."[1] In the opinion of Cousens, the stupa in question belongs to the 4th century A.D., but there is no means of establishing the age of the relics. The ten copper coins found together with the other deposits in the relic chamber do not offer any help in determining the probable date because they are badly corroded and were not identified.[2] But we shall probably not be far wrong in assigning them to the Kushan's era.

Dikshit discovered a crystal reliquary during his excavations at Sripur in the Raipur district in Madhya Pradesh. The reliquary "is shaped like a stupa prepared from a single piece of crystal. It is about 4 cms. in height and has a small projecting grooved base. The hemispherical anda (ht. 2.5 cms.) is surmounted by a square

---

1. Cousens, H. 'The Antiquities of Sind 'Arch. Surv. of India. (Imperial Series.) Vol. XLVI 1929. p.87.
2. Ibid. p.93.

Harmika, 1.5 cms. square, and a cone shaped pinnacle, about 1.5 cm. in height. The diameter at the base is 2.5 cms. The base of the stupa is hollowed by boring an aperture, about 1.3 cms. wide, roughly forming a karaṇḍaka shaped depression. This hole was intended for the keeping of the Dhātu, but no relics were found in it at the time of discovery."[1] On the strength of a gold-plate and beads found together with the above reliquary Dikshit is inclined to suggest a 7th century A.D. date.[2]

No specimen of crystal reliquaries later than the 7th century A.D. so far seems to have come to light[3] and it is quite likely that, after this period, the practice of preserving corporeal relics in crystal reliquaries and depositing them in stupas lost currency and ceased. Thus in the absence of any surviving objects, it is not possible to say how far rock-crystal continued to be employed as an art material. Almost every mediaeval archaeological site has produced a fairly large number of beads of semi-precious stones both finished and unfinished, and at least such beads continued to be admired and appreciated as ornaments. It is difficult to say if vessels of hard

---

1. Dikshit, N.G. 'Crystal Reliquaries' J.M.P.I.P. 1959. No.1. pp.53-73.
2. Ibid. pp. 54-55.
3. Ibid. p. 57.

stones continued in vogue, but the absence of vessels of such material tends to suggest that their use ceased. Rock-crystal does not seem to have been commonly used again as an art material in India until the Mughal period. During this period the aesthetic merits of the mineral were admired and a variety of objects of beauty were carved out in it with great skill. But since we have the small wine cups in jade with linear decoration which seem to belong to Akbar's reign, and all surviving Mughal crystal show the sprig floral decorations which emerged at the earliest in Jahangir's reign, it seems that the revived use of crystal followed on the Indian manufacture of jade objects.

CHAPTER IV

The Indian Working of Rock-Crystal.

There does not seem to be any fundamental difference between the working of rock-crystal and jade. The techniques used are identical. Both materials are tough, and neither will submit to the chisel. Both must, therefore, be worked under the saw or lap-wheel, the drill and by various forms of grinding with abrasives and polishing. It has already been mentioned that the art of working hard stones was in practice in India from a remote past. As has been said, beads were used for personal decoration, and rock-crystal was commonly employed for this purpose.[1] We have, also, noted that this art was highly developed from the technological point of view when rock-crystal was worked into reliquaries in Buddhist India. Before any salient features which took place in the development of the working of hard stones are pointed out, it seems necessary to know the methods used in ancient India in the manufacturing of hard stone beads including rock-crystal. Mackay has described the working of such

---

1. Microliths of rock-crystal fragments are also commonly used as points. Since the material is intractable, flakes and blades do not occur.

beads as follows: "In order to obtain as long a bead as possible, the nodule of agate or carnelian was split along the longer axis to produce a number of slips or rods, square or slightly rectangular in section. At each end every slip has part of the original surface of the nodule from which it was struck, and this sometimes also remains along one side of the slip. To prepare the slips from a nodule by striking alone would have been a very wasteful, as well as a difficult task. In actual fact, one or two grooves along the exterior angles of most of them show that the nodules were first sawn longitudinally and then cleaved into sections when the cuts were deep enough. Judging from the rounded bases of these saw cuts, it was first thought that a wire saw was used, together with a fine abrasive, emery or the like; indeed, this form of saw was used in Sind until only a short time ago for cutting up agate and similar hard stones. But it seems more likely that a toothless metal plate was used as a saw."[1] "After the rough blanks had been separated from the parent stone" continues Mackay, "they were worked by coarse flaking to a more even shape.[2] The next stage was

---

1. Mackay, op.cit. p.4.
2. Here Mackay does not seem to realise the toughness of the material which does not flake regularly but shatters under the hammer as the diamond does. Grinding dominates the bead-making process in the large barrel bicone beads in agate or chalcedony.

the removal of the sharp angles by finer flaking, which was followed by more careful and minute flaking until the bead was almost, but not quite round in section; when this stage had been reached recourse was had to grinding, and the bead was finally shaped by rubbing it to and fro on a piece of a sand stone."[1] It may be accepted that pieces of rock-crystal were selected of suitable sizes and that they were trimmed with the wire saw or the plate saw. The lap-wheel may have been used though we have no evidence of its use in ancient India, nor have we any evidence of the use of the revolving ground stone. The form of the finished bead was certainly mainly derived from grinding either on the rotary ground stone or on a grooved block as Mackay has said. Many of the Buddhist soft stones or steatite reliquaries, such as those from Sanchi and Sonari, are, however, lathe turned and it is probable that the lathe was used for rotary, grinding and polishing. "After the bead had been rounded", says Mackay, "the rough ends were ground down flat, and before the final polishing, the boring was commenced."[2] This was done from either ends of the bead so as to make the holes meet in the middle or thereabouts. "From examination", Mackay continues, "of

---

1. Mackay. op.cit. p.4.
2. Ibid. p.5.

the unfinished hard-stone beads that were made by the people of the Harappa culture, it was at first thought that copper or bronze tubular drills were employed to bore the holes. Beads that have been broken in the boring show at the break a slight polished core surrounded by a smooth circular ring. Numbers of examples have been found at Chanhu-daro and a few at Mohenjo-daro, all with this characteristic pimple in the centre of the break.[1]... That stone and not metal drills were used in boring the hard-stone beads of Chanhu-daro is now proved by a large number of stone drills being found there .... The business end of these stone drills is rounded, with a slight depression in the centre. A micro-photograph of the end of one (greatest diameter 0.12")[2] clearly shows the concentric markings formed by an abrasive in its rotation of a hard substance, or alternatively the rotation of a hard stone against it. All these drills, whether black or dark brown in colour, were made by roughly flaking the stone into a rod-like shape and then grinding them

---

1. Plate III 5.
2. Plate III 8. There is a good reason for adopting this shape of bit, which seems to have escaped Mackay's notice. A solid cylindrical bit, due to wear will not produce a cylindrical bore but a tapering one, while the bit itself will in time be reduced to a tapering object with a rounded end. To prevent this happening it is necessary to reduce wear anywhere along the bit at the working end - hence the constriction just above the working end.

in much the same way as the beads. They are never of the same diameter right through, but narrow slightly just above the working end and then thicken towards the butt, which more often than not has slightly faceted sides, doubtless to prevent its turning in the handle or chuck in which it was fixed. It might not at first appear possible to use so brittle a drill with the hardness of 7 against a material of similar hardness such as agate or carnelian. By itself the drill would have made little or no impression on these stones, but the use of a fine abrasive with it, such as emery or crushed quartz, would entirely alter matters."[1] In support of his arguments, Mackay quotes the statement of Dr. C.H.Desch, the then Director of the National Physical Laboratory, Teddington, England, to whom he had sent some specimens of the chert drills for experiment. The statement runs as follows: "I think that the depression at the end of the drills[2] is intended to hold the abrasive under the drill and prevent it from escaping. I mounted one of the stone drills in a small Archimedean brace, which I held vertically. The action would be just the same as that of a bow drill. Using 120-mesh emery and water, I found that it took about

---

1.Mackay, op.cit. pp.5-6.
2. Plate III. 8.

20 minutes to drill a depth of a millimetre in one of the rough pieces of carnelian. A small depression must have been made to locate the drill, as on a flat surface the drill wanders around before getting to work. The drilling is certainly quite practicable. Failing emery, possibly even sand may have been used. The wear on the drill is very slight."[1] Mackay's statement as to the use of these chert drills may, therefore, be accepted. However, the use of chert for drills of this fineness raises an acute technological problem; for chert breaks easily under lateral strain. There is also the problem of providing a practicable chuck of such small dimensions. Apart from this, the making of such a drill would itself be a laborious matter of great difficulty. In the case of beads of softer stones such as shale or steatite, the use of chert drills with abrasives is possible, but in the case of beads of hard-stones, such as agate or carnelian, it seems that cylindrical metal bits were more probably used. Such drills were extensively used in ancient Egypt in the boring of hard-stones, particularly cylindrical jars.[2] The problem of the chuck remains. It may be worth considering the possibility of the drill

---

1. Mackay, op.cit. pp.6-7.
2. Lucas, A. Ancient Egyptian material and Industries. p.84.

point being mounted vertically between wood blocks and the un-pierced bead attached to the drill. The very necessary first entry into material in the case of hard-stone would seem to demand a metal point. The boring of the bead was carried out by means of either a bow-drill or pump drill.[1] Mackay, however, does say: "Whether the bead revolved or the drill itself is uncertain, nor do we yet know whether the beads were drilled in a horizontal or vertical position. I am inclined to think that the bead was horizontal; owing to the difficulty of keeping a very long barrel-cylinder bead in exact alignment with the drill, it was probably inserted in a very deep wooden chuck, and perhaps also cemented in to prevent it from shifting.[2] Even if this were done, the boring might occasionally be out of the straight, owing to faulty bearings."[3] With regard to the polishing he says: "It is not yet known how

---

1. Mackay, op.cit. p.7.
2. In advocating horizontal drilling Mackay shows a lamentable failure to grasp the fundamentals of drilling with an abrasive and solid bit. Dr. Desch, it is to be noted, made no such mistake and carried out his experiment using a vertical drill, which allows the force of gravity to keep the abrasive at the working end. Working horizontally the abrasive would rapidly become dispersed and drilling cease.
3. Mackay, op.cit. pp.7-8. In ancient Egypt the boring was also done by turning and rolling the copper drill between the hands. Lucas, op.cit. p.84.

the very long beads of Chanhu-daro were polished; but whatever the process employed it was very successful - even the ends of the beads were rounded off so that they should not cut the string.[1] At the present day in India, a large number of beads are put into a leather bag with fine emery and carlinian powder and the bag is pulled to and fro between two men until the desired polish is acquired. This technique may be effective with the shorter varieties of beads, but it would, I imagine, be hardly suitable for very long ones owing to their liability to break."[2] Mackay does not take into consideration the possible use of a number of abrasives. Various dried earths of a clayey nature may have been used in the final stages of the work. If, however, the bead was attached directly to the point of the drill or lathe, fine abrasive on cloth or leather could have been used. In the case of the long barrel bicones and all faceted beads this method would be more practical. However, it must be admitted that evidence is lacking. It may be pointed out that Arkell in his study of "Cambay and the bead trade"[3] does not cite any example where a bead of

---

1. The wear of the string itself produces this effect.
2. Mackay, op.cit. p.9. Also see Arkell, A.J. Antiquity, Vol.X. 1936. p.297.
3. Arkell, op.cit. pp.292-305.

any type was either broken or damaged during the course of polishing carried out in the above manner. To avoid any risk of breakage, it appears that the modern craftsmen take special care to see that the beads are gently handled while in the polishing bag. Mackay's apprehension thus seems to be uncalled for. It appears, therefore, that the current method of polishing the beads may well have prevailed in ancient India.

As has been said, for the manufacture of soft stone reliquaries the lathe was clearly used. It is probable that rock-crystal reliquaries of circular basic section were ground and polished on the lathe. In making these to begin with, a suitable piece of rock-crystal was selected and sawn either by means of a wire saw or a toothless metal plate with abrasive mixed with water or oil, or by a lap-wheel of large dimension. Since many of the rock-crystal reliquaries are in the form of a bowl or stupa or circular in basic section, the use of a grinding wheel with the object held in the hand does not seem probable. Since rock-crystal will not turn on the lathe, no tool marks are available to us to indicate its use, but the accuracy of the circular section suggests that the material was attached to the lathe and the circular form achieved by applying an abrasive on leather or cloth. No

mention of these methods is made with reference to these reliquaries by any author, but from their circular shape and excellent workmanship they must have been produced by the use of highly specialised tools. Their being circular in shape strongly suggests that no medium other than the lap-wheel was used. It is, however, not known of what material these lap-wheels, which must have consisted of a number of sizes, were composed. Originally these lap-wheels seem to have been made of copper or bronze. Modern practice shows that subsequently iron discs were introduced and used. So far as the lathe is concerned, the bow driven wheel which is commonly used in India even today is very ancient in origin. The ancient lathes were almost certainly of this kind.

After the cutting process using the saw or large lap-wheel was completed, to rough out the crude form, the interior must have been excavated by means of parallel cuts of the large lap-wheel, as we know was done by the Chinese jade workers from earlier times. Narrow interiors were certainly excavated either by means of tubular drills or corundum tipped drill. In using the latter drill, the same method as described on page 79 was followed. The interior was subsequently enlarged by using various types of hooked-twisted bits on curved

needles. The interior work was most probably continued by the use of burr drills, but the interiors show very little signs of the tools. A further examination of all these crystal reliquaries is necessary before any conclusion can be arrived at. The position may be summarised by saying that the Chinese jade worker's horizontally drawn drills and tools could do all this work. In India, however, the soft stone reliquaries, also prove the use of the lathe.

It may be argued that the surface of the reliquary could have been ground down by means of rubbing it on a grooved block. It is possible that this method was utilised in the case of eccentric and non-circular objects. But uneven angles and irregularities left by the lap-wheel specially in the interior of the reliquaries of small orifices, must have required some kind of burred tool. In China the ground stone was not used for outside finish, nor is its use necessary for our Indian objects. The Chinese, as has been said, hold the object in the hand. In India the lathe was available, though unfortunately we have no evidence as to the nature of the chuck used.

All these tools mentioned seem to have persisted in the Mughal period, when the art of cutting hard-stones

reached its apogee from both the technological and artistic points of view.

As has been said before, there is no basic difference between the methods used in the making of Mughal rock-crystal and jade objects. The basic tools used for the deep and delicate undercutting were drills and burr-points of various sizes. Small lap-wheels were also certainly used, and upon these two tools depended the achievement of the low relief work in crystal of which Plate XXVII - a, b, c and d are examples.

In many objects of rock-crystal the foliated and floral decoration, as well as the inscriptions [Pl. XXIX] are often carried out by fine hatching, which could only have been done by the use of the diamond tipped graver - a tool not used in jade working. Both the floral and foliated motifs on jades are worked entirely by means of the lap-wheel, and then left un-hatched, although these inscriptions are sometimes filled with some unidentified whitish material [Pl. I, b]. In some crystal objects the surface is covered by a pattern of diamond shaped facets. To produce this decoration [Pl. XXVII, c] the diamond shapes were first outlined by cross-cutting grooves with the lap-wheel. Following this, each diamond-shaped area was faceted by means of a wide lap-wheel held

at an angle to the face being worked. A similar faceting process is followed when diamonds are cut. There are no Mughal jades bearing this design. The use of the lap-wheel in this way probably indicates some connection between crystal working and the cutting of gem-stones in the 17th century.

Most of the floral and foliate patterns on rock-crystal objects are composed of tiny shallowly drilled holes linked by grooves worked by the lap-wheel. [Plates XXVII and XXIX]. In many cases the lap-wheel has over run the drill holes with the result that the grooves end with a characteristic eliptical point. It is difficult to estimate if these points are deliberately carried out, but the decorative pattern suggests otherwise. We have quite a few examples of shallow drill holes on Mughal jades, but the linking of these holes by grooves is not seen on them. The connecting of shallow drill holes by grooves does not require any special technique but it does suggest a change in the choice of decorative pattern. This type of decoration appears on some of the Mughal paintings where small flowers are linked by long thin stems.[1] This is, of course, a stylistic rather than a

---

1. Browne, P. Indian Painting under the Mughals. Pl. LXXII.

technological innovation. Even so, it is remarkable that in Mughal jade-work fine lines, such as are used in the crystal objects under discussion, do not appear. It would seem most probable that nephrite was too intractable a material to allow quite this degree of fine cutting.

Technologically the working of these Mughal crystals attains the very highest quality. The industry is clearly fully developed, and a complete mastery of tools and materials was achieved. The same cannot be said of the jade working, save perhaps in a very few instances. On the whole the jade-work is rather crude and compares poorly with that done in China. Thus, seen from a purely technological point of view, it appears that crystal working was an industry of long standing, whilst the cutting of jade was a newcomer to the Mughal craftsmen, and represented a medium in which he was not very happy.

CHAPTER V

The Diamond.

We now enter on a rather lengthy digression which arises from the fact that diamond drills and diamond dust seem to have been employed in the working of jade. It will be seem to emerge from what follows that the preparation and use of diamond dust plays an important part not only in the working of intractable materials such as jade but also in the cutting of the diamond itself. It is, therefore, a matter of no little interest to us to make an attempt to find out at what stage both the diamond and its dust were first employed as a means of cutting tough materials, including jade. However, in pre-Mughal India precious stones were cut or faceted on the wheel but merely polished, blocks of corundum being used. Examples of these grinding blocks have survived. The visits to India of the jewellers Bernier and Tavernier may have initiated a taste for jewels of rose and tabular form, cut according to the European manner. However, very little Indian jewellery made up of cut stones has survived though their use was common in the early 19th century, especially in jewellery associated with Rangit Singh.

The diamond is generally regarded as the most

beautiful and indeed, the most imperishable of all gems. From the earliest times it has been held in great esteem and believed to be a sign of power, dignity and wealth. It is not only distinguishable because of its hardness and brilliance but also by its unique chemical composition. It is the only gemstone which is composed of a single element - carbon - of which it is an allotrope, and from which it may be synthesised, or to which it may be converted by heating. It crystallises perfectly in the cubic system and usually assumes the shape of an octahedron. It is generally transparent and clear, but it also occurs in coloured varieties, both translucent and opaque due to impurities. Its lustre is intermediate between that of glass and metal and is, therefore, called 'adamantine lustre'.[1] Its cleavage is perfect and runs parallel to the faces of an octahedron. Its specific gravity ranges from 3.52 to 3.55 and its refractive index in the case of red light is 2.402 and for violet light 2.55. It is a good conductor of heat and 'phosphoresces' when rubbed either with cloth, paper or across the fibres of a piece of wood and emits visible light in darkness. Both acids and alkalis fail to produce

---

1. There is an artificial glass known as strass which possess an adamantine lustre and is widely used to manufacture imitation diamonds. Bauer, Max. Precious stones. Tr. by Spenser, L.J.P. p.130.

any effect on it, but it oxidizes when heated with potassium carbonate and sulphuric acid. In its impure form its most predominant colours are yellow, green, red, blue and black.

The diamond has now been discovered in all the five continents, but before it was found in Brazil and South Africa, India was the only country where it was known and worked. It has been assumed that diamond working in India is ancient but we have no proof of this. The diamond mines of India have been frequently referred to by the ancient writers. The earliest and most reliable reference is in Kauṭilya's Arthaśāstra. In India, the diamond is found in three regions, each separated from the others by long distances. The most southern field embraces Cuddaph, Anantapur, Guntur, Kṛishna, and the Kurnol district of Andhra. The second deposit lies between the valleys of the Mahanadi and Godavari rivers. The third, and by far the most important source, lies in Bundelkhand where the famous Panna mines are located.

"The diamond", says Kunz "is to the pearl as the sun to the moon, and we might well call one the 'King-gem' and the other the 'Queen-gem'."[1] The word diamond is

---

1. Kinz, G.F. The curious lore of precious stones. p.69.

derived from a Greek word 'adamas' meaning invincible and untamable. It may, however, be pointed out that the word 'adamas' was not originally associated with the diamond. The earliest occurrence of 'adamas' is found in the writings of Homer (C 850 B.C.)[1] where it is used as a personal name. In Hesiod 'adamas' was employed to designate a hard substance signifying metals, particularly steel or an alloy of steel and gold.[2] The word 'adamantine' has also its origin in 'adamas' which is evident from the dramas of Aeschylus (525-456 B.C.) who used "adamantine chains" to bind Prometheus.[3] Plato also used 'adamas' apparently to indicate the sapphire rather than the diamond.[4] Any suggestion linking Plato's 'adamas' with the diamond has been rejected by von Lippmann[5] but, Jones maintains that Plato's adamas was the diamond.[6] A surprising statement comes from Osborne who says that "it is more than doubtful if the true diamond was known to the ancients. The consensus of the best opinions is that the 'adamas' was a variety of corundum, probably our white

---

1. Encyclopaedia Britannica. Vol. XIII. p.627.
2. Streeter, E.W. The great diamonds of the world. p.26.
3. King, C.W. The natural history of precious stones and gems and of precious metals. p.19.
4. Streeter, op.cit. p.26.
5. Laufer, B. The diamond. p.36.
6. Jones, W. History and mystery of precious stones. pp. 251-2.

sapphire."[1] Manilius is generally regarded as having referred to the diamond in one of his poems where it is mentioned as more precious than gold.[2]

Opinion is, however, divided about Theophrastus's acquaintance with the diamond. Some authorities maintain that he had no knowledge of the mineral. King says that "Theophrastus does not include the adamas in his list of gems and only once incidentally alludes to it as an incombustible substance". He goes on to say that "Theophrastus could not by mere oversight have omitted it from his list of gems, if known to his contemporaries."[2] Laufer who disagrees with this statement says that "Alexander's expedition made the Greeks familiar with the diamond, hence it is mentioned by Theophrastus who compares the carbuncle with the adamas. I do not agree with the objections raised by some authors against Theophrastus's acquaintance with the diamond."[3] Cattelle, also, holds the similar views.[4] It is true that Theophrastus in his book "The History of Precious Stones" refers to a stone which he compares with the carbuncle only once,[5] and which

---

1. Osborne, D. Engraved Gems. p.271.
2. King. op.cit. p.19.
3. Laufer. op.cit. pp.44-5. Also see Warmington, E.H. The Commerce between the Roman Empire and India. p.235.
4. Cattelle, W.R. The Diamond. p.19.
5. Theophrastus's History of Precious Stones. pp.77 & 79.

has since been identified by some of the authorities with the diamond. One feels inclined to agree with Laufer who says that "it is not necessary to assume, however, that he knew the diamond from autopsy, as he does not describe it, but mentions it only passingly in the single passage referred to it."[1] Apart from this it is accepted on all hands that Alexander opened the gates of India and introduced her to the western world. There is every reason to believe that on his return he must have carried in his train an enormous amount of wealth including precious stones.

