INDIAN GEMMOLOGY

By
RAJ ROOP TANK
JEWELLER

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SHRI RAJROOP TANK

भारतीय श्रुति-दर्शन पै
जयपुर

"मंगलाचरण"

INVOCATION OF BLESSING

यस्य निखिलाश्च दोषा न सन्ति सर्वे गुणाश्च विद्यन्ते ।
ब्रह्मा वा विष्णुर्वा हरो वा जिनो वा नमस्तस्मै ।।

He who is the abode of all that is good and virtuous, and in whom no trace of evil is to be found, be He Brahma, or Vishnu, or Shiva, or Jin, we pay Him our most humble and respectful homage

Dedicated

to

Those Countless Workers

Engaged in the Art and Business

of Gemstones

By the Dint of Whose Soil

The Industry is Flourishing Today

Opinions from abroad....

RAJROOP TANK....
DEAN OF THE JAIPUR GEM DEALERS

1 *Rajroop Tank, dean of stone dealers in Jaipur (India), teacher, author, lecturer, statesman welcomes Monthly MODERN JEWELER's editor Hoyt Hurst to India*

2 *Jaipur, India, where all the buildings are pink, has been a coloured stone centre as long as man can remember*

3 *Tank in his classroom shows students a book about precious stones written in Hindi in the 14th century*

4. *Students learn to sort rough emeralds*

5 *Indian workmen at their corundum wheels polishing coloured stones*

6. *Tank's son examines black star sapphires that he is considering buying*

In India's pink city of gems, this precious stone dealer has been teaching gems and gemology for over 40 years without pay for education in India by custom is free

By HOYT HURST, Editor and Publisher

LONG before I ever dreamed I would visit India, I heard about Rajroop Tank, dean of stone dealers in the pink city of Jaipur (all the buildings are actually pink) teacher, author, lecturer, statesman

So it was only natural that on arrival I went directly to his place of business The taxi driver took me to the main street, directed me to a doorway and assured me that he would await my return

The doorway led to a hallway between two ground floor shops I had to step around a stone-cutter who sat on the floor in the doorway plying his trade Finally, I went up a stairway to a second floor courtyard where four gem-cutters sat on the floor polishing stones

Their polishing device was a corundum wheel about 12 inches in diameter mounted on a pole supported by two wooden posts With his left hand the polisher alternately dipped the stone into water to cool it and held it against the polishing wheel

The energy to drive the wheel was furnished by his right hand on a pole about five or six feet in length, equipped with a leather thong—fastened securely at one end of the pole, then wrapped once around the pole that held the polishing wheel, then looped into a hook at the other end

I was motioned to a doorway at the end of the court Upon entering I found a room equipped with white-covered mats or pallets, and was greeted by a dark man seated on the floor behind a low table

I introduced myself explained my mission and asked if it were possible for me to interview Mr Tank, whom I knew by reputation only I was invited to be seated—on the floor Mr Tank was just finishing his lunch

Sometime later I was ushered into a room at the other end of the court where I met Mr. Tank himself In excellent English he told me that his family preceding him as far as recorded were in the jewellery business

"You see, it was part of the Indian caste system that one must follow the same vocation as one's father," he explained "And while the caste system was abolished

under Mahatma Gandhi, it still unofficially exists—especially in the villages "

"Nevertheless, those who make up the former 'untouchables' are required by law to a quota of 20 per cent of anything fostered by the Government And they are inclined to claim it—particularly for such things as quotas for going abroad for higher education at foreign universities "

Interestingly, Mr Tank has both a son and a grandson who are following in his footsteps in his jewellery business

Explaining that he had been teaching gems and gemmology for over 40 years, he led me into another room—a study room—where a group of about 20 young men in their late teens and early 20s were hard at work grading emeralds

"In all those years I have never received one rupee for teaching," he explained "There are two things in India which are by custom free—education and medical care "

Reaching for a specific book, he proudly displayed its hand-lettered, Hindi script

"It's a book about Indian gemstones written probably in the 14th or 15th century," he said

No doubt it served as source material for Mr Tank in the writing of his own book, *Indian Gemmology*

Mr Tank explains that he wrote his book at the instigation of some Hindi journalists because there was no such book in the Hindi language—despite the fact that gemstones have been an important part of Indian culture and commerce dating back to ancient times

After the book was finished, he gave a talk for the Jaipur Rotary Club where various members of the Government of India as well as foreign dignitaries were in attendance They encouraged him to translate the book into English (Anyone interested in purchasing a copy

might send $ 10 00 American money to Rajroop Tank, Jeweller, Johari Bazar, Jaipur-3 (India)

Perhaps the most interesting characteristic of the book is its collection of lore about 84 stones treated in the book While the author gives scientific data—for it is obvious that it is a teaching manual—the book's charm lies in its collection of lore such as the relation of a store to the planets, the days of week, the time of day when it should best be worn—and finally the illnesses for which it may be prescribed when powdered and administered to the sick