Unfortunately there is no specific mention of the diamond being amongst the treasures which he is said to have brought from India. From this, it has been inferred that after the diamond was introduced to Greece by Alexander, the word 'adamas' which was current to identify an extremely hard and compact material may have been subsequently employed to designate the diamond. Under the circumstances, there does not seem to be any point of disagreement with both Laufer and Cattelle when they assign Greek's knowledge of the diamond to the post-Alexander period. Real evidence, however, is entirely lacking.

---

1. Laufer. op.cit. p.45.

Pliny, also, who was almost the contemporary of Manilius, speaks of the diamond's being more esteemed than pearls. In view of his statement that "it is the substance that possesses the greatest value, not only among the precious stones, but of all human possessions, a mineral which for a long time was known to kings only, and to very few of them"[1] and from his accurate definition of the physical characteristics of the stone, almost all authorities are unanimous on Pliny's 'adamas' being none other then the actual diamond.

The Indian Diamond.

"India", says Laufer, "was the distributing-centre of diamonds to Western Asia, Hellas and Rome, on the one hand, and to South-Eastern Asia and China on the other hand."[2] It is not possible to say when the diamond became known in India, but from the frequent references in the ancient literature it is inferred that the antiquity of the diamond dates back to a very early period. In ancient times the Hindus employed the diamond as a means to enrich

---

1. McCrindle, J.W. Ancient India as described in Classical literature. p.129.
2. Laufer, op.cit. pp.5,6.

the images of gods and to render them more impressive and attractive to be worshipped with intense fervour.[1] It was known in India by the name of vajra.[2] All this can only have been after the creation of Indian iconography and it must be admitted that nothing of this sort has survived.

The earliest reliable and systematic reference to the diamond appears in Kauṭilya's Arthaśāstra in which the author mentions the varieties and qualities of the substance.[3] A further reference of the diamond is to be found in the Milindapanha,[4] written and composed immediately after the beginning of the Christian era. In this book the mineral is referred to as pure and precious.

---

1. Tagore, S.M. Mani-Mala. p.91.
2. The word vajra was originally applied to designate a club shaped weapon, as well as the vedic god Indra's thunderbolt. (MacDonell, A.A. Vedic Mythology. p.55). It seems that vajra was assigned to the diamond owing to the latter's peculiar physical hardness. It is interesting to know that the diamond was also sometimes referred to as Mani. This however only means 'jewel' and colloquially 'bead'.
3. Kauṭilya's Arthaśāstra, translated by Shamasastry, R. p.89. There exists a controversy with regard to the date of the Arthaśastra which is in any case a most difficult text. Some authorities are of the opinion that it is the work of CHANAKYA, alias Kauṭilya, who was the minister of Chandragupta Maurya (324-300 B.C.), while others are inclined to think that the work belongs to a much later date. However, it may be said that the majority of scholars accept the early dating and the work undoubtedly contains much early information.
4. The questions of King Milinda, translated from Pali text by Davids, T.W.R. Vol.36. Part II. pp.357-8.

Indian diamonds are also mentioned by Ptolemy (3rd century A.D.).[1]

Van Linschoten, a Dutch traveller who visited India gives an account of the diamond and its working in India.[2] Similar details are also given by Marco Polo [3] and Garcias de Horta, a Portuguese physician to the viceroy of Goa.[4] Tavernier who travelled in India in the 17th century visited almost all the diamond mines of Southern India and has left for us an interesting account of their workings.[5]

Ball,[6] Watt,[7] Farrington,[8] Crooke,[9] Cattelle[10] and Burnham[11] are all of the opinion that the diamond was known and worked in remote antiquity in India but the evidence of this does not go back beyond the Arthaśāstra.

---

1. McCrindle, J.W. Ancient India as described by Ptolemy. p.71.
2. The Voyage of John Huyghen van Linschoten to the East Indies. Vol.II. pp.136-8. The Hakluyt Society.
3. Yule. H. The Book of Ser Marco Polo. Vol.II. pp.360-1.
4. King. op.cit. p.32.
5. Tavernier, J.B. Travels in India, translated by Ball.V. Vol.II. p.54.
6. Ball, V. The Diamonds, Coral and Gold of India. p.1.
7. Watt, G. A dictionary of the economic products of India, Vol.III. p.94.
8. Farrington, O.C. Famous diamonds. p.153.
9. Crooke, W. Things Indian. p.134.
10. Cattelle, W.R. op.cit. p.161.
11. Burnham, S.M. Precious Stones in Nature, Art and Literature. p.197.

Laufer, who disagrees with the above authorities, says that "philo logical considerations show us that the diamond had no place in times of Indian antiquity, for no plain or specific word has been appropriated for it in any ancient Indian language." He goes on "that the diamond became known in India during the Buddhist epoch in the first centuries B.C. say, roughly, from the sixth to the fourth centuries."[1] He does not accept "Mani" as standing for the diamond and says that "the word 'vajra', which at a subsequent period became an attribute of the diamond, originally served for the designation of a club shaped weapon and Indra's thunderbolt in particular."[2] So far as the word 'Mani' is concerned, it originally appeared as a proper name in the Rigvedic period, but was subsequently used to denote any amuletic jewel. Later it came to denote merely a bead with special reference to the use of beads for necklaces. The tieing of the "TALI" or marriage

---

1. Laufer, op.cit. p.16.
2. Laufer. op.cit.pp.16.17.
3. Ibid. Laufer is not aware of the positivity of information available to us when dealing with the early, so called Buddhist centuries. The known facts do not warrant his generalization. Later it came to be known merely a bead with special reference to the use of beads for necklaces. The tieing of the "TALI" or marriage necklaces in Southern India gives it a special importance.

necklaces in Southern India gives it a special importance there.

It is a fact that apart from the Arthaśāstra there is no direct evidence to show precisely when diamonds were first used in India. It can only be said that their use in ancient times is possible but that there is no other literary evidence. Moreover, material evidence is entirely lacking.

So far as the use of diamond dust in India is concerned, the earliest historical reference is found in Bernier's account of his travels in India in the 17th century. He says that "jachen[1] is in great estimation in the court of the Mogol: its colour is greenish, with white veins, and it is so hard as to be wrought only with diamond powder."[2] Tavernier, a contemporary of Bernier, also, speaks of the diamond dust. Describing the diamond mines of Southern India he says that "there are at this mine numerous diamond-cutters, and each has only a steel wheel of about the size of our plates. They place but one stone on each wheel, and pour water incessantly on the wheel, until they have found the 'grain' of the stone. The 'grain' being found, they pour on oil and do not spare

---

1. Jade.
2. Bernier, F. Travels in the Mogul Empire. Vol.I. p.423.

diamond-dust, although it is expensive, in order to make the stone run faster, and they weight it much more heavily than we do."[1]

As to earlier European usage, the evidence of Leonardo Da Vinci (1452-1519) is important. He describes the preparation of diamond dust in Europe as follows:- "The diamond is crushed [by being] wrapped up in lead and beaten with a hammer, the lead being several times spread out and folded up again, and it is kept wrapped up in paper, so that the powder may not be scattered. Then melt the lead, and the powder rises to the surface of the lead when it has melted, and it is afterwards rubbed between two plates of steel so that it becomes a very fine powder; afterwards wash it with aqua fortis and the black coating of the iron will be dissolved and will leave the powder clean."[2]

It is of interest to note that the use of the diamond as an engraving point is mentioned by Pliny who says that "when an adamas [diamond] is successfully broken, it disintegrates into splinters so small as to be scarcely

---

1. Taverner, J.B. Travels in India, translated by Ball.V. Vol.II. p.57.
2. The Note-Books of Leonardo Da Vinci, tr. by MacCurdy,E. Vol.II. p.256.

visible. These are much sought after by the engravers of gems and are inserted by them into iron because they make hollows in the hardest material."[1] Manilius goes a step further and says that the diamond point was considered as more precious than gold.[2] It should be noted here that in making a fine diamond point, the use of diamond dust is essential and inevitable since no other material is hard enough to form the point. Since engraved seals were common in India from the 1st century B.C. and these require the use of diamond point, it seems that the Indians were cognizant in the use of both the diamond dust and the diamond point. Indeed the same argument may be applied to certain Greek hardstone seals of fine workmanship, though Manilius is the earliest writer to record the use of diamond point. However, neither Pliny nor Manilius say anything about the use of diamond dust and Laufer, without doubt, is correct when he says that "as a matter of fact, neither Pliny nor any other ancient writer loses [sic] a word about diamond-dust; nor does he mention that the diamond can be cut and polished."[3]

---

1. Pliny, Book XXXVII. pp.59-61.
2. Warmington, op.cit. p.236.
3. Laufer, op.cit. p.47.

CHAPTER VI

Conclusion

We have seen that the art of cutting hard-stones was practised in India from early times. Beads were not only manufactured and commonly worn as ornaments, but were also exported to foreign countries.[1] We have also noticed that this art was further developed from a technological point of view in Buddhist India when in order to produce rock-crystal reliquaries to contain corporeal relics, new types of tools were introduced to suit the advanced techniques of the craft. So far as jade is concerned its very limited use before the Mughal rule in India suggests that the people did not realize the physical as well as aesthetic merits of the substance and that it failed to appeal to their taste. China is the only country in the world where craftsmanship in stone was held in great esteem from both the practical and spiritual points of view. Religious beliefs for centuries dominated the Chinese highly specialised use of jade. This enabled the Chinese craftsmen to produce superb masterpieces on this interesting material. Hard-stones including the American nephrites were known and worked in different quarters of

---

1. Arkell, A.J.'Cambay and the Bead Trade', Antiquity Vol.X. 1936. pp. 292-305.

the world; but in no country did this work attain so much importance as in China. In India the taste for jade was introduced by the Mughals, "who must have imbibed love for this stone in their central Asian home, the source of nephrite."[1] The Mughal emperors were great patrons of the arts and took keen interest in their development and perfection. Babur was a great admirer of art but unfortunately all we know about the art of his period is confined to painting only, and here too, our knowledge is incomplete and fragmentary.[2] He mentions the name of Bihzad as the most eminent painter [3] but surprisingly enough he criticises his work. The scarcity of artistic activity at the court of Babur, it must be remembered, was entirely due to his unsettled life. Immediately after the death of his father, Umar Shaikh Mirza, Babur found himself in great difficulties, even his life being threatened. The circumstances forced him to abandon his inherited ancestral principality of Fargana once and for all. He eventually diverted his attention towards Hindustan which he attacked in 1526. Babur's victory over

---

1. Motichandra, 'The Art of Cutting Hardstone Ware in Ancient and Modern India', Bhagwan lal Indrajit commemoration volume, Gujrat Research Society. Oct.1939.
2. Dimand, M.S. A Handbook of Muhammadan Art. p.57.
3. The Baburnama. (Memoirs of Babur) Tr. by Beveridge, A.S. Vol.I. p.291.

Ibrahim Lodi was a decisive historical event. It brought his wandering life to an end on the one hand, and on the other, laid the foundation of a great Empire in India which survived for centuries after him. Babur was succeeded by his son, Humayun, but before the latter could establish himself on the throne, he was driven into exile by Sher Shah. Humayun, having lost all his father's gains, eventually sought refuge at the court of Shah Themasp of Persia in order to enlist his support to regain his lost Indian kingdom. He stayed in Persia for about a year, where he displayed his love for art, particularly painting. He was so moved by the works of Ab'd-al-Samad and Mir Syyed Ali that when he returned to Delhi he persuaded them to come to his court.[1] "It is related that Humayun and his son Akbar took lessons in drawing and interested themselves generally in the subject of painting."[2] Humayun returned to India in 1526 but before he could consolidate his position he died as the result of an accident. Akbar was a young lad of thirteen when he succeeded his father. His position was insecure and many dangers surrounded him. Once again the fate of India was decided at the famous battle-field of Panipat. Akbar

---

1. Binyon, L. 'The Emperor and the Art', Indian Art, and Letters. (New Series) p.33. Vol.XVII. 1943.
2. Brown, P. Indian Painting Under the Mughals. p.54.

regained Agra and Delhi and took Gwaliar and Ajmer, and so repaired the losses of his father. He gradually freed himself from the tutelage of Bairam Khan and assumed full sovereignty of the State at the age of twenty. Akbar spent the early years of his reign in establishing his position but he also greatly extended his father's empire. He conquered the northern parts of Central India and a portion of the Deccan, and firmly established his rule there. Akbar was illiterate. Nevertheless, "his interests," says Professor Codrington, "were wide and deep, his powers of concentration prodigious, and he forgot nothing. From his grandfather he had inherited the appreciation of poetry and art and the love of flowers and gardens that is characteristic of all his family."[1] His love for the arts was immense and he took a real personal interest both in artists and their achievements. Unlike his grandfather, he identified himself with India. Humayun introduced the taste for the Persian painting into India "but with Akbar came a change," says Binyon. "Persian masterpieces retained their prestige, they were studied as classic, just as Italian art was in Western Europe."[2] He created a school and wished it to have an independent

---

1. Codrington, K. de B, 'Akbar, Masterbuilder', Indian Art and Letters. Vol.XVII, (New Series) 1943, p.39.
2. Binyon, op.cit. p.33.

Indian character. At his court Akbar had more than a hundred painters, and the majority of them were Indians, mostly Hindus, belonging to the lower castes, many being Ahirs.[1] So deeply interested was Akbar that he would inspect the work of his artists regularly and either increased their salaries or conferred upon them rewards suitable to their abilities. It must, however, be remembered that Akbar's interest was not confined to painting alone. He surrounded himself with artists of all kinds. "He found time", says Professor Codrington "to give his personal attention to the royal armoury and to the forging and decorating of the weapons made there. In the royal wardrobe were to be found the products of all nations. The skill of the weavers and embroiderers of Delhi was such that the finest products of Persia, China and Europe were eclipsed and found no sale."[2] Accounts of contemporary travellers are full of descriptions of the splendours of the Imperial Court and praise of the skill and ingenuity of the Indian craftsmen employed there. Unfortunately no details are available with regard to the working of jade in the workshops of Akbar, although "Abul-Fazal speaks of jewellers, engravers of precious

---

1. Wilkinson, J.V.S. 'Indian Painting', Indian Art edited by Winstedt, Sir R. p.128.
2. Codrington, K. de B. 'The Minor Arts of India', p.161

stones, inlayers of gold, damascene workers, enamellers, filigree-workers, makers of gold and silver lace, and workers in crystal and carnelian."[1] Here it may be pointed out that painting was by far the most popular art both inside the court and outside it, that is to say, it was the art of the day. As has been pointed out, the appreciation of this art seems to have been greatly increased after Humayun returned to India from Persia where he stayed with Shah Tehmasp who had a tremendous interest in painting. Had the working of jade and rock-crystal been a major art at the Persian court, it is unlikely that Humayun would not have appreciated and developed a taste for it. Apart from this it is clear that up to this time in India vessels of hard-stones were not admired and certainly none have survived. With Akbar the case was different. He had a long, prosperous and peaceful reign and enough time to devote both to artists and their work. There is, however, no account extant describing the working of jade during the reign of Akbar. Nevertheless, we have an inscribed bow ring with the name of Shah Salim, later Emperor Jahangir, which indicates that jade was also worked.[2] Apart from this we have some

---

1. Codrington, K. de B. 'The Minor Arts of India', Indian Art edited by Winstedt, Sir R. p.161.
2. Motichandra. 'Mughal Carvers of hard-stones and their art'. Kala-nidhi, Benares, No.4. Pl. I.

jade pieces decorated with linear and geometric patterns. [Plate Ia]. These designs were common and popular during Akbar's time. Indeed the court gridles (PATKA) show them in the Akbarnama painting, floral designs being wanting on the textiles depicted.

With the accession of Jahangir to the throne, the evidence for jade and rock-crystal working in its developed form in India became clear. Jahangir's artistic personality and his aesthetic temperament greatly influenced both the development and perfection of the arts. He passionately loved not only art, but also nature. "He delighted in flowers, the names of which he loved to enumerate, and he commissioned one of the greatest of his painters, Mansur, to paint all that he could collect."[1]

"Jahangir's love of flowers", says Professor Codrington, "is reflected in every phase of later Mughal art. The borders of the paintings of his reign are floral and naturalistic in intention, though it is evident that his court artists, while striving to meet his taste, had not the emperor's eye or knowledge, and, consequently, few of the gay and delightful blossoms they painted are recognizable. Indeed, the whole thing rapidly became

---

1. Wilkinson, op.cit. p.134.

conventional, though the colours still live."[1] Like other arts of his time both jade and crystal vessels reflected Jahangir's floral taste. Plates III, XXI, XXII are examples of it, but here again craftsmen could not present floral decoration in its true and natural form and Jahangir had to content himself with the artist's easy lapse into convention. His interest in jade and rock-crystal vessels, as well as in European jewellery of the Benvenuto Cellini kind, is evident from his own descriptions. He refers to "a little crystal box of Frank work, made with great taste with some emeralds,"[2] presented to him by his son Khurram who later became Shah Jahan. Elsewhere Jahangir shows his appreciation of a jade jug presented to him by Munis Khan, son of Mihtar Khan. The jug had been made in the reign of Mirza Ulug Beg Gurgan and Jahangir says of it in the following words; "It was a very delicate rarity and of a beautiful shape. Its stone was exceedingly white and pure. Around the neck of the jar they had carved the auspicious name of the Mirza and the Hijra year in riqa characters. I ordered them to inscribe my name and the auspicious name of Akbar on the edge of the lip of the jar."[3] His delight in crystal is further evident from the

---

1. Codrington, K. de B. 'The Minor Arts of India' op.cit. p.188. Only the commonest flowers, the poppy and the narcissus are recognizable. Codrington, K. de B. 'Akbar Masterbuilder ' op.cit. p.43.
2. The Tuzuk-i-Jahangiri, Tr. by Rogers, A. and Beveridge,H. Vol.I. p.286.
3. Ibid. p.146.

crystal figure presented to him by the King of Bijapur[1] and a little crystal box of English workmanship by Sir Thomas Roe.[2] According to Hawkins, Jahangir had as many as five hundred drinking cups "fifty very rich, that is to say, made of one piece of ballace-ruby, and also of emerods [emeralds], of eshim,[3] of Turkish Stone [turquoise], and of other sort of stones."[4] He also mentions eight rosaries [Tasbih], each bead consisting of a variety of hard-stones such as "pearle, ballace-rubyes, diamonds, rubyes, emeralds, lignum aloes, esham[5] and corall."[6] The increased production of jade vessels during the reign of Jahangir may be attributed to two main factors. Firstly to Jahangir's peculiar interest in the mineral and secondly to his love for wine which demanded a number of drinking cups.

Jade and rock-crystal working achieved even greater perfection during the reign of Shah Jahan. His vast range of interests, settled government and enormous wealth, enabled him to devote a greater part of his time and money to the arts, especially architecture with which his name

Plates X, XI and XII.

1. The embassy of Sir Thomas Roe to India, edited by Foster, Sir William. p.99.
2. Ibid. p.127.
3. Jade.
4. Foster, W. Early Travels in India, p.103.
5. Jade.
6. Foster, op.cit. p.115.

is popularly associated. He, however, displayed great interest in jade vessels which is evident from the statement of Bernier, which runs as follows; "Jachen[1] is in great estimation in the Court of the Mogol; its colour is greenish with white veins, and it is so hard as to be wrought only with diamond powder; cups and vases are made with this stone. I have some of the most exquisite workmanship inlaid with strings of gold enriched with precious stones."[2] The working of both jade and rock-crystal entered a new phase in Shah Jahan's reign. The ordinary floral decoration in relief which was very common and popular in Jahangir's time changed into a new method of encrusting jade with precious and semi-precious stones, and inlaying them with gold. This new taste and the consequent departure from the previous simple floral ornamentation seems to have emerged as a result of Shah-Jahan's deep interest in pietra dura decoration which was so lavishly applied by him to the Taj Mahal, the tomb of his beloved wife, Mumtaz Mahal, and to his palaces at Agra and Delhi that volumes could be filled with reproduction.[3]

Plates X, XI and XII

1. Jade.
2. Bernier, F. Travels in Mogul Empire, Vol.I. p.423.
3. Smith, V. A History of Fine Arts of India and Ceylon, revised by Codrington, K. de B. p.198.
   Technically pietra dura is composed of hard precious or semi-precious stones as onyx, jasper and carnelian etc., cut into thin sockets prepared in the marble.

With the coming of Aurangzeb to power, there was a rapid decline in the Mughal arts from the high standards previously attained. Professor Codrington, surveying the arts during the reign of Aurangzeb says that "political ruthlessness and dogmatic orthodoxy are certainly no substitute for personal interest where the arts are concerned. Aurangzeb was, however, a realist. He may have seen that the era was finished and could not be protracted. In a country where the margin between subsistence and starvation is so narrow, the cost of public works, artistic or otherwise, must be considered. History makes it clear that under certain conditions art costs too much. It is not merely a matter of the willingness of the patron to pay; Aurangzeb did not merely neglect the arts. The truth is that the system, which made that kind of patronage and that kind of art possible, had bled the country white. It is the patron that costs too much, not the artist."[1] However, we have a little evidence which shows that vessels of rock-crystal were still popular during the reign of Aurangzeb. Tavernier presented Aurangzeb with "a bottle-mace [gurz or shash-par] of rock-crystal, all sides of which [were] covered with rubies and

---

1. Codrington, K. de B. 'The Minor Arts of India'. op.cit. p.3.

emeralds inlaid in gold in the crystal."[1] Of another rock-crystal cup, Tavernier writes as follows: "I remember having seen the king drink upon three different occasions while seated on his throne. He had brought to him upon a golden saucer, enriched with diamonds, rubies and emeralds, a large cup of rock-crystal, all round and smooth, the cover of which was of gold with the same decoration as the saucer."[2] That rock-crystal was being worked during the time of Aurangzeb is, also, evident from the statement of Thevenot who, in his description of Agra, says that the artisans of that city had a way "of working in Gold and Agate, Chrystal and other brittle matters, which our Gold-smiths and Lapidaries have not. When the Indians would beautify vessels, cups or coffers, besides the circles of Gold they put about them, they engrave flowers and other figures, and also enchase stones upon them. They cut leaves of Gold to fill up the void spaces of the figures, lay several pieces one upon another, and enchase them so artificially in the hollow places, with an Iron Instrument like a Graver, that when the void spaces are filled up it looks like Massie Gold. They do the same with stones; they encompass them also with such pieces of Leaf-Gold,[3]

---

1. Tavernier, op.cit. Vol.I. p.140.
2. Ibid. p.389.
3. Thevenot must mean sheet gold; for gold leaf is not malleable.

and press them in so close that the stones hold very well."[1]

The appreciation of rock-crystal vessels by the Mughal emperors is also recorded by Ball who says that "vessels made of rock-crystal were much esteemed by the Emperors. I remember to have seen some very fine examples of large size which were found in the palace at the capture of Delhi after the Mutiny."[2] It is seen, therefore, that vessels of both jade and rock-crystal were in great demand during the Mughal period and that local industries existed to provide these vessels. It may, however, be pointed out that jade was a foreign material to the Indian craftsmen and its import was more expensive than rock-crystal. Motichandra says that "the comparative absence of jade in ancient India might have also been due to the fact that it had to be transported from Central Asia which must have been a costly affair quite beyond the pocket of ordinary people."[3] However, jade was certainly not in use in ancient India. The coming of the Mughals certainly opened up the trade routes from Central Asia to India. The working of jade vessels in India clearly depended upon the patronage which the Mughal Emperors provided. It was fashionable and its value as a commodity rose to such an

---

1. Indian travels of Thevenot and Careri, edited by Sen, S. p. 55.
2. Tavernier, op.cit. Vol.I. p.389.
3. Motichandra, op.cit. p.8.

extent that fairly massive importation became economic. During the Mughal period jade was brought from Kashgar first to Kashmir, and then to northern India[1] for distribution to the various Imperial workshops. It is not known at how many places workshops for the working of both jade and rock-crystal were situated but it seems very likely that they functioned not only at Delhi, but also at some other major towns such as Agra, Lahore and Jaipur. The possibility of Sabaur in the Bihar district, where a bead manufacturing factory existed from before the time of Shah Jahan,[2] and other similar sites cannot be ruled out. But it does seem that the raw material was made available to the local craftsmen at the expense of the Imperial treasury and that the manufactory was commissioned for court use. However, the technological problems involved in the working of hard-stones were known and the tools were available, though the complicated floral designs of the post Shah Jahan period must have provided special problems to the craftsmen. These were probably met by the development of the use of the burr and the grinding wheel. It seems clear that little wine cups of Akbar's reign represent the beginning of the art. Their decoration is

---

1. Bernier, op.cit. Vol. I. p.426.
2. Beck, H.C. 'Etched Carnelian Bead', The Antiquaries Journal, Oct. 1933. Vol.XIII. No.4. p.386.

purely linear. The technique necessary to accomplish complicated floral design does not seem to have been available until the reign of Jahangir. Further improvement and a comparatively higher standard of workmanship were achieved in Shah Jahan's period when lavish patronage was extended to the craft. After Shah Jahan, the craft seems to have suffered a setback, perhaps on account of inadequate patronage. The whole industry was decentralized and the craftsmen seem to have started working independently. In Delhi jewelled jades are still being worked and the following account from the Delhi Gazetteer is interesting: "Another speciality of Delhi is the incrustation of jade with patterns, of which the stem work is in gold and the leaves and flowers in garnet, rubies, diamonds etc. The mouth pieces of huqqas, the hilts of swords and daggers, the heads of walking canes and curious crutch-like handle of the Bairagis are, with lockets and brooches for English wear, the usual application of the costly work. Each individual splinter of ruby or diamond may not be intrinsically worth very much, but the effect of such work as a whole is often very rich. The Murassakar or jewel setter was formerly often called upon to set stones so that they could be sewn into jewelled clothes. For this purpose, as when the stone was to be encrusted upon another as with minute

diamonds or pearls on large garnet as common Delhi form, or on jade, he works with gold foil and a series of small chisel-like tools and fine agate burnishers."[1]

It is sometimes argued that Indian jades were manufactured either with the help or under the supervision of Chinese craftsmen. Had the Chinese experts been responsible for Indian jades, the quality and standard of workmanship would certainly have been maintained at all times, but this is not the case. Early Indian jades are remarkably inferior technically to contemporary Chinese jades. We have examples of Indian jade working passing through different stages, reaching perfection over the years. Here it is worthwhile quoting the account given in the Bishop collection; Investigations and Studies in jade with regard to the appreciation of Indian jades by the Chinese in China. It runs as follows; "The Emperor of China, Ch'ien-lung, in his verse written in 1770 and engraved in the remarkable Indian bowl, No.762, which must have been taken out of the Summer palace at Yuan-Ming Yuan, expresses his surprise that such jade should come not only as tribute from Yurungkash in Khotan, which had been for long centuries past the chief source of jade for China, but be brought also by merchants from far-away India. The

---

1. Delhi District Gazetteer, pp. 144-145. Quoted by Motichandra, op.cit. pp.8-9.

author of the "Hsi yü Wen Chien lu", a description of the new dominion of Chinese Turkistan published at Peking in 1777, a Manchu general who had been stationed there in command of the army, alludes to the surprising fact that artistic objects of jade were cleverly carved in India and brought overland through the passes of the Himalayas from Lahore." The account continues: "After these specimens of Indian work had been brought to their own country in the way we have indicated, the Chinese, struck by their artistic value, at once proceeded to imitate them, copying both the forms and the decorative details" and named that industry the "Indian School."[1]

Conversely, there is a specimen (Pl.XVIb) amongst our Indian jades which technologically shows Chinese workmanship. This piece has loose rings and there is not a single specimen of clearly Indian origin either in rock-crystal or jade exhibiting such features. The uniqueness of the specimen strongly suggests that its origin lies in China.

Thus we see that the working of hard-stones and rock-crystal in India is very ancient and developed from the beads of Harappan times to the crystal relic caskets and objects of the early historic period. This provided

---

1. Bishop Collection, op.cit. Vol.I. p.251.

the foundation and the industrial traditions upon which the later work in jade and crystal came into being. The Mughals brought a new and exciting element into their workshops by their importation of jade. Our study of Mughal jade work shows that the craft in India has a clear history of its own, and that the earliest pieces are experimental. They lack the confidence demonstrated by the objects of the later high period. It has often been said that, together with the stone, the Mughals, also, imported craftsmen from China and Persia. We have observed that the Indian craft shows important differences from the Chinese tradition. With regard to Persia, very little can be said of the prior existence of work in jade. Indeed, the few surviving Persian jade objects give the impression that they have a parallel history to those of India. But we would like to conclude by stressing that all the evidence at present available suggests that the Indian craft was, like so many aspects of Mughal civilization, an amalgam or synthesis of Indian, Persian and other elements. Such was its genius.

CATALOGUE

Jades.

Bowl. Light green translucent nephrite. Mughal. late 16th century. H. 1½ ins. Diameter 6⅛ ins. Museum No. 01371. Pl. I a

A bowl of egg-shell thinness with a slightly raised circular foot and spreading rim. In the centre of the interior is an incised geometric motive which is encircled by a double band, from which spring lotus petals in a vertical position terminating at another double band at the rim of the bowl. The petals are slightly incised. The outer band is surrounded by flutings and slightly scalloped rim. The centre of the outer side is decorated with a lotus flower carved in low relief. The other details of decoration are similar to those of the inner side. The bowl and decoration more or less represent a complete lotus flower.

The nephrite is homogeneous and compact. The bowl is crudely made. The rim is irregular and uneven. One of the flutings is broken. It carries two visible cracks. It, however, possesses a fair amount of polish. The design is worked by means of the lap-wheel and in some places the cutting has been allowed to over-run the intended pattern.

Jahangir's Wine cup with loop handle. Green translucent nephrite. Mughal. 1613 A.D. H. 1⅛ ins. diameter 5/12 ins. Museum No. I.M. 152-1924. Pl.I b

A shallow bowl-shaped wine cup with a circular low foot. The loop handle [originally the cup had two handles, the other one is missing], is fashioned to represent the form of a curved peacock neck and head, the beak being connected to the rim. In the centre of the interior of the cup is a vertical projecting knob fashioned to represent a lotus flower in low relief. Incised round the mouth and inlaid with white "cement" is the following quatrain within four long cartouches:-

از شاه جهانگیر جهان یافت نظام ـ پرتو شده از پرتو عدلش ایام
از عکس شراب لعل رنگش بادا ـ یاقوت اسا پیاله لبریز مدام

"From king Jahangir the world obtained order.
The age was illuminated by the ray of his justice.
From the reflections of red wine may the colour
Of the jade cup resembling [that of] the ruby.
i.e. may it always be full.

Jahangir's drinking cup. Green opaque nephrite. Mughal. 1605-27. H. 3.10 ins. Museum No.1945.10.17.257. Pl. IIa.

This cup has globular body, short neck and low circular foot. Around the neck the following inscription is engraved.

> This vessel of jade which is of a fine substance - arranged [completed] at Fatehpur - belongs to King Jahangir - the great King [= the greatest] - year of accession 14 - May the water of life be in his vessel - Hijri 1028 - so long as the water of KHIZR is the nourishment of the soul - God is great [= the greatest].

The cup is finely worked and polished.

Shah-Jahan's drinking cup. Green translucent nephrite. Mughal. 1628-1657. H. 6.11 ins. Diameter 4.5 ins. Museum No. 1954-10-17-256. Pl. II b

A deeply hollowed double gourd drinking cup with a low foot. The cup is fluted and the inner side of it shows horizontal raised ridges. The base of the foot, which is in low relief, is shaped like a group of lanceolate leaves. The upper surface of the rim, also, decorated in low relief, bears an S - shape design. On either side of the outer surface, below the rim, the following inscription is engraved;

کشتی شاه شهنشه گیتی ستان شاه جهان صاحبقران

The boat of the King who is the ~~conqudrer~~ King of the world - [the King of the age] - ~~the Second.~~

The cup is polished.

Dish. Green translucent nephrite. Mughal. Early 17th century. H. 1.2 ins. W. 4.10 ins. Museum No. 89-5-7.19 Pl. III a

A hollowed circular dish with plain interior, and low circular foot. The outer-side is decorated with a circle of arch. Within each arch a foliated pattern is worked in low relief. The dish is finely worked and polished.

Box with cover. Light green translucent nephrite. Mughal. Middle of the 17th century. L. 5¼ ins. W. 4 ins. Museum No. 1601-1882. Pl. III b

Box with cover carved in the shape of a betel leaf. The box is enclosed by a broad band of floral scroll worked in low relief. The outer-surface of the cover is provided with a floral ornamentation conceived as a single ramifying branch also carved in low relief.

The nephrite is compact and uniform in colour. The box and the cover are finely worked and polished. The specimen represents a good standard of Indian workmanship.

Bowl with cover and handles. Light green translucent nephrite. Mughal. Early or middle of the 17th century. L. including cover 6¾ ins. Museum No. 1537-1882. Pl. IV a

A globular bowl with low circular foot and domed shaped cover. In the centre of the outer surface of the cover is a flower with two registers of petals and a projecting knob in the form of a closed bud. Along the rim runs a circle of petals. The edge of the cover projects downwards to fit on the bowl. Both the neck and the foot are enclosed by a circle of acanthus leaves. The handles are formed of drooping leaves and a closed bud. The foot is worked to represent a lotus flower. The entire decoration is in low relief. At one place, the lip of the cover is horizontally cut deliberately. It seems that this cut was made to accommodate some sort of spoon.

The bowl is finely worked and polished.

Bowl with handles. Light green translucent nephrite. Early or middle 17th century. $8\frac{5}{8}$ ins. by $5\frac{3}{8}$ ins. Museum No. 1641-1822. Pl. IV b

An oval bowl with an oval shaped foot fashioned to represent a lotus flower, the points of petals are slightly recurved. The bowl is fluted and carries a scalloped rim. The interior of the bowl shows the raised ridges of the flutings. Each panel of fluting is decorated with a floral design carved in low relief. At least three different species of flowers are represented. Somewhat stylised, it is difficult to be certain which flowers are intended but they appear to be (1) lotus? or poppy? (2) lily or (3) tulip. The handles of the bowl, represent the heads and necks of birds (perhaps ducks) from the beaks of which protrude serrated leaves. The eyes are set with precious stones and secured by a gold wire.

Excepting a few dark brown patches, the nephrite is homogeneous and compact. The bowl and the cover are finely carved and well polished.

Box with cover. White translucent nephrite, Mughal. Late 17th century. H. $1\frac{3}{4}$ ins. with lid. Diameter 6 ins. Museum No. 02589. Pl.va

A finely worked octagonal box with domed cover and flat bottom. Each divisional panel is decorated with a similar complete plant composed of flowers, buds, leaves and stems carved in bold relief. Each section of the surface of the cover is also embellished in the same fashion. In the centre of the outer side of the cover is a projecting knob in the form of an opening bud around which are carved in low relief eight serrated leaves which may be identified as a calyx. From the points of each leaf radiate a raised line dividing the cover into eight equal panels. The decoration is executed in low relief.

The material is flawed. Details of ornamentation are carried out neatly and efficiently. It is very well preserved and represents a good standard of workmanship.

Box with cover. Light green translucent nephrite. Mughal. Late 17th to early 18th century. L. 4 ins. H. $2\frac{1}{8}$ ins. and W. 3 ins. Museum No. 02559. Pl. V b

An oval shaped box with cover carved in extremely elaborate interlaced fretwork floral design. It carries three gold bands, two on either rim and one on the outer surface of the cover.

The nephrite is uniform in colour and compact. The box and the cover are finely worked and polished.

Looking glass frame. Light bronze green opaque nephrite. Mughal. Late 17th century. L. $7\frac{1}{2}$ ins. W. $4\frac{7}{8}$ ins. Museum No. 633-1875. Pl. VI

A frame for a looking glass worked in an elaborate interlaced floral fretwork carried out by means of wire-saw. The outer side is slightly excavated to fit the looking glass. The top is surmounted by a projecting knob in the shape of a bud. The handle at the base is formed of two serrated leaves with their points recurved and a fluted panel. The handle is also provided with a

knob in the shape of a closed bud which projects downwards. Both the knob and the main handles are carved in low relief. The fretwork is executed neatly and with due care. Represents a good standard of a moderate industry.

Box with cover. Parchment white translucent nephrite. Mughal. late 17th or early 18th century. Box including cover, L. $2\frac{3}{4}$ ins by W. $2\frac{3}{4}$ ins. X H. $1\frac{1}{8}$ ins.
Museum No. 02539. Pl. VII a

A delicately worked flat-bottomed box with cover of trefoil form with indentations to form three lobes, two rounded and one slightly pointed. The box is partitioned internally to form three compartments of almost equal size. Both rims of the box are defined by a gold wire between which a broad band of floral scroll is worked. The cover which is slightly domed shows raised ridges partitioning the cover into three sections. The rim of the cover is slightly projected downwards to fit on the mouth of the box. The outer surface is ornamented with a spray, consisting of flower, leaves, buds supported by stems. The decoration is surrounded by a gold band. The

decorative motives are set with precious stones and inlaid with gold.

The nephrite is compact, and of uniform quality. Both the box and the cover are very finely and exquisitely worked. Highly polished, and represents a matured standard of workmanship.

Box with cover. Light grey translucent nephrite. Mughal. Late 17th or early 18th century. L. 3¼ ins. W. 2¾ ins. H. 1 5/16 ins. Museum No. 02540. Pl. VII c

A finely executed box and cover fashioned in quatrefoil pattern with rounded cover and deeply indented, so as to form sixteen lobes. From the indentations proceed vertical partition crossing at right angles and dividing the interior of the box into four irregular compartments. Both the upper and the lower lines are defined by a band of gold wire and are decorated with a floral spray pattern. The design is inlaid with gold and encrusted with gems. The cover is embellished with a floral pattern of four branches, one spreading into each section of the quatrefoil. The central area of the cover

is provided with a four petalled flower with a projecting knob in the shape of an opening bud in the centre. The petals of the bud are also inlaid with gold and set with precious stones. The stems of the design are outlined in gold.

The nephrite is homogeneous and compact. The specimen is highly finished.

Scent bottle white opaque nephrite. Mughal. Late 17th or early 18th century. H. $2\frac{3}{8}$ ins. diameter 2 ins.
Museum No. 688-74. pl. VIII a

A scent bottle fashioned to represent an inverted lotus flower. The outer surface is decorated with four bands of flowers or buds supported on stems. The first band of buds around the neck are arranged in echelon: the second band of decoration is of pairs of buds held together by a stem. The lower end of the bottle is also provided with buds supported on stems. All the stems are rendered by means of inlaid gold wire. The nephrite is compact. The object is very finely carved and polished.

Spouted cup with cover. White translucent nephrite. Mughal. Late 17th or early 18th century. H. 2¾ ins. diameter with spout 2⅜ ins. Museum No. 02537.

A stemmed cup with cover, spout and round stand. The stand is hollowed slightly underneath. The cover is dome-shaped. On the centre of the upper surface of the cover is an eight-petalled flower with a projecting knob set with a ruby and inlaid with gold wire. The rim of the cover is enclosed by a band of gold. Each end of the stem is provided with a circle of flowers supported on stems outlined with gold wire. The upper side of the spout carries a leaf worked in gold. Both the cover and stem are set with precious stones and inlaid with gold.

The object is finely worked and polished. Two precious stones, one from each band, are missing.

Shell shaped tray. Parchment white translucent nephrite. Mughal. late 17th or early 18th century. H. 1½ ins. L. 5⅛ ins. W. 3¼ ins. Museum No. 02561. Pl. VIII c

A hollowed shell-shaped tray with a low foot designed to represent an eight petalled flower. The tray

is fluted and carries a slightly scalloped rim. The interior of the tray shows the raised ridges of the flutings. The outer surface is covered by a branch consisting of flowers, buds and leaves supported on stems. The handle of the tray is formed from the lower part of the branch, carrying three serrated leaves and the recurved stem. The decoration is done in low relief. The specimen is a good example of a moderately high standard of Indian workmanship. It is so thin that print in contact with it can be read through it easily. The rim although executed evenly, is chipped at one place. This defect seems to have developed later on.

A shell-shaped tray with handle. Parchment white translucent nephrite. Mughal. 17th century. H. i in. L. 4.5 ins. W. 3.5 ins. No Museum No. Pl. IXa

This tray is like No.02561. See [Pl. VIII b].

Box with cover. Light green translucent nephrite. Mughal. late 17th or early 18th century. H. $2\frac{3}{4}$ ins. L. 6 ins. W. $4\frac{3}{8}$ ins. [Both box and cover]. Museum No. 1627-1852. Pl. IX b

A flat octagonal hollowed box with cover. Each panel of the box is decorated with a similar floral decoration. The leaves and stems are outlined in gold and the flowers are set with precious stones and inlaid with gold. Each set pattern is surrounded by a rectangle outlined in gold. The cover of the box is a shallow dome-shape. The edge of the rim is slightly projected downwards to fit over the mouth of the box. The outer surface of the cover is divided octagonally and each section carries an almost similar decoration to that on the box.

The centre is provided with an eight petalled flower and a projecting knob set with precious stones and inlaid with gold. The flower is surrounded by an ornamentation similar to that appearing on the section of the cover. The nephrite is homogeneous and compact.

Finely worked specimen, well preserved and highly polished. The details of ornamentation are perfect and every precious stone is intact.

Dagger-handle. Variegated blue opaque nephrite. Mughal. Late 17th or early 18th century. L. 4.5 ins. W. 4 ins. Museum No. I.S. 100-1955. Pl. X

A dagger-handle fashioned to represent a horse's head and neck. Both the sides of the handle are decorated with a branching design spreading from the base and terminating at the top. The base is also provided on either side with a six petalled flower set with precious stones and inlaid with gold. The stems and leaves are outlined in gold. The right side of the neck is worked with the mane hanging in carefully arranged curled locks, while the fore-lock is designed as three curls. The eye is set with a ruby and inlaid with gold. The bridle - nose-band, cheek-band and head-band are decorated with precious stones and inlaid with gold. The centre of the forehead is also inset with a precious stone mounted in gold.

The nephrite is compact. The dagger-handle is finely carved and polished.

Sword handle. White opaque nephrite. Mughal, Late 17th or early 18th century. L. 7 ins. Museum No. 630-75. Pl. XI

A sword handle with disc-shaped pummel, stem and cross guard. The entire surface is covered with similar floral design. The flowers and the petals are set with precious stones and inlaid with gold. The stems are outlined by gold wire. The material is homogeneous and compact. The handle is finely worked and polished.

Dagger with white opaque nephrite handle. Mughal. Late 17th or early 18th century. L. 5 ins. Museum No. 3467. Pl. XII

A dagger handle with curved pummel with a flowing of floral decoration. Almost the same pattern is worked on the guard. The design is set with precious stones and inlaid with gold. The material is homogeneous. The handle is well finished.

Woman's scent bottle or powder flask. Light green opaque nephrite. Mughal. Early 18th century. L. $5\frac{3}{4}$ ins. Museum No. 02585. Pl. XIII a

A horn-shaped scent bottle or a woman's powder flask. The larger mouth is carved in the shape of a tiger's head and the smaller in the form of a black buck's head with the horns flattened backwards. The opening, the Buck's mouth, is provided with a gold stopper on a gold chain attached by a link to a band of gold foliated decoration encircling the middle of the bottle. The gold band has bud like designs springing from it with inlaid precious stones. The tiger's and buck's eyes are also set with precious stones.

It is finely worked and highly polished and represents a high standard of Indian carving.

Bowl with cover and two cup shaped handles. Greenish grey translucent nephrite. Mughal. 18th century. L. 2⅛ ins. diameter 1½ ins. Museum No. 02596. Pl. XIII b

A deeply hollowed circular bowl with cover and two cup-shaped handles. Both the bowl and the cover are fluted and carry a scalloped rim. The innerside of both the bowl and the cover show sharp raised ridges. Each fluted panel of the cover is occupied alternately with the figure of a human or an animal, each design being different. These are bordered by a foliated band. In the centre is an eight petalled flower with a projecting knob in the shape of a closed bud. The flower is bordered by a circle of leaves. The fluted panels of the knob are filled with figures only which are surrounded by a foliated design, each differing from the other. Both the rim and the foot are bordered by a band of foliage. The cups forming the handles differ from each other in size; but are decorated with a similar floral ornamentation. Both the cup-shaped handles are provided with a hinge opening dome-shaped lid. The outer surface of the lids carry a lotus flower consisting of two registers of petals. On both sides of the handles are two knobs in the form of a closed bud. The details of ornamentation are worked in low relief. The lid also bears on the

outer edge of one fluting two applied pieces worked as flowers. Their function is obscure, but they may have been connected with some form of hinge. The whole piece is finely executed and polished. The decorative details are carried out neatly and efficiently. This is the only piece to carry representations of figures, animals and plants, all Indian. The nephrite is compact and uniform in colour.

Vase with two handles. Mutton fat translucent nephrite. Mughal. Late 18th century. H. $3\frac{1}{8}$ ins. diameter of bowl $4\frac{1}{4}$ ins. Museum No. 02550. Pl. XIV a

An exquisitely worked globular vase with two knob handles, narrow neck, spreading mouth, and circular foot fashioned to represent a six-petalled flower. The points of the petals are slightly recurved. Each side of the vase consists of a group of five leaves in low relief, springing from the base and showing their underside. The points of two of the fine leaves of each side are turned downwards. The handles are formed of a projecting knob in the form of a stylised bud carved in low relief.

The nephrite is compact and uniform in tone. The bowl is very finely worked and highly polished.

Vase with handles and cover. Light green translucent nephrite. Mughal. Late 18th century. H. 4½ ins. W. 5¾ ins. Museum No. 02548. Pl. XIV b

A globular shaped vase with shallow neck, two handles and low foot fashioned to represent an eight petalled flower. Two handles, one opposite the other, are in the form of a drooping leaf and a bud. The leaf springs from the base and shows its under side. The dome-shaped cover carries in the centre of its upper surface an eight petalled flower and is enclosed by a band of inlaid gold. This band is encircled by a band of twelve flowers, each joined to the other by a stem. This decoration is again enclosed by a band of gold. The rim of the cover is bordered by a circle of closely arranged flowers and is defined by a gold band. The innerside of the cover is provided with a gold mount. The shoulder of the base is decorated with a circle of petals and the foot is defined by a circle of flowers, each supported by a

stem and consisting of two leaves.

It is well polished.

Vase with cover and two handles. White translucent nephrite. Mughal. Late 18th century. H. 4½ ins. X Diameter 3½ ins. Museum No. 02541. Pl. XVa

A globular shaped vase with cover and two handles. The cover which is domed, is surmounted by a projecting knob in the form of a six petalled flower. The surface is covered with three bands of flowers the band of the rim is designed in scroll. The neck is enclosed in simulated petals worked in low relief, probably that of the lotus flower. The neck is bordered by a circle of acanthus leaves carved in low relief. This circle is overlapped by a scroll of alternating flower and leaf. The body is decorated with four sprays each consisting of three eight petalled flowers and leaves and scattered flowers supported on stems. The low circular foot is fashioned to represent a four petalled flower worked in low relief. It is enclosed by a band of petals supported on stems. The handle is formed by a serrated leaf springing from the

base and a knob in the form of a bud, projecting downwards. Both the buds are decorated with floral pattern. The decorative motives are set with precious stones and inlaïd with gold. The stems are outlined by gold wire.

The specimen is a very fine example of a high standard of Indian workmanship. The details of ornamentation are executed very neatly and delicately. It is well preserved and highly polished.

Bowl with two handles. White translucent nephrite. Mughal. Late 18th century. W. $6\frac{3}{4}$ ins. X 5 6/8 ins.
Museum No. 02564. XVb

A deeply hollowed bowl with two handles and low circular foot with scalloped edge. The outer surface is decorated with four bands of four-petalled flowers set with precious stones and inlaid with gold. The top band is, however, composed of only three petals. Each point of the petal is joined to the point of its neighbour. The foot is bordered by a circle of acanthus leaves set with green nephrite and inlaid with gold. The handles are formed of a vertical large serrated leaf and its recurved

stem. The outer surface of the recurved stem is covered with a small serrated leaf also set with green nephrite and inlaid with gold.

The bowl is finely worked and polished.

Handle of a walking stick, or an ascetic's clutch. White opaque nephrite. Mughal. L^{a}te 18th century. L. 8¾ ins. Museum No. 1675-1882. Pl. XVIa

A finely carved handle of a walking stick. Each extremity is worked to represent a shape of a flower and its calyx. At the base of the handle is a large flower. The points of the petals are turned upon themselves. Above the flower and on both sides of the handle is a pair of birds and two branches carrying a flower and leaves. In the centre of the outer surface is a four petalled flower. From the flower up the base also spring two large leaves, supported by a stem. The points of these leaves are also turned upon themselves. The birds and the decoration on the outer surface are set with precious stones and inlaid with gold. Other design is worked in low relief.

Details of ornamentation are neatly executed. It is highly polished and well preserved.

Spouted Sauce boat with handle. White translucent nephrite. Mughal. Late 18th or early 19th century. L. 7¾ ins. W. 3½ ins. Museum No. o2586. Pl. XVI b

A delicately carved vessel in the form of a sauce-boat with an ornate high projecting handle. The bowl and spout are worked in flutings with a rim scalloped in ogee curves. The edge of the foot bears a plain scallop. In the centre of the foot is an eight petalled flower in low relief. The handle is composed of six serrated leaves and two closed buds in low relief and two loose rings each held in the curved circle of a leaf. The buds are partly drilled for the insertion of precious stones. The spout is supported by a pair of multi-foliated leaves.

The object is finely worked and polished. This is the only piece of its kind to have loose rings. Similar finely worked rings may be seen on many Chinese jades.

Lipped sauce boat. Parchment white translucent nephrite. Mughal. Late 18th or early 19th century. H. 3 ins. L.6½ ins. Museum No. 903-73. Pl. XVII a

A deeply hollowed sauce-boat with pointed lip and

two perforated "S" shaped loop-handles formed of a stem terminating in a bud. The handle and the foot are in silver gilt applied to the sauce-boat. These are contemporary in design and probably are the result of accidental fracture. From the foot rim protrude three small feet in the shape of a bud. Handle and foot are held in position by simple clasps. The sauce boat is decorated with an overall floral design in low relief, the workmanship being uneven. The rim is chipped at one place. The nephrite is flawed. It is,however, polished.

Pen box. [Qalamdan] Parchment white nephrite. (The box is opaque but the cover is translucent.) Mughal. Late 18th early 19th century. L. 8¼ ins. X H. 1¾ ins. X W. 3¼ ins. Museum No. 02549. Pl. xvii b

An oblong quadrilateral pen box with cover. The interior of the box is partitioned horizontally into two equal parts which are hollowed to keep pen holders. The rim of both parts is outlined by gold wire. At one side of the box are two rectangular containers for ink. The mouth of the ink bottles are provided with a hinge opening.

The cover fashioned to represent a flower. It is enclosed in a floral ornamentation which is defined by a double band of gold. The box itself is,also,enclosed by a broad band of floral decoration. The slightly raised outer-surface of the box is covered with a floral embellishment and is bordered by a gold band. The cover is enclosed by a band of flowers, each separated from the other. The decorateive motives are set with precious stones and inlaid with gold. The stems are defined by gold wire. The box contains a knife with steel blade and nephrite handle and a small nephrite spoon, both of which are decorated with floral motives executed in precious stones set in gold. These objects seem somewhat out-of-place, and it seems possible that at some time in the past they may have been placed in the pen-box for convenience sake and so have been recorded as a part of it.

Finely executed and highly polished.

Box with cover and tray. Parchment white opaque nephrite. Mughal. Late 18th or early 19th century. Box with cover. H. $2\frac{3}{4}$ ins. W. 4.5 ins. Tray, L. 10.1 ins. W. 9 ins. Museum No. 02604. Pl. XVIII a

An octagonal box with dome shaped cover and tray

[stand]. The tray is decorated with a similar floral pattern set with precious stones and inlaid with gold.

The material is homogeneous. The specimen represents a good standard of Indian workmanship.

Huqqah bowl. Light green opaque nephrite. Mughal. Late 18th or early 19th century. H. 7½ ins. X W. 6½ ins. Museum No. 02593. Pl. XVIII b

A globular huqqah bowl with narrow cylindrical neck with a projecting flange between the mouth and the base of the neck. On the neck above and below the flange is a band of petals supported by stems. The flange itself bears a double scroll design. Both the base of the neck and the bottom of the bowl are provided with a gold band and are bordered by an ornamentation similar to that worked on the neck above and below the flange. The surface is embellished with a geometric design, accompanied with a six petalled flower. The decorative details are set with precious stones and inlaid with gold.

It is finely worked and polished.

Box with cover and stand. White translucent nephrite. Mughal. Late 18th or early 19th century. Box H. $1\frac{7}{8}$ ins. X L. $2\frac{1}{4}$ ins. X W. $2\frac{3}{4}$ ins. Stand. L. 4 7/18 ins. X W. $4\frac{7}{8}$ ins. X $1\frac{1}{8}$ ins. Museum No. 02580. Pl. VII b

A flat bottomed box with cover fashioned to represent a trefoil form on a heart-shaped stand. The box, which has three rounded lobes, is partitioned internally into three equal compartments and is enclosed by a broad floral band worked in gold. The decoration on either side is bounded by bands of gold. The cover is slightly domed. Each section of the outer surface of the cover consists of a similar floral design set with precious stones and inlaid with gold. In the centre is a projecting knob in the form of a bud which is surrounded by a circle of petals and crowned by a precious stone. The petals are set with precious stones and inlaid with gold. The rim is outlined by a gold wire and its edge is projected downwards to fit on the box. The outer-side of the stand is slightly raised in the centre to form the shape of the box. This is bordered by a floral scroll, the flowers and leaves of which are set with precious stones and inlaid with gold. The stems are outlined with gold. The flat base of the stand is set on three homogeneous feet. The nephrite is homogeneous and compact.

The specimen is very delicately and finely worked. It is well polished. It represents the highest standard of Indian workmanship.

Bottle with cover. Parchment white opaque nephrite. Mughal. 19th century. H. 11 ins. Loaned to the V. & A. Museum by Mrs. Schreiber. [Museum No. 02537] Pl. XI

A globular bottle with a cylindrical neck and fluted and scallop edged foot. The body is, also, fluted and each fluting is separated from the other by means of a broad vertical line in gold. The entire surface of the bottle including the outer side of the cover is decorated with a similar geometric design set with precious stones and inlaid with gold. In the interior of the neck is a six petalled flower in gold. The dome shaped cover is crowned by a projecting knob which is set with precious stones and inlaid with gold.

The bottle is made in two parts, the body and the neck. The neck is attached to the mouth of the body by a gold mounting.

The workmanship is of high standard.

Huqqah mouth piece. Greenish brown opaque nephrite. Mughal. Late 16th century. L. 5 ins. Diameter of larger opening $\frac{7}{8}$ ins. Museum No. 705-74.

A huqqah mouth piece. The upper half is decorated with cross-hatching and the upper half of the lower half which is globular in shape is worked in flutings. Both the designs are separated by means of two indentations. It is drilled from either end. The interior of the upper half is drilled with a tubular drill and the core is broken off. It is not rubbed well with the result the grooves of the tubular drill are quite visible. After this part was hollowed out, an attempt was made to drill a hole right through the lower half using a diamond pointed drill, but it was soon abandoned. The hole was finally drilled from the lower end by means of a diamond tipped drill. The specimen represents a poor standard of Indian workmanship.

Ink-bottle. Bronze green translucent nephrite. Mughal. late 16th century. H. 2 ins. Diameter $2\frac{1}{2}$ ins. Museum No. 647-74.

It is a globular shaped ink bottle with a thick hollowed out interior. It has a low foot decorated with flutings and around the rim with a diamond shaped floral pattern. The surface of the body is deeply fluted. The bottle is not very well finished and represents a low standard of workmanship. It is of uneven thickness.

The interior of the bottle seems to have been hollowed out by means of a tubular drill and the body was subsequently enlarged by using hooked, twisted bits. It carries good polish.

Tray. Bronze green translucent nephrite. Mughal. Late 16th century. L. $5\frac{5}{8}$ ins. W. $3\frac{5}{8}$ ins. Museum No. 612-74.

A tray worked to represent the shape of a mango, with one end round and the other curved and pointed. The surface of the tray is shallow but becomes deeper at the pointed end. The back carries a slightly raised foot having a shallow rhomboid shape in the centre and incised lines around it. The nephrite is of uniform tone. The rim is not evenly done. It is also chipped at some places and shows traces suggesting the use of the lap-wheel. It is neither well ground nor finished with care.

Shah Jahan's thumb ring. Parchment white translucent nephrite. Mughal. 1628-1657. Diameter 1 5/8 ins.
Museum No. 1023/71.

A finely worked thumb ring with an inscription. The king of the age, the second صاحب قران ثانی belonging to the Emperor Shah Jahan. The nephrite is homogeneous and compact. It is polished.

Huqqah mouth piece. Parchment white opaque nephrite. Mughal. Early 17th century. L. 1 1/8 ins. Diameter 5/8 ins.
Museum No. 712-74.

A huqqah mouth-piece. On outer surface are four leaves in low relief. It is drilled throughout but the top aperture is slightly bigger in circumference than that at the base. The top rim is unevenly executed. It appears that the tubular drill was used to make the hole. The material is uniform in tone. The specimen is polished.

Cup. Parchment white translucent nephrite. Mughal. Early 17th century. H. 2 ins. Diameter 1½ ins. Museum No.610-74.

A stemmed cup with circular flat stand. It is without any ornamentation.

The material is flawed. It is so thin that print in contact with it can easily be read through it. It is well polished and shows no marks of any working tool.

Vase with cover. Parchment translucent nephrite. Mughal. Early or middle of the 17th century. L. including cover 6 ins. Museum No. 02560.

A globular vase with shallow fluted neck and circular foot in the form of a four petalled flower. Both the neck and the foot are defined by a circle of acanthus leaves. The body is decorated with a floral ornamentation. The handles are formed of a large drooping serrated leaf radiating from the base and showing its undersurface and a knob in the form of a closed bud projecting downwards. The decoration is in low relief. The cover is fluted and its outer surface is covered with a four-petalled flower

with a vertical projecting knob in the form of a bud in the centre worked in low relief.

The material is flawed. The rim of the cover is unevenly and irregularly executed. It represents poor quality work. It is, however, polished.

Pot. Light green opaque nephrite. Mughal. Early or middle 17th century. H. $5\frac{7}{8}$ ins. diameter $3\frac{1}{2}$ ins.
Museum No. 1573-1882.

A finely carved pot with spout, cylindrical neck, cover and low circular foot. The outer-surface of the dome-shaped cover is occupied with a lotus flower with a projecting knob in the form of a closed bud. The rim of the pot is decorated in a running relief of leaves. Both the base of the neck and the foot are encircled with a band which is bordered by a circle of leaves. The points of the leaves of both the circles, which are arranged opposite to each other, are joined by means of a double vertical stem. The spout consists of two leaves, one a long serrated leaf radiating from the base of the spout and the other a small leaf. The decoration is

carried out in low relief.

The specimen does not show any marks of working tools. It is well-preserved and finely polished. It is not known actually for what purpose the pot in question was used; but it is very likely that pots like this might have been used for wines.

Tray. Parchment white translucent nephrite. Mughal. Early or middle 17th century. L. 4½ ins. W. 2⅞ ins. Museum No. 1680-1882.

An almost oval shaped tray of an egg-shell thinness, highly fluted and scalloped rim and low oblong fluted and scalloped foot with a four petalled flower in the centre. The foot is surrounded by a foliated border from which radiate the flutings corresponding with vertical raised ridges inside the tray, where too, there is a four petalled flower in the centre. The handle is formed by a drooping leaf with stem carved in low relief rising to a volute. The material is homogeneous. It is so thin that print in contact with it can easily be read through it. The tray is finely worked and polished.

Tray. Olive green translucent nephrite. Mughal. Early or late 17th century. L. 6¼ ins. W. 5 ins. Museum No. 1641A-1882.

A finely carved oval tray with rim fluted and scalloped. The upper surface is decorated within an oval band with a floral design worked in low relief. The flutings radiate from the band. The nephrite is homogeneous and compact. It is very well worked and polished.

Vase with cover and stand. Light sage green translucent nephrite. Mughal. Early or late 17th century. Vase - H. 4¼ ins. W. 2¼ ins; Stand - 4¼ ins by 2¾ ins; Cover - H. ⅞ ins. L. 2⅛ ins. W. 1¾ ins. Museum No. 1574 & 1574a - 1882.

A flat-sided vase with cover. Both at the top as well as at the bottom, there is a design of spreading foliage branching upwards, carved in light relief, on which are set, one on each side, a handle representing an inverted bud. The cover is raised and the outer-surface is covered with foliated ornamentation and is surmounted with a bud. The neck of the vase is decorated with a loose collar in an alternating floral pattern with eight

downward pointing triangular teeth, perforated at their apices. The stand which is made of wood (probably teak) is carved in an elaborate openwork pattern.

Vase with cover and stand. Light green translucent nephrite. Mughal. Late 17th century. Vase - H. 2½ ins. W. (including the handles) 4½ ins. Cover - H. 1¼ ins. Diameter 2⅛ ins. Stand - L.5 ins. W.4 ins. Museum No. 01373.

A globular vase with two floral handles, one on each side, carved in fretwork. The outer-surface of the vase is decorated with a floral pattern carved in bold relief. It has a low foot which is fluted and scalloped. The outer-surface of the dome-shaped cover also consists of a floral ornamentation and is surmounted by a knob. The rim of the cover projects downwards to fit the mouth of the vase. The stand, which is a circular plate in shape, is fluted and carries a scalloped edge. The centre of the cover is slightly raised to fit the base of the vase. The specimen is finely worked and polished. It represents a moderate standard of Indian workmanship.

Vase with cover and stand. Light bronze green translucent nephrite. Late 17th century. Vase - H. 3 ins. Diameter 3½ ins. W. across the handles 5¼ ins. Cover - H. 1½ ins. Diameter 2 ins. Stand - L. 5⅜ ins. W. 4¼ ins.
Museum No. 01374.

A two handled vase with low circular foot and stand. The vase is carved in an elaborate floral design combining openwork and low relief. The handles, one of which is comparatively larger than the other, are also decorated with floral ornamentation in low relief based on openwork. The interior of the foot is decorated in the same fashion. The rim of the cover is hollowed to fit the top of the vase and is surmounted by a knob resembling a bud. The stand has a widely fluted edge and is decorated with floral design in low relief. The centre is raised to accommodate the foot of the vase. The underside of the stand has a fluted edge and a fluted motif in the centre.

The material of both the vase and cover is homogeneous and compact, but that of the stand flawed.

The interior of the vase which is not ground well seems to have been hollowed out by means of a tubular drill and the body was later enlarged by hooked, twisted bits or curved needles. It is well polished.

Box. White translucent nephrite. Mughal. Late 17th century. L. 2 ins. W. 1¾ ins. H. 13/16 ins.
Museum No. 02557.

An octagonal box with a hinged opening at the side. The interior of the box is smooth and without any ornamentation. Both the top and the bottom are decorated with a similar foliated design, carved in low relief, around a central rose. In each of the eight panels of the box a rose in low relief is introduced. In the centre of one of the flowers there is a circular projection with a horizontal perforation. It is finely worked and polished.

Box with cover. Light grey translucent nephrite. Mughal. Late 17th century. L. 4 ins. W. 3⅛ ins. H. 2 ins.
Museum No. 02552.

A finely worked box carved in quatrefoil pattern with alternately rounded and sharply pointed sections, and with a low circular foot fashioned in the form of a flower with a register of petals. The box is divided into four compartments having deep recesses cut so as to leave thin walls which cross it diagonally. The outer-surface

is decorated with a floral pattern in low relief having the form of four branches spreading from the central flower. The lid carries a comparable floral embellishment in each rose with a projecting bud worked in high relief. The material is homogeneous. At one place the cover is damaged. The decorative patterns are neatly done. It is well polished.

Bowl with cover. White translucent nephrite. Mughal. Late 17th century. H. 4½ ins. diameter 4½ ins. Museum No. 1537-1882.

A globular bowl with narrow receding neck, two handles and circular foot shaped like a ten-petalled flower carved in low relief. The foot is bordered by a circle of acanthus leaves. The neck is also decorated in the same fashion. The handles are formed of drooping leaves. The outer-surface of the centre of the cover, which is dome-shaped, is occupied by a flower and a projecting knob in the form of a bud. The rim is enclosed by a circle of petals. The designs are in low relief. The rim of the cover is damaged and the interior of the

cover shows two light blemishes. The rim of the bowl is also chipped at one place. It is polished.

Cup. White (mutton fat) translucent nephrite. Mughal. Late 17th century. $4\frac{1}{8}$ ins. by 3 1/16 ins. Museum No. 02546.

A finely worked stemmed cup with flat circular foot. The foot is defined by a double band of gold wire and the space between the two bands is filled with twelve precious stones. The centre of the underside of the foot is slightly shallow.

The cup is polished. The material is so thin that print in contact with it can easily be read through it. The rim of the cup, however, is chipped and carries two splits or cracks.

Sword handle. Light green translucent nephrite. Mughal. Late 17th century. $6\frac{3}{4}$ ins. by $3\frac{3}{4}$ ins. Museum No. 02607.

The handle, into which the sword is fixed, consists of

three parts. The pummel, the handle and the guard are decorated with floral ornamentation, composed of flowers, fruits, petals and buds, inlaid with gold and set with precious stones. The floral decoration on either side of the handle is carried out on a large serrated petal. The stems as well as each section of the decoration are defined by gold wire. At the bottom of the pummel is a projecting knob with a horizontal perforation. The material is compact and uniform in colour. The handle is delicately worked and polished.

Dagger handle. White opaque nephrite. Mughal. Late 17th century. L. $5\frac{1}{8}$ ins. Museum No. 1674-1882.

It is a network of jewel sprays spreading upwards from the base and winding round at the top. The flowers and the buds are inlaid with gold and set with precious stones. The stones are also defined by gold wire. The material is homogeneous and compact. The handle is finely worked and polished.

Back scratcher. White-green translucent nephrite. Mughal. Late 17th century. L. 14 ins. Museum No. 1268/74.

A back scratcher with a spiral handle. The upper-end represents an open right hand. The index and little finger, which is damaged, are provided with a ring. The wrist is defined by a gold band set with two rubies. The handle carries four silver mountings, one at each extremity and two others, which are joined together in the centre. The lower end of the handle is composed of a flower, supported by a stem. The corolla is in white, the calyx in light bronze green. It is finely worked and polished and represents a good standard of Indian workmanship.

Back scratcher. Light green translucent nephrite. (The decoration is in white) Mughal. Late 17th century. L. 22¾ ins. Museum No. 02606.

A back-scratcher. The upper end is provided with a six petalled flower supported by a stem carrying three leaves at its lower end. In the centre of the flower is a projected knob which is surmounted by a ruby secured by

means of gold wire. The lower end consists of a spiral decoration and two serrated leaves. In between the leaves emerge two circular buds each supported by a stem. The decoration on either side is in low relief. On each end of the handle is a floral design in green enamel. The material is homogeneous and compact.

It is very well worked and polished.

Chowrie handle. Bronze green opaque nephrite. Mughal. Late 17th century. L. 8¼ ins. W. of bowl 1 in.
Museum No. 02597.

This chowrie handle is made out of a single piece which forms the bowl and the handle. The bowl which carries a globular base is fluted and has a scalloped rim. The interior of the bowl is smooth and indicates no ridges. The base of the bowl is bordered by a circle of petals carved in low relief. The other end of the handle is modelled after the shape of a closed bud also carved in low relief and with an indentation immediately below it. The stem of the handle is decorated both from the base and globe by a gold band,

from each of which depends a ring of eight precious stones inlaid and outlined with a metal wire.

Bowl. Light green translucent nephrite. Mughal. 17th century. L. 5 ins. W. 3½ ins. Museum No. 01368.

An elliptical deeply hollowed bowl with low foot of oval form. The body and rim are eccentric to the long axis, being irregularly carved and of unequal thickness. It is without any relief decoration. The material is flawed

The bowl represents a low standard of Indian workmanship. It has no marks of any working tools and is polished. It is so thin that print in contact with it can easily be read through it.

Vase with stand. Light olive green translucent nephrite. Mughal. 17th century. H. 1⅞ ins. Museum No. 617-74.

A flat ornament delicately carved in the form of a vase with a spray of flowers. The vase has a globular

body with a rounded base, a narrow cylindrical neck, and a low, spreading foot. It has two loop handles, one on each side of the neck. The central area of the vase is covered with three incised vertical leaves. The floral spray at the top of the vase is carved in openwork to outline the stem. The flowers, which are incised, are worked by means of undercutting. The base of the foot is also executed in a like manner.

Both the undercutting as well as the openwork are carried out efficiently. The details of decoration are also worked with skill and care. It is well finished and polished.

Box without cover. Light green translucent nephrite. Mughal. 17th century. H. 6 ins. L. 3.6 ins. W. 3 ins. Museum No. 1930-12-17-33. [British Museum]

A twelve sided box. The inner-side of it is divided into four compartments having deep recesses cut so as to leave thin walls crossing it diagonally. In the centre of the base of the box is a four petalled flower from which radiate alternately a leaf and a flower supported by a

stem; the flower being spread in each larger section of the box. The floral ornamentation is worked in low relief.

The nephrite is compact. Although the box is well polished; yet the interior sections of it show the marks of the grinding tools.

Box with cover. Green translucent nephrite. Mughal. 17th century. H. including cover 1.1 ins. L. 3.6 ins. W. is also 3.6 ins. Museum No. 82-5-7-18.[British Museum]

A finely worked box carved in quatrefoil design with rounded sections and slightly raised cover. The interior of the box is partitioned into four equally divided compartments. The sides of the box are enclosed by a floral scroll. The outer surface of the cover is occupied alternately by a different floral design; each spreading over a section of the cover. The inner-side of the cover shows the dividing raised ridges. The edge of the cover projects downwards to fit on the mouth. The rim of the cover carries a silver mounting, which has lost its original colour. The decoration is worked in low relief.

The nephrite is compact. Both the box and the cover exhibit a good standard of workmanship and polish.

Box with cover. Light green translucent nephrite. Mughal. 17th century. H. 1.1 ins. L. 3.5 ins. W. 3 ins. This specimen has no Museum No. [British Museum]

A leaf-shaped box with a slightly raised cover. Both the sides of the box and cover are carved in an extremely elaborate floral fretwork.

The rim and fretwork design on the box are slightly damaged at some places. The fretwork is neatly cut by means of the wire saw. Nevertheless, the interior of the box shows visible marks of the grinding tool. The box does not seem to represent a good standard of Indian workmanship.

Box with cover. White translucent nephrite. Mughal. 17th century. L. 5 ins. W. 4 $\frac{3}{8}$ ins. H. 3$\frac{3}{8}$ ins. Museum No. 02578.

A finely carved octagonal box and dome-shaped cover. Each side of the box is decorated with a complete plant consisting of flowers and leaves, each supported by a stem. The flowers and leaves are set with precious stones and inlaid with gold. The stems are rendered in gold.

This decoration is contained in an oblong square. The similar ornamentation is repeated on the upper surface of the cover. In the centre of the cover is a projecting knob, crowned by a precious stone. The edge of the cover projects downwards to fit on the box.

The rims of both the box and the cover are badly damaged. The nephrite is homogeneous and compact. It shows no marks of any working tool and is polished.

Box with cover. Translucent nephrite, light green, uniform in colour. Mughal. 17th century. H. 1.1 ins. L. 3.5 ins. W. 3 ins. No museum number. [British Museum]

A leaf-shaped box with a semi-domed shaped cover. Both the cover and the sides of the box are worked in an elaborate floral fretwork. The edge of the cover projects downwards to fit on the box.

Both the rim and the fretwork on the box are slightly damaged at some places. The interior of the box, however, carries a fair amount of polish; yet the marks of grinding tool are quite visible. The box does not represent a good standard of Indian workmanship.

Box with cover. Light green translucent nephrite. Mughal. 17th century. 3 ins. by 3 ins. Museum No. 02603.

A nicely worked box in trefoil shape with a shallow dome-like cover. The rim is indented at three places and forms three undulations or lobes. The box is partitioned internally. The box is enclosed by a band of floral decoration worked in low relief. The cover also carries a floral design carved in low relief; the pattern spreading to each lobe. In the centre is a projecting knob in the form of a bud, worked in low relief. It is finely worked and polished.

Dagger handle. Light green translucent nephrite. Mughal. 17th century. L. 14½ ins. Museum No. 02607.

A dagger with a straight blade of watered steel and handle. The pummel as well as the guard of the handle are decorated with floral ornamentation. The base of both the decorations are provided with raised and incised circular bands. These bands are bordered by a circle of serrated petals. The designs of decorations are carried out in low relief. At the bottom of the pummel is a projecting knob

with horizontal perforation. The material is of a uniform tone. The dagger handle is finely worked and polished.

Book-cover. Light green panels and bronze green screen. Translucent nephrite. Mughal. Late 17th or early 18th century. L. 8¾ ins. H. 4½ ins. Museum No. 02584.

A book cover, for a small illuminated edition of the Quran. Each board is composed of a central rectangular panel worked in floral open-work within a geometric design defined by gold wire. This decoration is outlined by a double band of gold wire. The framing borders are embellished by a floral scroll, the design being set with precious stones and inlaid with gold. This floral decoration is also defined by means of a gold band. The spine is carried out in open-work of similar geometric design. The inlaid gold is missing from the geometric design of the central panel. The open-working and other details of ornamentation are perfect and skilfully executed. It is finely worked and is well polished.

Comb. White opaque nephrite. Mughal. Late 17th or early 18th century. L. $2\frac{3}{4}$ ins X H. $1\frac{5}{8}$ ins. Museum No. 02545.

A comb with scalloped crest-like handle defined by gold. On either side the handle bears two birds with a six-petalled flower between them. The teeth are separated from the upper part by means of a double line of gold. On each face of the large end teeth there is a pair of leaves. The entire decorative design is set with precious stones and inlaid with gold. The material is of uniform colour. It is finely worked and polished.

Box with cover. Light green translucent nephrite. Mughal. Late 17th century. H. $1\frac{3}{4}$ ins. L. 4 ins. W. 3 ins. Museum No. 1626/52.

A flat based box with cover fashioned to represent a heart. Both the box and the cover are carved in an extremely delicate interlaced floral fretwork executed by means of a wire saw. It has three bands, two on the outer-surface of the cover and the other on the box. It is finely carved and finished. The fretwork is carried out neatly and with care.

Box with cover. Light green translucent nephrite. Mughal. Late 17th or early 18th century. (Box and cover) - L. 4½ ins. W. 3 ins. H. 2¼ ins. Museum No. 9-1896 (15).

An oval shaped box with a lid. Both the box and the lid are decorated with an extremely elaborate and delicate floral openwork pattern, carried out by means of a wire saw. The details of the decoration are executed with great perfection and skill.

Both the box and cover are finely worked and polished.

Box with cover and handle. White translucent nephrite. Mughal. Late 17th or early 18th century.

Museum Nos. 1673, 1673a, 1882.

An oval shaped box. The Box is provided with two gold bands, one at the rim and the other at the base. The space in between the bands is covered with a foliated motif inlaid with gold and set with precious stones. The stones are defined by means of gold wire. In the centre of the outer-side of the cover is a six petalled flower surrounded by a foliated pattern. Both the central flower

and the foliated design are inlaid with gold and set with precious stones. The stem of this pattern is also outlined by gold wire. The stand is hollowed in the centre to take the box. The rim is enclosed by a gold band and bordered by a foliated design encrusted with precious stones and set with gold. The stones are also decorated with gold. The outer-side of the stand carries four partly drilled holes of equal size, each for a foot, now missing. The specimen is very well worked and polished. At one place the rim is slightly chipped.

Tray. White (mutton fat) translucent nephrite. Mughal. Late 17th or early 18th century. L. $3\frac{7}{8}$ ins. W. $3\frac{5}{8}$ ins. Museum No. 02599.

An exact representation of a scallop-shell. The lines are raised by means of the lap-wheel. Highly polished and finely executed. Print in contact with it can be easily read through it. The rim shows two blemishes.

Box with cover. White translucent nephrite. Mughal. Late 18th or early 19th century. H. $1\frac{1}{8}$ ins. L. $2\frac{1}{8}$ ins. W. $1\frac{7}{8}$ ins. Museum No. 1628-52.

A box with cover worked in eight flutings and slightly scalloped rim. The plain interior of the box is partitioned vertically into two equal compartments and shows sharp raised ridges. Each of the outer panels of the box is embellished with a foliated design inlaid with gold and set with precious stones. The stems are outlined by gold wire. The cover is slightly raised and carries inside ridges similar to the box. The ornamentation on the box is repeated on the outer-surface of the cover. In the centre of the upper side of the cover is a projecting knob representing a bud crowned by a precious stone. From the bud-shaped knob eight lines defined by gold wire radiate outwards and terminate at the rim, also outlined by gold wire.

The material is homogeneous and compact. Both the box and the cover are finely worked and well polished. Both the interior and exterior of the box show cracks. It seems as if these defects occurred during the course of preparation necessary for such an object. This tends to suggest that either the specimen was not handled with due care or that the lapidary himself was not an expert hand.

Box with cover. Light olive green translucent nephrite. Mughal. Late 18th or early 19th century. W. 3 ins. H. with lid 1 in. Museum No. 02544.

An extremely attractive box modelled after the quatrefoil pattern, and divided into four equal parts of internal partition. The lid is slightly raised and is encrusted with a gold foliated pattern in four branches, one branch spreading into each lobe of the lid. The centre is provided with a ruby around which runs a wavy band.

The sides of the box are ornamented with gold herringbone pattern. It is finely worked and polished.

Bowl with handles. Parchment white translucent nephrite. Mughal. Late 17th or early 18th century. H. 1.11 ins. W. across handles, 6.2 ins. Museum No. Nil. [British Museum]

A hollowed quatrefoil bowl with two handles and low circular foot, fashioned to represent a flower. The body of the bowl is divided into four lobes showing raised ridges of indentations in the interior of the bowl.

The upper rim of the outer side is enclosed by a

circle of simulated petals and around the foot runs another circle of alternate serrated and unserrated leaves. The handles are formed like an inverted bud. The decoration is in relief.

The bowl is well finished.

Huqqah mouth piece. White opaque nephrite. Mughal. Late 17th or early 18th century. L. 3 ins. Diameter 11/16 in. Museum No. 02538.

A huqqahmouth piece. The nozzle is decorated with gold and cloisonné enamelled in red, blue and green. The head is in the form of an opening bud, and one leaf standing away from the head. The base of the bud is bounded in a geometrical pattern of silver wire and set with precious stones. The outline of the bud is, also, traced in silver. Below the bud pattern, there is an indentation. The tip and the bottom of the stem are ornamented in an identical pattern of silver inlaid with precious stones.

The end for the insertion of the huqqahtube has been hollowed by means of a tubular drill and the core was

subsequently broken off. The resulting fracture was left un-smoothed. From this point a diamond drill was used to bore a smaller hole right to the bottom. After the hole was drilled to an extreme depth, the same drill was again used to bore this hole from the other side to meet the first drilling. Excepting that part where the core was broken away, the interior is well polished.

Box with cover. Rock-crystal. Mughal. 18th century.
H. including cover, 1.4 ins. L. 2.8 ins. W. 1.9 ins.
No Museum Number. [British Museum]

An oval shaped box with a hinge-opening cover and an oval-shaped low foot. Both the outer-surface of the cover and the body of the box are decorated with floral ornamentation. The design is set with precious stones and inlaid with gold. The stems are, also, rendered in gold. The rim of both the cover and the box carry gold-mounting. The foot is bordered by a gold wire.

It is finely worked and the decoration is perfectly done.

Box with cover. Light green translucent nephrite. Mughal. Late 18th century. L. 5 ins. W. 4½ ins. H. (including cover) 3⅜ ins. Museum No. 02601.

A box and cover fashioned in an octagonal form. Each side panel of the box is decorated with a similar foliated design set with precious stones and inlaid with gold wire. The stem of the pattern is also outlined by gold. The embellishment is enclosed by a rough square defined in gold. The interior of the box is plain and smooth. The cover is considerably domed. Each section of the outer-surface of the cover consists of a foliated decoration which is set with precious stones and inlaid with gold wire. The stones are also defined with gold wire. The central part is occupied by an eight petalled flower set with precious stones and inlaid with gold wire. The material is flawed. The interior of the cover shows a few blemishes which seem to have emerged during the course of the preparation of the specimen. The defect reflects upon the efficiency of the craftsman. It is, as a whole, worked very well and is well polished.

Perfume container. Light green translucent nephrite. Mughal. Late 19th century. H. 1½ ins. W. 1¼ ins. Museum No. 1.5.50.1956.

A perfume container fashioned to represent a tiger's claw. The lid and the mount are finished with chased gold and both sides are decorated with gold filigree in the form of flowering branches. It has a gold chain with a central ring meant for suspension.

Rock-crystals.

An eye bath. Rock-crystal. Mughal. Early 17th century. 2½ ins. by 1¾ ins. Museum No.664-74. Pl. XX a

An eye-bath carved in a boat-shape with low oval foot. The object is damaged. It is finely worked and polished.

Two-handled bowl. Rock-crystal. Mughal. Early 17th century. H. ¾ ins.L. 2½ ins. W. 2½ ins. Museum No. 02612. Pl. XX b.

A deeply hollowed bowl with two handles, one opposite the other. Each handle is formed of a single leaf (showing its underside) with the tip recurved. Finely worked and polished. The material is flawless.

Bottle. Rock-crystal. Mughal. Early 17th century. H. 1¼ ins. diameter 1¼ ins. Museum No.727-74. Pl. XX c

A small bottle with globular body, shallow neck and low circular foot. It is without any ornamentation. It is finely worked and polished.

Drinking vessel. Rock-crystal. Mughal. Early 17th century. H. 4 ins. W. with handle 5 ins.
Museum No. I.M. 151 - 1922. Pl. XXIV

A globular fluted drinking vessel, with narrow neck, low circular foot and an "S" shaped loop handle. Both the neck and the foot are bordered by a scroll of acanthus leaves in halves, below which is a circle of complete acanthus leaves. The points of the leaves opposite to each other are joined by means of the dividing line of the flutings. The neck is enclosed by eight petals each separated from the other. The outer side of the handle is carved to represent a leaf. The decoration is in low relief.

The vessel shows a blemish. Its ornamental details are carried out finely and it is polished.

Bowl. Rock-crystal. Mughal. Early or middle of the 17th century. H. $3\frac{1}{4}$ ins. diameter $5\frac{7}{8}$ ins. Museum No.986-75. Pl. XXIII

A deeply hollowed bowl with flutings, plain rim and

low circular foot representing a flower. The circular foot is bordered by a circle of acanthus leaves from which radiate vertical stems forming the compartment divisions of the fluted panels, and terminating at the rim of the bowl with flaring buds and bifurcated leaves forming the band of ornament round the rim. The interior of the bowl shows raised ridges of the flutings.

The bowl is very finely worked and polished.

Bowl. Rock-crystal. Mughal. Early or middle of the 17th century. H. 2¼ ins. diameter 5⅛ ins. Museum No. 02609. Pl. XXXIII.

A hollowed bowl with flaring rim and circular foot, fashioned to represent a four petalled flower carved in low relief. The foot is bordered by a circle of leaves from which radiate four sprays each consisting of flowers and leaves supported on stems carved in low relief. The interior of the bowl is without any ornamentation.

Both the foot and the rim, which is chipped at one place, are irregularly executed and imperfectly done and represent a rather inferior quality of Indian workmanship. It is well polished.

Vase with cover. Rock-crystal. Mughal. Early or middle of the 17th century. L. with cover 5½ ins. W. 3¼ ins. Museum No. 01354. Pl. XXXVI b

A globular vase, with a collared cylindrical neck, a dome-shaped cover and a low oval-shaped foot. The neck bears a simple chevron pattern in relief. Both the foot and the collar are decorated with a circle simulating the petals of a flower. The upper circle is, however, divided into two parts by means of two trefoil leaves opposite to each other. The body is embellished with a multifoil arch with a sprig consisting of a flower and two trefoil leaves, one on each side of the flower. On either side of this pattern are six trefoil leaves. Other details of the decoration are similar to that of No. 01380.

Both the neck and the rim of the cover are damaged.

It does not represent a good standard of Indian workmanship. It is polished.

Vase with cover. Rock-crystal. Mughal. Early or middle 17th century. L. with cover 4¼ ins. W. 3 ins.
Museum No. 01358. Pl. XXIV a

A vase with a globular body, narrow neck, spreading rim and a low circular foot fashioned to represent a lotus flower. The neck is bordered by a circle of acanthus leaves below which is a double band. The body, i.e. the space between the double band and the foot is filled with a floral ornamentation. Both the neck and the outer surface of the dome-shaped cover carry a design similar to that carved on the cover and the lower part of the body of No. 01359.

The foot shows blemish. It is finely worked and polished.

Vase with cover. Rock-crystal. Mughal. Early or middle of the 17th century. L. including cover 4¾ ins. W. 2½ ins.
Museum No. 01359. Pl. XXIV c

A globular vase with cylindrical neck, spreading mouth, dome-shaped cover and circular foot. The foot is

hollowed from the inside and in the centre of it is an eight petalled flower. The body is divided into three parts by means of two double bands. The top part which borders the neck is decorated with a scroll of trefoil leaves, the middle one is provided with a circle of six petalled flowers, each separated from the other by means of a double vertical line. The lower part, bordering the foot is decorated with a circle simulating petals.

There is a vertical projecting knob in the centre of the dome shaped cover which is enclosed by a circle of petals bordered by a scroll of trefoil leaves. The edge of the cover projects downwards to fit on the mouth of the vase. The decoration is worked in low relief.

Both the rim of the vase and cover are damaged. It is however, finely executed and polished.

Cup with cover. Rock-crystal. Mughal. Early or middle of the 17th century. H. 4¼ ins. (including the cover) diameter 2 ins. Museum No. 1668-1882. Pl. XXVIC

A stemmed cup with dome-shaped cover and pedestal base. The outer surface of the cover is carved to represent a flower with a vertical projecting knob in the shape of a

closed bud. The outer surface of the cup consists of three bands, two of flowers and the other of leaves. The stem is also encircled by a band of petals.

Finely worked and polished.

The edge of the rim projects downwards to fit on the mouth of the vase.

Vase. Rock-crystal. Mughal. Early or middle of the 17th century. L. $3\frac{3}{8}$ ins. W. $2\frac{3}{8}$ ins. Museum No. 01357.
Pl. XXXII.

A cylindrical vase with shallow neck, spreading rim and circular foot. In the centre of the foot is carved a five-petalled flower in low relief. The body is divided into eight panels by means of a large vertical stems, springing from the base and surmounted by a three-petalled flower at the neck of the vase. Each panel is provided with two six-petalled flowers, one on the top of the other. The lower flower is supported on a stem consisting of two leaves, one on each side. The neck is decorated with a spiral design. The decoration is worked in low relief.

The vase is finely worked and polished.

Mouth piece of Huqqah. Rock-crystal. Mughal. Late 17th or early 18th century. H. $3\frac{7}{8}$ ins. W. 1 in.
Museum No. 147-1922. Pl. XXVI a

A mouth piece of a huqqah with three bands of emerald inlaid with a double band of gold.

Both the sides of the mouth piece seem to have been drilled by means of a tubular drill and the core was subsequently fractured and narrowed. The lower rim is badly damaged. It is finely worked and polished.

Pot with cover. Rock-crystal. Mughal. Late 17th or early 18th century. H. $4\frac{1}{2}$ ins. diameter 4 ins.
Museum No. I.M. 144-1922. Pl. XXVI b

A globular shaped pot with receding narrow neck, spreading mouth, cover and low foot. The outer surface of the pot is fluted. The neck is bordered by a scroll of foliated design worked within a double gold band. The outer side of the shallow dome-shaped cover is worked to represent a flower and is bordered by a design similar to

to that of the pot. In the centre is a projecting knob in the shape of a bud which is provided with four petals supported by a biforcated leafed system. The knob is bordered by a band of gold. The foot is fashioned to represent a lotus flower. The ornamentation is set with precious stones and inlaid with gold.

It is finely worked, preserved and polished.

Vase with cover. Rock-crystal. Mughal. Late 17th or early 18th century. L. with cover 4½ ins. W. 2⅝ ins. Museum No. 01361. Pl. XX[illegible] d

A globular vase with a fairly narrow neck, cover and circular foot. Both the neck and the foot are bordered by a double band. The body is decorated with spiral ribs. The projecting knob surmounting the dome-shaped cover is bordered by a double band from which radiate incised lines terminating at the rim of the cover. The edge of the cover projects downwards to fit upon the mouth of the vase.

The edge of the rim of the cover, the rim of the vase and the foot are chipped. It is, however, well worked and finely polished.

Spouted pot with cover. Rock-crystal. Mughal. 18th century. L. with cover $4\frac{3}{4}$ ins. W. 4 ins. with spout. Museum No. 01353. Pl. XXVIb

A pot with globular body, narrow neck, spreading rim, spout, dome shaped cover, and circular foot fashioned to represent an eight petalled flower. Both the neck and the foot are bordered by a broad band simulating petals of flowers [probably that of the lotus]. The neck is also decorated in the same manner. The main body is cross cut to produce a series of diamond-shaped panels in the centre of each of which is the setting for a jewel - now missing. The spout which is an integral part of the body bears a chevron pattern and carries a flower at its lower end.

In the centre on the outer surface of the cover is a flower with a vertically projecting knob in the form of a bud. The flower is encircled by a band or scroll of flower. The edge of the cover projects downwards to fit on the mouth of the vase. The embellishment is worked in low relief.

The material is flawed. The upper part of the spout is broken. It is, however, finely carved and polished. The diaper pattern on the body is most uncommon, and is not to be seen on Mugul jadework.

Bowl. Rock-crystal. Mughal. 18th century. H. 3 ins. diameter $4\frac{5}{4}$ ins. Museum No. 1662-1882. Pl. XXV/c

A deeply hollowed bowl with two loop handles and circular low foot worked to represent a lotus flower carved in low relief. The interior of the bowl is plain and the outer surface is decorated with a design of diamond-shaped facets worked by means of the lap-wheel. The handles, one on each side are composed of a scroll, a large acanthus leaf showing its underside and radiating from the base and a knob projecting downwards. The leaves are worked in low relief.

The bowl is finely worked and polished. At one place the rim is chipped.

This design is unknown amongst Mughal jade-work.

Tumbler with cover. Rock-crystal. Mughal. Late 19th century. H. $5\frac{1}{4}$ ins. diameter $2\frac{1}{8}$ ins. Museum No. I.M. 325-1920. Pl. XXVII a

A tumbler with cover, shaped like a shallow dome with

a projecting knob in the centre. The knob is enclosed by a design of flowering trees springing from a small pot. This decoration is encircled by a floral band. The design on the cover is repeated on the tumbler. The flowering tree is, however, far larger than that worked on the cover.

Formerly the decorative design was set with precious stones and inlaid with gold. The stems were outlined by gold wire. The object is finely worked and polished.

Bowl with handles, Rock-crystal. Mughal.
Late 19th century. H. 2½ ins. diameter 5⅞ ins.
Museum No. 1663-1885. Pl. XXVIII b

A bowl with two handles and low circular foot worked to represent a four-petalled flower carved in low relief. The bowl is fluted and the outer surface of each fluted panel is decorated with a floral ornamentation. Both the rim and the foot are bordered by a band of floral scroll. The handles are formed of a serrated leaf, radiating from the base of which is a bud.

The bowl is finely worked and the designs carefully engraved. It has good polish. One fluted panel is damaged.

Cup with cover. Rock-crystal. Mughal.
Late 19th century. Cup. H. $2\frac{3}{8}$ ins. W. $3\frac{5}{8}$ ins.
Cover. H. $1\frac{3}{8}$ ins. W. $3\frac{5}{8}$ ins. Museum No. I.M.383-1914.
Pl. XXVII c

A deeply hollowed cup with flutings, scalloped rim and low circular foot. The foot is hollowed from inside. The fluted panels of both the cup and the cover are decorated with sprays, consisting of flower, leaves, and stems. The design on the cup differs slightly from that of the cover. In the centre of the dome-shaped cover is a projecting knob. The design is punctuated throughout with holes for jewel settings.

The rim of the foot is chipped at two places, otherwise the specimen is carved nicely and its decorative design outlined efficiently and with merit. Both the cup and the cover were originally set with precious stones and inlaid with gold, now completely missing.

Bowl with Cover. Rock-crystal. Mughal.
Late 19th century. H. 3 ins. diameter 4¼ ins.
Museum No. I.M. 324-1920. Pl.XXIIId.

A bowl with cover and low circular foot. The outer surface of the bowl is ornamented with sprays, consisting of a central stem, the side branches, flowers and leaves radiating from the base. The design of two sprays differs. On two branches of each larger spray are two parrots (one on each branch). The rim of the bowl is enclosed by a band of foliated scroll. The cover which is in the shape of a shallow dome, carries on its outer surface almost the same decoration as on the bowl. In the centre of the cover is a projecting knob which is crowned by a six-petalled flower.

The bowl is nicely worked, finished and polished. Originally the details of the decorative pattern were set with precious stones and inlaid with gold wire. Both are now missing. The foot is slightly chipped at two places.

Bowl. Rock-crystal. Mughal. Late 19th century.

H. $2\frac{1}{4}$ ins. L. $5\frac{1}{8}$ ins. W. 5 ins.

Museum No. 1664-1882. Pl. ~~XLIV~~ XXVIII, a.

A sub triangular bowl with flutings and scalloped rim. The circular foot is fashioned to represent a four-petalled flower carved in low relief. The foot is bordered by a circle of serrated leaves, also, carved in low relief. The handle is formed of a recurved stem consisting of flowers and leaves with buds worked in low relief. Below the handle there is a rib in the shape of a stem rooted in the base of the bowl.

The bowl is nicely worked and finished. It is well polished. Both the flutings and the serrated leaves can be paralleled in many Mughal jade bowls.

Box with cover. Rock-crystal. Mughal. Late 19th century.

H. $3\frac{1}{4}$ ins. L. $5\frac{1}{8}$ ins. W. 4 ins.

Museum No. 1671-1882. Pl. XXVIII b

An oval box with hinged cover and circular low foot.

The cover is attached to the box with silver mounting. On the outer surface of the cover is a horizontal oblong panel surrounded by a double band. The lines between the bands are filled with rubies. The interior of the panel is embellished with a trefoil leaf design. This decoration is repeated around the panel and either rim of the box. The central area of the box is provided with a floral ornamentation, each flower is joined by an arched stem. The design is set with precious stones and inlaid with gold. The stems are also outlined in gold. The silver mounting is tarnished. Both the box and the cover are finely worked and polished.

Represents a good standard of Indian workmanship.

Bowl. Rock-crystal. Mughal. Late 18th or early 19th century. H. $1\frac{3}{8}$ ins. Diameter $4\frac{5}{8}$ ins.
Museum No. I.M. 169-1910. Pl. XIX

A bowl with convex base (underside concave) and spreading rim. The outer-side of the bowl is decorated with an engraved foliated scroll. Each scroll is provided

with an eight petalled flower. The base consists of two foliage bands between which is engraved the following verse.

ساقی شراب معرفتِ کردگار دی ۔ ساغر میں آج باد کوثر اتار دی

Saqqi-Shārab -i- Mārifat - i - kirdgār-de
Sāgar main ajj bād -i- kausar utār de.

'Cup bearer - give [us] wine of [love]
the knowledge of God - [we] are the cup.
Give [us] this wine of the River of Paradise
continually this day.

The bowl is finely worked and polished. The decorative pattern which is executed largely by joining adjacent drill holes with shallow grooves was originally set with precious stones and inlaid with gold. Both the precious stones and the gold are now missing. Nevertheless, the charm and attractiveness of the specimen remain almost unaltered. This style of decoration is quite unknown amongst Mughal jade work.

Spouted pot. Rock-crystal. Mughal. Early or middle of the 17th century. H. 5¼ ins. W. with spout, 5¼ ins. Museum No. 01352.

A pot with globular body, narrow receding neck, spreading mouth, dome shaped cover, an oblique spout, and low circular foot fashioned to represent an eight petalled flower. The neck is enclosed by a design simulating the petals of a flower and is bordered by a vague floral decoration. The globular part of the pot is divided into five panels, each decorated with a floral design of a different nature. The centre of the outer surface of the domed cover is provided with a flower and a projecting knob. The flower is bordered by a band of a floral scroll. The spout, which is integral with the body, is decorated with a ribbed decoration encircling the spout. The ornamentation is worked in low relief. The rim of the pot is damaged. The specimen is, however, finely worked and polished.

Stemmed Cup. Rock-crystal. Mughal. Early or middle of the 17th century. H. $2\frac{1}{4}$ ins. Diameter 3 ins. Museum No. 01360.

A stemmed cup with spreading mouth and circular foot. The under surface of the foot is fashioned to represent a petal. Both the foot and the rim are bordered by a band of floral ornamentation. In between the bands is a circle of five-petalled flower. The base of the cup is provided with a circle of petals of lotus flower. The decoration is worked in low relief. The rim is damaged and shows a blemish. It is, however, finely worked and polished.

An eye bath. Rock-crystal. Mughal. Early 17th century. H. 1 ln. L. 3 ins. W. $1\frac{3}{8}$ ins. Museum No. 913-73.

A boat-shaped eye bath with two handles, and eliptical low foot. The foot is slightly hollowed. The handles, one on each side, are formed of a projecting knob.

It is finely worked and polished. One handle is damaged and one side of the cup shows a blemish.

Spouted pot with cover. Rock-crystal. Mughal. Early 17th Century. H. $4\frac{1}{8}$ ins. W. $3\frac{3}{4}$ ins. Museum No. 1665-1882.

A flat-sided pot (probably a wine pot) with cover, spout and low circular foot. The foot which is slightly hollowed from inside is worked to represent a lotus flower. In the centre of the dome-shaped cover is a projecting knob which is bordered by a circle of petals. The outer side of the pot is decorated with four flowers, two of them are enclosed by a double arched band. The cover projects downwards to fit upon the mouth of the pot. The outer surface of the spout consists of a large serrated leaf, spreading from the base and terminating at the mouth of the pot. On the upper surface of the pot is a small trefoil.

The spout is not an integral part of the body, but is set in the same menner as is the spout in a similarly shaped nephrite pot No. 01353.

Flawed. The spout is attached to the main pot. The rim of the pot is chipped. The ornamental design is worked nicely.

It is well polished.

Box with cover. Rock-crystal. Mughal. Early 17th century. 4¾ by 3⅛ins. Museum No. 1666-1882.

An oval shaped box with dome-shaped cover. The box is enclosed in a broad band of floral scroll and the flat base is provided with four leaves, one on each side. The cover which is domed carries in the centre of its outer surface a flower with two registers of petals and a projecting knob. Around the flower runs a band which is bordered by a slim design similar to that of the box. The rim of the cover slightly projects downwards to fit upon the box. The entire decoration is executed in low relief.

Finely worked and polished. At one place the rim of the box is damaged.

Box with cover. Rock-crystal. Mughal. 17th century (1605-1658). H. with cover 3¾ ins. diameter 5¼ ins.
Museum No. I.M. 330-1920.

A circular box with a low domed cover. Both the box and the cover are deeply fluted. In the centre of the

outer surface of the cover is an eight petalled flower from which radiate the lines of the flutings. The edge of the cover projects downwards to fit upon the box. The box and the cover are in excellent condition. The material is without any flaw. It is finely carved and highly polished.

Vase. Rock-crystal. Mughal. 17th century. H. 5 ins. diameter $2\frac{3}{4}$ ins. Museum No. 01356.

A globular vase with cylindrical neck, spreading rim and low circular foot. The foot is hollowed from inside. The vase is plain and carries no ornamentation. The material is flawed and the vase is damaged. It is well polished.

Bowl with two handles. Rock-crystal. Mughal. Early 17th century. H. $2\frac{1}{4}$ ins. W. $5\frac{3}{4}$ ins. Museum No. 02608.

A deeply hollowed bowl with flaring mouth, two handles, and low circular foot to represent a lotus flower.

The flower is bordered by a circle of acanthus leaves. Both the flower and the leaves are carved in low relief. The handles, one on each side, is composed of two serrated leaves and a bud, both carved in low relief.

The rim of the bowl is unevenly executed. It is well polished.

Bowl. Rock-crystal. Mughal. Early 17th century.
H. $1\frac{1}{4}$ ins. diameter $2\frac{3}{4}$ ins. Museum No. 1667-1882.

A hollowed bowl with a beaded rim and slightly hollowed circular foot. The base is bordered by a circle of upright leaves carved in low relief. The outer surface is decorated with an alternate fish and floral design carved in low relief. The inner side of the bowl is plain and smooth.

It is very well finished and polished. At one place the outer rim of the foot is chipped and shows a few blemishes.

Two handled bowl. Rock-crystal. Mughal. 17th century. (1605-1658). L. $3\frac{5}{8}$ ins. W. with handles $7\frac{1}{4}$ ins. Museum No. 1M. 328-1920.

A deeply hollowed bowl with two handles and circular foot. Each handle, one opposite the other, is formed of a large serrated leaf radiated from the base of the body and showing its underside and a bud. The underside of the foot is fashioned to represent a four petalled flower. The foot carries a gold mounting, set with stones of different colours. The mounting was done by Robert Phillips, London in 1867. Finely carved and highly polished. The material is flawless.

Bowl with handle. Rock-crystal. Mughal. 17th century. L. $2\frac{3}{8}$ ins. W. 4 ins. Museum No. 914-73.

An oval shaped bowl with an oval shaped silver mounted foot. At one side of the rim is attached a bird which is integral with the tray. The beak of the bird is broken. The silver mounting is tarnished. The specimen is finely carved and polished.

Cup with two handles. Rock-crystal. Mughal. Early 17th century. H. 1 in. W. with handles. 2¼ ins. Museum No.01320.

A hollowed cup with two handles and circular low foot. The inner side of the cup is plain and smooth but the outer surface is decorated with a circle of leaves each joined and supported on stems. Two handles, one on each side, are fashioned to represent an ear.

It is finely worked and polished. The decoration on the cup seems to have been worked by means of a lap-wheel.

Cup with two handles. Rock-crystal. Mughal. Early 17th century. H. 1¼ ins. W. with handles. 3 ins.
Museum No. 02612.

A deeply hollowed circular cup with a low circular foot and two handles. The interior of the foot is decorated with a two petalled flower. Two handles, one opposite the other, are formed by the recurved stem of a vertical leaf springing from the base and showing its underside. Both the flower and the leaves are worked in low relief. The inner side of the cup is plain.

It is finely worked and highly polished.

Cup. Rock-crystal. Mughal. Early 17th century. H. 2¼ ins. diameter 4⅜ ins. Museum No. 634-75.

A cup with spreading rim and low circular foot, set with precious stones and inlaid with gold. The inner side of the foot carries a gold mounting by Phillips of London. In the centre of the foot is carved a flower in low relief. Both the foot and the rim of the outer side of the cup are bordered by a double band. The broad band at the rim is provided with a foliate design worked in low relief. The body is decorated with a circle of large flowers consisting of two registers of petals carved in low relief. Each flower is contained in a cartouche of ogee curves.

The rim which is chipped at some places is irregularly and unevenly executed. The details of ornamentation are finely done. Well polished.

Cup. Rock-crystal. Mughal. 17th century. H. ¾ in. diameter 2 ins. Museum No. 01349.

A shallow cup with spreading rim. The centre of the outer surface of the cup carries a double band. The outer

band is bordered by a circle of flowers, each supported on a stem. Both the bands are unevenly executed. The material is flawed and the rim of the cup is damaged. It is fairly well polished.

Cup. Rock-crystal. Mughal. Early 17th century. H. 1¼ ins. Diameter 2½ ins. Museum No. 02611.

A deeply hollowed cup with spreading rim and circular foot. The foot is enclosed by a band which is encircled by a scroll of leaves from which springs a branch consisting of a flower and two leaves, one on each side. The decoration is worked in low relief. The material is flawed. It is finely worked and polished.

Dagger handle. Rock-crystal. Mughal. Early 17th century. L. 5½ ins. Kitchner Loan. No.45.

A dagger handle with both the guard and the pummel decorated with a floral design carved in low relief.

Finely worked and polished. Details of decoration are done perfectly.

Sword handle. Rock-crystal. Mughal. 17th or 18th century. L. 5 ins. W. 1⅝ ins. Museum No. 1569-1882.

A guard with rounded pummel. Both the pummel and the guard are decorated with a floral pattern carved in low relief. The handle is decorated with a design of diamond shaped faces worked by means of the lap-wheel. This pattern is not found represented on the Mughal Jades. Even on crystal objects, this design is not met with very frequently. The material is without any flaw. It is finely carved and polished.

Tray. Rock-crystal. Mughal. 1605-1658.
10⅝ ins. by 9⅜ ins. Museum No. I.M. 326-1920.

A quatrefoil shaped tray with four identations to form four lobes. The rim of the tray is bordered by a

scroll of foliage. In the centre of the tray is a circular band which is bordered by a decoration similar to that of the rim. Both the outer and inner sides of the indentations have a leaf carved in low relief.

It is nicely worked and polished. This tray like the other objects was also formerly set with precious stones and inlaid with gold.

Two handled Tray. Rock-crystal. Mughal. 17th century. Diameter with handles. 3½ ins. Museum No. 02613.

A circular shallow tray with two handles, one opposite the other. The outer-side carries a wavy band forming the foot. The material is without any defect. Part of the rim is irregularly executed. It is, however, finely worked and highly polished.

Saucer or Tray. Rock-crystal. Mughal. 17th century. Diameter 4 ins. Museum No. 23-1893 - (1S).

A circular saucer or tray. Its outer side carries two bands, the inner one constitutes the foot. It is badly damaged but well polished.

Box with cover. Rock-crystal. Mughal. Late 17th century. 2½ ins. by 1½ ins. Museum No. 722-74.

A finely carved oval box with a domed-shaped cover. Both the sides of the box and the outer rim of the cover consist of flutings. (There is an oval shaped band on the outer side of the cover from which radiate the flutings terminating at the rim.) In the centre of the cover is a shallow circular hole probably for a precious stone which is now missing. The edge of the cover projects down to fit the box. The material is flawless. It is finely carved and polished. At one place the rim of the cover is chipped.

Bowl. Rock-crystal. Mughal. Late 17th or 18th century. H. $1\frac{7}{8}$ ins. diameter $4\frac{1}{8}$ ins. Museum No. 1.M. 384-1914.

A deeply hollowed circular bowl with low circular foot. The inner side of the bowl is plain and smooth. The outer rim is decorated with a floral scroll and the body is embellished with five complete plants each springing from a pot. It has three bands, two at the rim and the other around the foot. The pattern was originally set with precious stones, but now all of them are missing. The bowl is badly cracked and had to be repaired in order to keep it intact.

The ornamental decoration is neatly and efficiently carried out and the specimen represents a good standard of Indian workmanship. The material is free from any defect. It is polished.

Tray or Saucer. Rock-crystal. Mughal. Late 17th or early 18th century. Diameter $3\frac{3}{4}$ ins. Museum No. 726-74.

A circular shallow tray or saucer with low circular foot. It is without any ornamentation. The foot is not evenly executed and is chipped at one place. It is polished.

Drinking cup. Rock-crystal. Mughal. Late 17th or early 18th century. L. 3 ins. W. 3 ins. Museum No.01348.

A hollowed circular cup with low circular foot. The outer-surface of the cup is decorated with two broad bands of chevron pattern edged above and below by a double band. The material of the specimen is flawed. Nevertheless,the workmanship is of a good standard. Both thr rim of the cup and the foot are damaged. It is well polished.

Pot with handles. Rock-crystal. Mughal. Late 17th or early 18th century. H. 3¼ ins. W. including handles 4¼ ins. Museum No. 1.M. 329-1920.

A pot with narrow neck, two handles and circular low foot fashioned to represent a flower with two registers of petals carved in low relief. The neck is enclosed by a circle of petals. Both the neck and the foot are bordered by a band of acanthus leaves. In between the circles of acanthus leaves is an alternate floral and vertical perforated leaf design. Two handles, one on each side, are composed of a perforated leaf, its stem and a bud.

The ornamentation is worked in low

relief.

The foot is chipped at a number of places. Finely worked and polished.

Chowrie handle. Rock-crystal. Mughal. Late 17th or early 18th century. L. 7⅝ ins. Museum No. 1.M. 331-1920.

A finely carved chowrie handle. The base of both the pointed and the rounded ends are enclosed by a circle of vertically arranged leaves carved in low relief. Below the upper circle of leaves is a gold band consisting of six flowers. The centre of each of the flowers is provided with an alternating red and light blue precious stone. The lower end has a circular tubular hole.

The specimen is a fine example of good work. It is polished. It is, however, not possible to say what type of drill, diamond or tubular drill was used to make the hole. The hole is not of uniform width throughout but it narrows as it proceeds downwards. Had the tubular drill been used, the diameter of the hole would have throughout been of equal size. Its being unequal, suggests that the diamond drill was used.

Tray. Rock-crystal. Mughal. Late 18th or early 19th century. Diameter 7 ins. Museum No. I.M.10 - 1912.

A twelve sided tray with a flat base consisting of a band. Each panel of the outer surface of the tray, which is separated from the other by means of a double line, is decorated with a complete branch composed of stems, flowers and leaves, radiating from a circular band in the centre of the tray. The decorative designs are grouped in three different patterns, each repeated four times in the twelve panels of the tray.

The tray is nicely worked and polished. It was formerly embellished with precious stones and gold, both of which are now missing.

BIBLIOGRAPHY

Allchin, F.R.	Piklihal Excavations, 1961.
" "	An un-published paper submitted to the Kanishka Symposium held in London in April 1960.
Arkell, A.J.	Cambay and the bead trade. Antiquity, 1936.
Baburnama	tr. by Beveridge. A.S. 1921.
Ball, V.	A manual of Geology of India, 1881.
Barrett, D.	Sculptures from Amavarati in the British Museum, 1954.
Barua, B.	Barhut, 1934-1937.
Bauer, M.	Precious Stones, tr. by Spencer, L.J. 1904.
Beck, H.C.	Beads from Taxila. Arch. Surv. of India, 1941.
" "	Classification and nomenclature of beads and pendants, Archaeologia, 1927.
" "	Etched Carnelian beads, Antiquaries Journal, Oct. 1933.
Bernier, F.	Travels in Mogul empire, 1891.
Binyon, L.	The emperor and the art, Indian art and letters, 1943.
Bishop, H.R.	The Bishop Collection. Investigations and Studies in jade, 1906.
Bleeck, A.W.G.	Jadeite in the Kachin Hills, upper Burma. Records of the Geological Survey of India, 1907.

Bosshard, W.	Hazards of Asia's highlands and deserts, 1932.
Brown, P.	Indian painting under the Mughals, 1924.
Burnham, S.M.	Precious Stones in Nature, art and literature, 1886.
Bushell, S.W.	The Chinese Art, 1924.
Budge, E.A.W.	The Mummy, 1893.
Cattelle, W.R.	The diamond. 1911
Chamber's encyclopaedia 1950.	
Chang Te K'un	The carving of jade in the Shang period. T.O.C.S. 1954.
Clarke, J.W. and Merill, G.P.	On nephrite and jadeite. Proceedings of U.S. National Museum, 1950.
Codrington, K. de B.	Akbar, Master builder. Indian art and letters, 1943.
" "	The minor arts of India. Indian art edited by Winsted, Sir R. 1947.
Crooke, W.	Things Indian. 1906.
Cousens, H.	The antiquities of Sind. Arch. Surv. of India. 1929.
Cunningham, A.	The Bhilsa Topes, 1854.
" "	Arch. Surv. of India, Vol.II. 1871.
Dani, A.H.	Pre-history and proto-history of eastern India, 1960.
Davids, T.W.R.	The questions of King Milinda tr. from Pali text 1894.
Dimand, M.S.	A hand-book of Muhammadan art. 1944.

Dikshit, M.G. Crystal reliquaries, journal of the Madhya Pradesh Itihasa Parishad, 1959.

Emanuel, H. Diamonds and precious stones. 1867.

Encyclopaedia Britanica. 1910.

Encyclopaedia of religion and ethics. 1910.

Farrington, O.C. Gems and Gem minerals. 1903.

Ferguson, J.C. Survey of Chinese art, 1939.

Fernie, W.T. The precious stones, 1907.

Foster, W. Early Travels in India, 1921.

Goetze, J. Jade Lore, 1936.

Goodchild, W. Precious Stones, 1908.

Gordon, D.A. The pre-historic Backgrounds of Indian culture, 1959.

Hansford, H.S. Chinese jade carving, 1950.

Hedin, S. Through Asia, 1898.

Hennessy, U.P. Early Chinese jades, 1923.

Hildburgh, W.L. Chinese methods of cutting hard-stones. Journal of the Royal Anthropological Institute, Vol. XXXVII. 1907.

Hirth, F. The ancient history of China, 1908.

" " China and the Roman orient. 1885.

" " The story of Chang K'ien, Journal of the American oriental Society, No. XXXVII, 1907.

Indian travels of Thevenot and Careri edited by Sen, S. 1949.

Indraji, B. Antiquarian remains at Sopara and Panda. Journal of the B.B. of R.A.S. Vol. XV, 1881-82.

Jenyns, S.	Chinese archaic jades. 1951.
Jones, W.	History and mystery of precious stones. 1880.
Kautilya's Arthsastra	tr. by Shama Sastry. 1910.
Kimpei, T.	The Chinese appreciation of jade, Burlington Magazine, Vol. 23. 1913.
King, C.W.	The natural history of precious stones and gems and of precious metals. 1865.
Konows, S.	Corpus Inscriptionvm Indicarvm, 1929.
Kunz, G.F.	The curious lore of precious stones. 1913.
" "	The Magic of jewels and charms. 1915.
Laufer, B.	The diamond. 1915.
" "	Jade. 1912.
MacCrindle, J.W.	Ancient India as described in Classical literature, 1910.
" "	Ancient India as described in Ptolemy. 1885
Mac Curdy, E.	The notebook of Leo Nardo Da Vinci. 1954
Mac Donell, A.A.	Vedic mythology. 1897.
Macgowan, J.	A history of China, 1897.
Mackay, E.H.	Bead making in ancient Sind, Journal of the American Oriental Society. Vol. 57.
" "	Chanhu daro excavations, 1943.
" "	Further excavations at Mohenjo-daro. 1938.

Marshall, Sir J. — Mohenjo-daro and Indus Civilization, 1931.

" " — The monuments of Sanchi [Publisher and date not published]

" " — Taxila, 1951.

Needham, J. — Science and Civilization in China 1954-9.

Nicols, T. — A lapidary or the history of precious stones, 1652.

Official descriptive and illustrated Catalogue of the Great Exhibition, 1851.

Osborne, D. — Engraved Gems, 1912.

Parker, E. — China, 1901 and 1971.

Penzar, N.M. — The Mineral resources of Burma, 1922.

Platt, A.F.R. — The ancient methods of working hard-stones, Proceeding of the Society of Biblical Archaeology. 1909.

Rama Chandran, T.N. — An inscribed pot and other Buddhist remains in Salihundan, Epigraphia Indica, Vol.28, 1949-50.

Rocher, É. — La Province Chinoise du Yun-Nan, 1879-80.

Rogers, R.J. — Dictionary of Jems, precious and semi-precious stones, 1933.

Rothschild, M.D. — Handbook of precious stones, 1891.

Sankalia, H.D. — From history to pre-history at Nevasa, 1960.

Sankalia, H.D. and Dikshit, N.G. — Excavations at Brahmapuri. 1952.

Scott, J.G. Burma, a handbook of practical information, 1921.

" " Gazetteer of Upper Burma and the Shan States. Vol.II, 1837.

Shorter Oxford English Dictionary, 1955.

Singer, A. and others. A history of technology 1955-57.

Sircar, D.C. Select inscriptions, 1942.

Smith, V.A. A history of fine arts of India and Ceylon revised by Codrington, K. de B. 1930.

Spooner, D.B. Excavations at Shah-ji-ki-Dehri, Arch. Surv. of India, 1908-9.

Stein, Sir M.A. Sand buried ruins of Khotan, 1904.

Tavernier, J.B. Travels in India, tr. by Ball, V. 1889 and 1925.

The Embassy of Sir Thomas Roe edited by Foster, Sir W.1926.

Theophrastus history of precious stones. 1774.

Thomas, E.J. The life of Buddha, 1927.

Tuzuk-i-Jahangiri. tr. by Rogers, A. Beveridge, N. 1909-14

Voyage of J.H. van Linschoten, Hakluyt Society. 1598.

Wadia, D.N. Geology of India. 1926.

Warmington, E.H. The Commerce between the Roman empire and India. 1928.

Watt, G. A dictionary of the economic products of India. Vol. III. 1890.

Webster, R. The gemmologist compendium. 1947

Wheeler, Sir M. The Indus Civilization. 1953.

Wilkinson, J.V.S. Indian painting, Indian art edited by Winstedt, Sir R. 1947.

Wong, K.C. — The antiquity of jade, The China journal of Science and art, 1926 - 28.

Wylie, A. — Notes on the Western regions, Journal of the Royal Anthropological Institute, Vol.X, 1881.

Yule, H. — The Book of Ser Marco Polo. 1903 & 1926.

M. No. 01371 a

M. No. 1. M. 152 - 1924 b

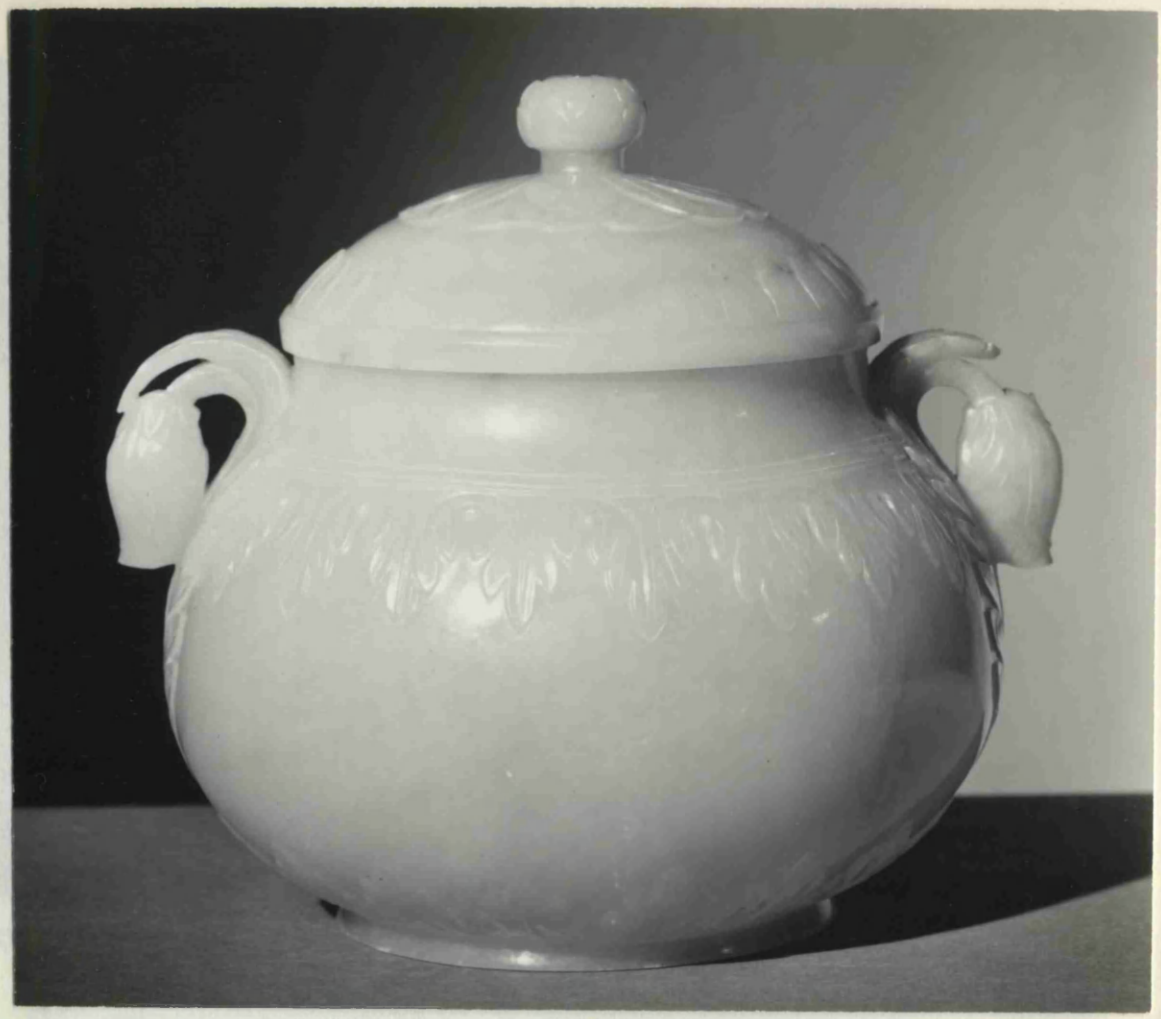
Pl. II

M. No. 10.45.10.17.252 a

M. No. 1954-10-17-256 b

M. No. 89. 5.7.19 a

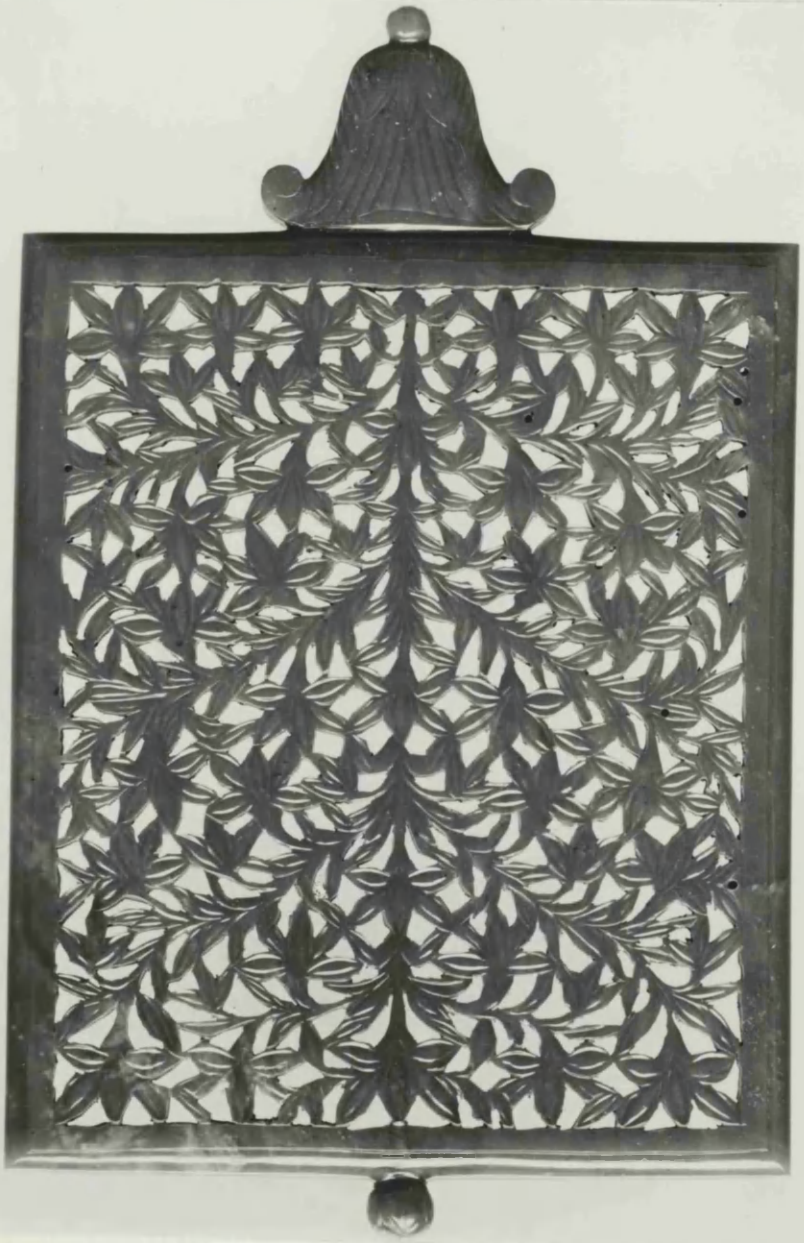
M. No. 1601 – 1882 b



N. No. 1537 – 1882 a

M. NO. 02589 a

M. NO. 02559 b



M. NO. 633-1875

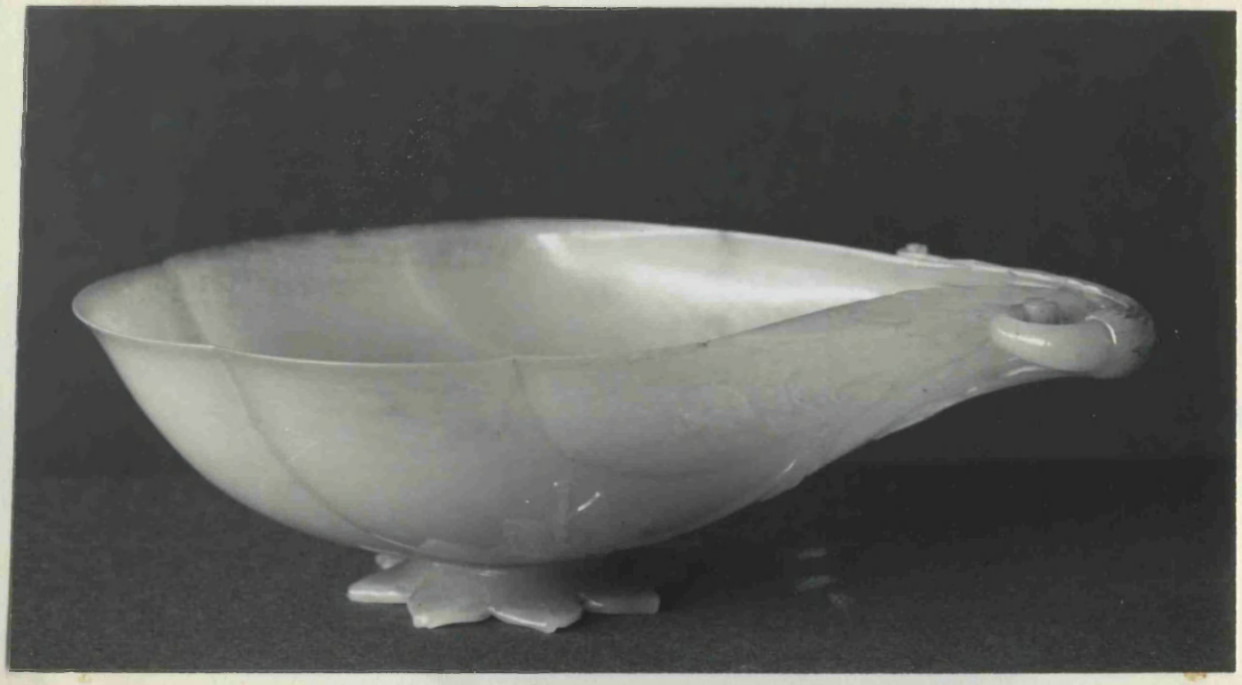
M. NO. 02539 a

M. NO. 02579 and 02580 b

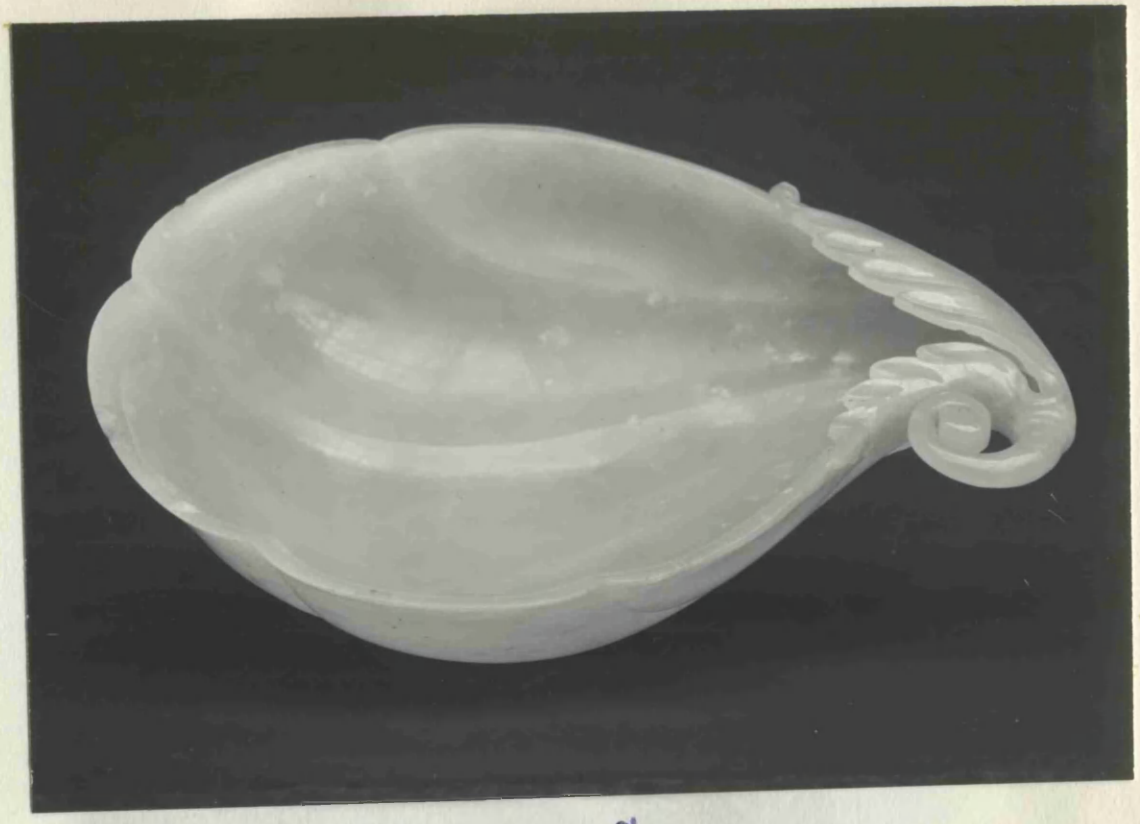
M. NO. 02540 C

Pl. VIII

M. No. 688-74 a M. No. 02537 b



M. No. 02561 b



No. Museum Number

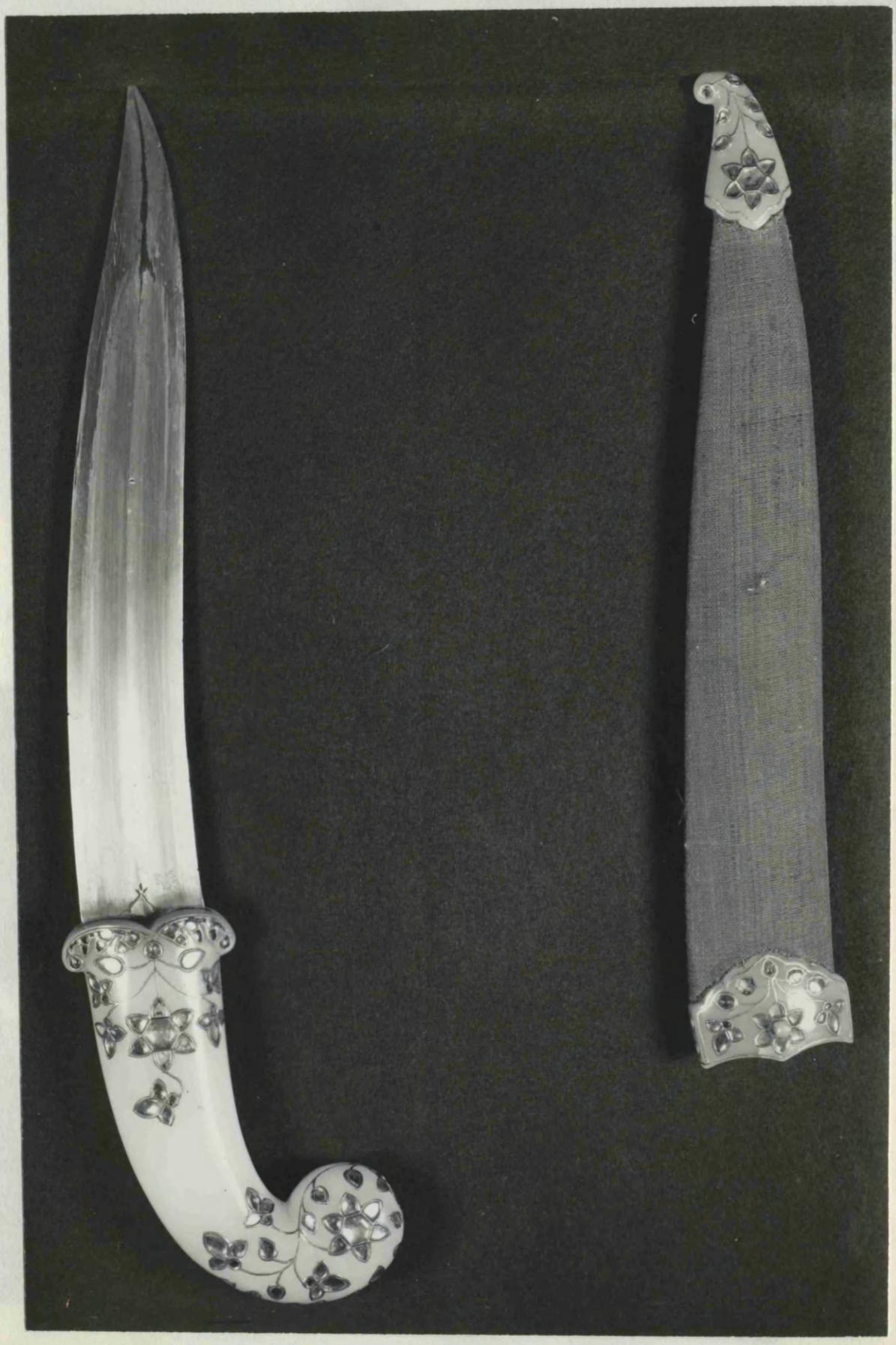
a

M. No. 1627-1852

b

M. No. 1.S. 100.1955

M. No. 630-75



M. NO. 3467

M. No. 02589

a

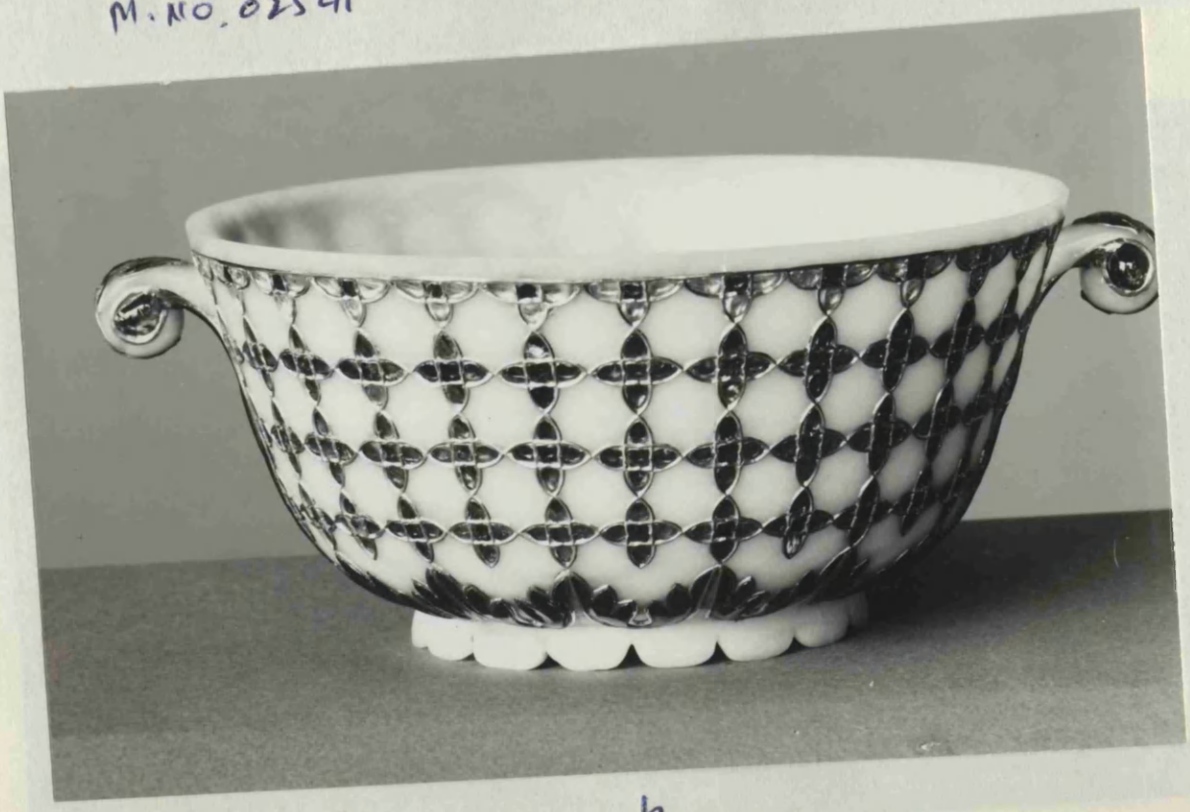
M. No. 02596

b

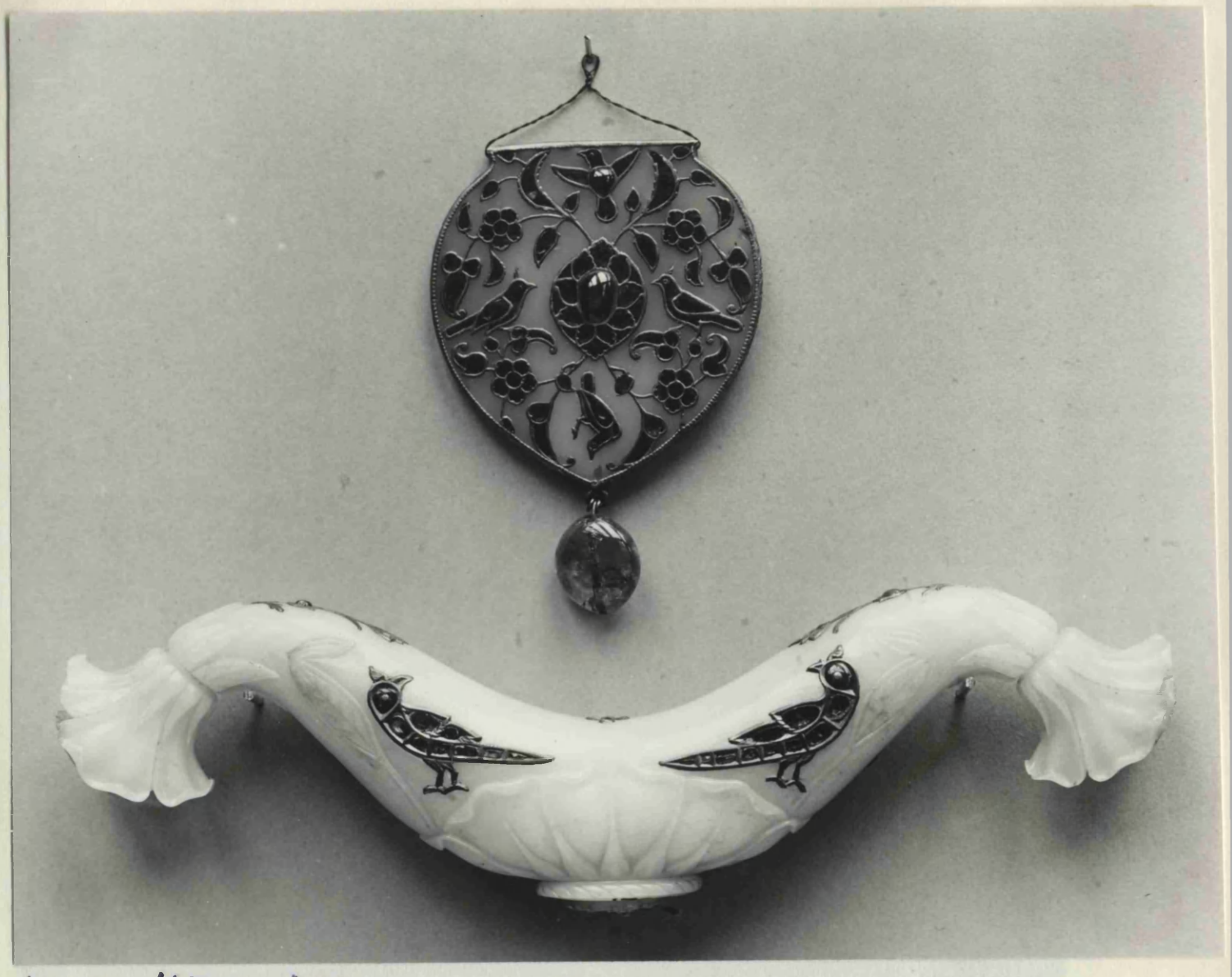
Pl. No. 02550 a

Pl. No. 02548 b

M. NO. 02541 a

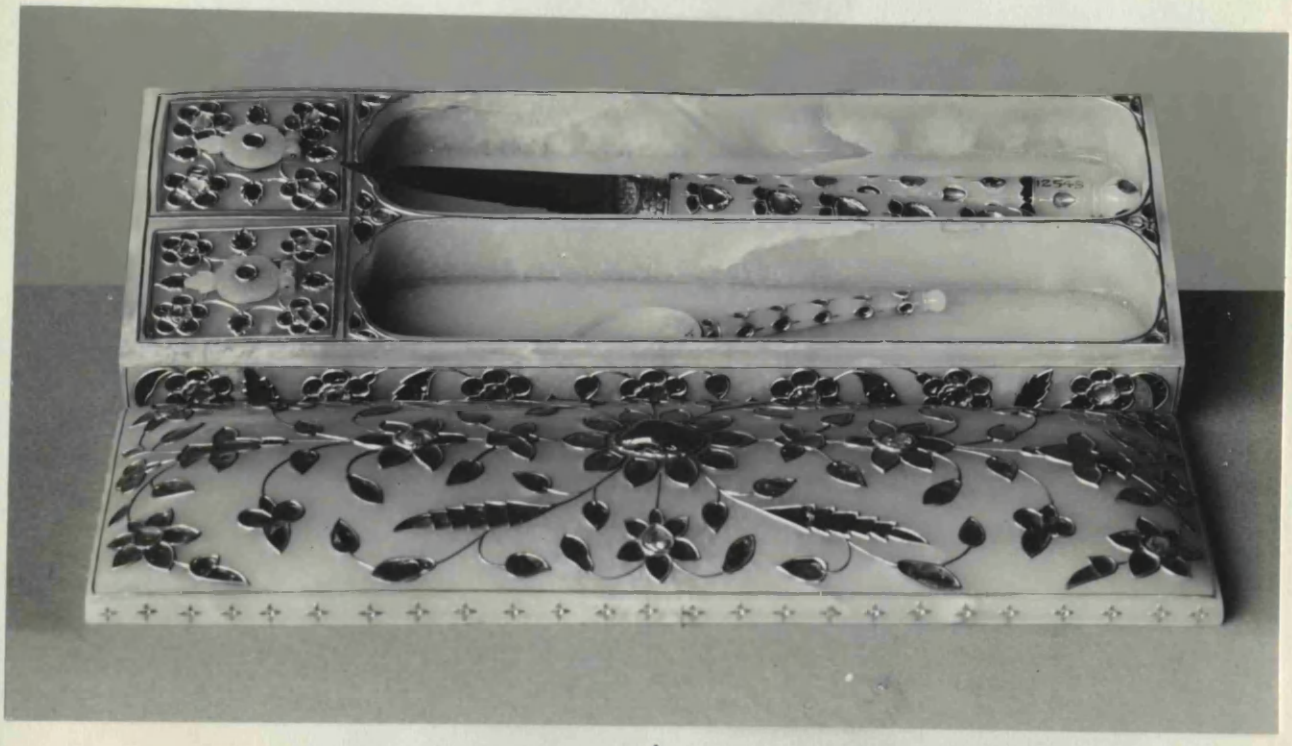


M. NO. 02564 b

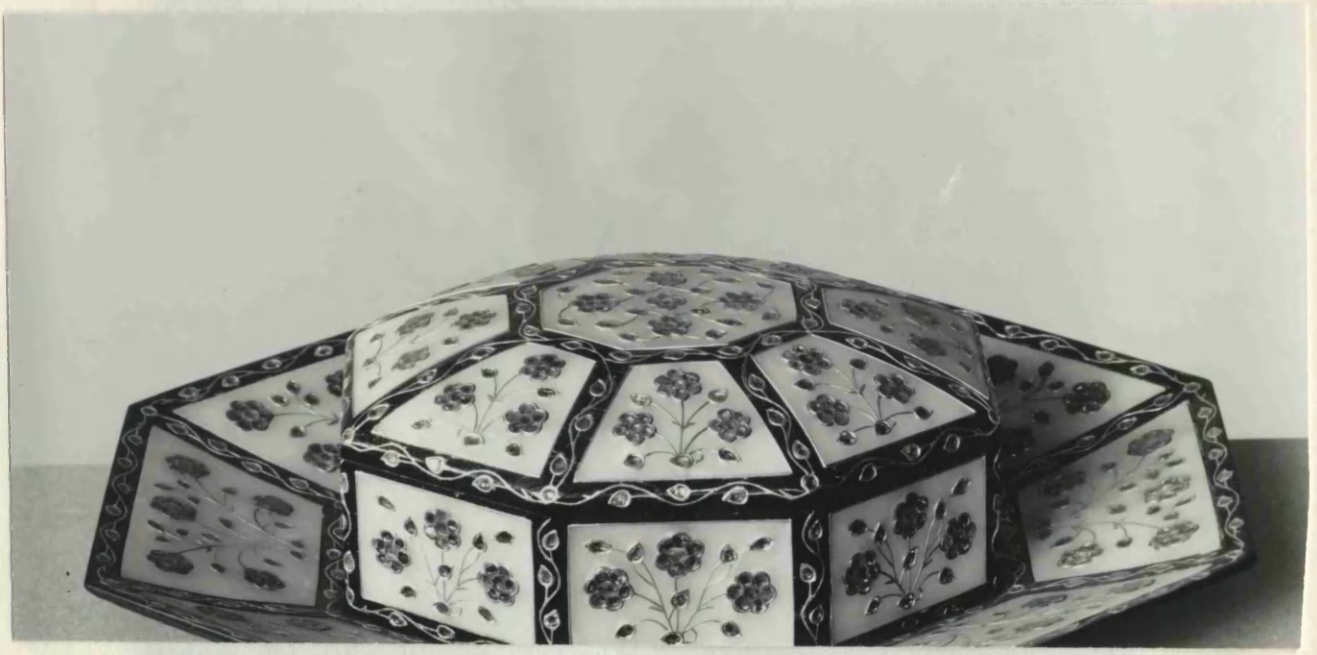


M. 110. 1675 - 1882 a

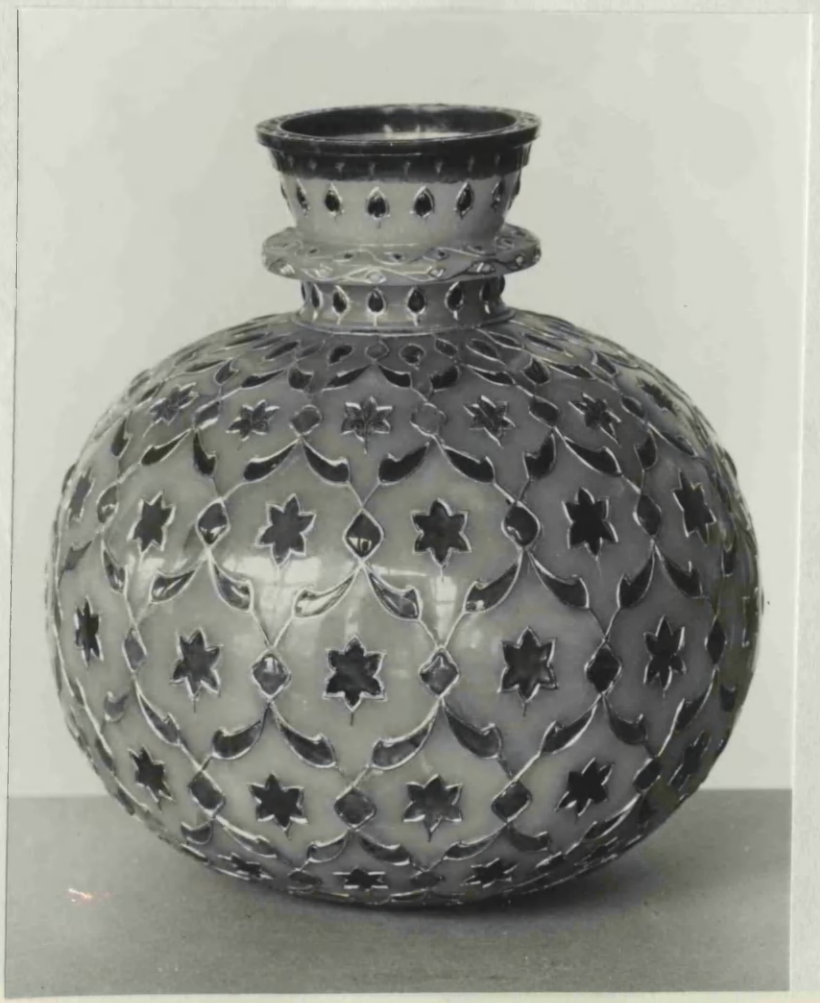
M. No. 903 - 73 a



M. No. 02549 b



M. No. 02604 a



M. No. 02593 b

M.No.02537

M. No. 644-74 a

M. No. 01361 d

M. No. 026/2 b

M. No. 727-74 c

M. No. 1, M. 151 – 1922

Pl. XXII

M. No. 986-75

M. No. 02609

Pl. XXIV

M. NO. 01358 a

M. NO. 01358 b

M. NO. 01359 c

Pl. XXV

M. No. 01357 a

M. No. 01353 b

M. No. 1660 – 1882
c

M. No. I.M.147-1922 a M. No. I.M.144-1922 b

M. No. 1662-1882 c

M. NO. 1662-1882 a

M. NO. 1671-1882 b

M. No. I. M. 169- 1910