Typical of the book's education laced with folklore approach is the chapter on emerald First comes the statement "A fine emerald possesses seven merits ' The seven merits are then numerically listed This is followed by a numerical list of ten flaws that occur in emerald

In speaking of the best time to wear emerald, Mr Tank reveals, "According to astrologers, emerald is a gem of Mercury and is beneficial when worn in a phase of that planet It is to be studded in gold and put on the neck, arm or finger on Wednesday in the morning, two hours after sunrise "

In speaking of the medicinal qualities of emerald, he states "Emerald finely cut in rosewater or Keora water is taken by mouth as a medicine, It is prescribed for purification of the blood, for curing urinary diseases, colic pains, leucoderma, dumbness, deafness and especially for treatment of diseases of heart '

On a more scientific note, the book also details sources of emeralds throughout the world, noteworthy emeralds of history, synthetic emeralds including "Distinctive Features of the Synthetic and Natural Emeralds" as well as treatises on ' New Non-Flourescent Emeralds" and "Doublets and Soude Emeralds "

Since Mr Tank's teaching efforts are without compensation, it becomes evident that the gem polishihg, marketing

function of his organisation has to pay the way The trading that goes on in his rooms must be an integral part of the gem industry in Jaipur Polishers come to his office to buy rough, to take it back to their own places for polishing

When it is polished, they return to market their stones First comes an investigation of the stones for quality and then the bargaining begins It usually ends with the buyer and seller holding hands with a handkerchief covering their hands

When I asked why the handkerchief, it was explained that neither the buyer nor the seller was interested in having generally known the price at which the goods is changing hands Besides, both parties already know the area in which they are buying or selling that is rupees, or hundreds of rupees, or thousands of rupees, So a figure from one to five may be achieved by grasping that many fingers Fingers from six to ten are indicated by grasping five fingers, then one, two or three at a time to make six, seven and eight, etc

The increasing interest in coloured stones on the part of the public and their rapid increase in price are making them more and more interesting to the American jeweller He should find a background of Indian folklore and scientific knowledge in Mr Tank's book that will not only make him a better buyer and retailer of 84 gems, but also the romance with which to create a desire on the part of the consumer to want to own these gems

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By

BRITISH JEWELLER AND WATCH-BUYER

A BOOK ON GEMMOLOGY WITH A DIFFERENCE

We thought we had a pretty complete set of books on gemmology, headed by Robert Webster's comprehensive volume But here we have something completely different, interesting and delightful, even though, sadly one has to take much of the text with a pinch of powdered garnet

The charm of Indian Gemmology is in chapters such as that describing pearls There are eight types, we are told, one being the sky pearl formed in the clouds and coming to earth along with the rain drops It is of a brilliant yellow colour Another pearl is nurtured in the head of the hog, and has a yellowish tinge 'resembling that of mustard oil'

In this mixture of fact and folklore the author goes into the association between various stones, their wearers and the planets, and he also gives medicinal properties Sapphire for instance, finely powdered and sieved through a piece of cloth and then crushed in rose-water of Bedmusk, may be taken with honey, cream, ginger juice or betel and is "indicated' in chronic fever, epilepsy softness of the brain, insanity, hiccups, neuritis, pains in the joints and other ailments

Colour description of stones comes near to poetry Take the ruby, 'Gem of the Sun' Just as the sun occupies the foremost place among the nine planets, says the author, so also the ruby finds precedence among the nine most important jewels Let us quote 'It is of scarlet red colour, resembling the seeds of the Kandhari pomegranate, the blossom of the tesu red lotus, or the beak of a parrot The delicate rosy colour, like that of the eye of the living 'chakravak' (goose) and Cuckoo is also to be found in ruby of the finest colour'

Again, on the medical side, powdered ruby is prescribed for loss of blood, loss of appetite and other troubles At today's prices It would probably also cure surfeit of funds

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COMMUNICATE WITH LOS ANGELES OFFICE

October 5, 1971

Mr. Rajroop Tank
Jeweller
Johari Bazar
Jaipur 3, India

Dear Mr. Tank :

We are delighted to receive your book entitled ''A Comprehensive Compendium and Study Volume of Gems and Gemology''. Your book is quite unlike any that we have encountered. We will be very happy to review it in our quarterly publication ''Gems and Gemology''. Many of the subjects that you take up in your interesting volume are considered from a point of view quite different from those that we have seen elsewhere in the Western World. As a result, we feel that your book will be of interest to many in the United States of America.

Please let us know the cost of the book in this country, that is, at what price we may be able to offer it to our students and other jewellers in America, and what our cost will be if we purchase from you in quantity.

Cordially,
GEMOLOGICAL INSTITUTE OF AMERICA

R. T. Liddicoat

Richard T. Liddicoat, Jr.
President

RTL:mm

By

GEMMOLOGICAL INSTITUTE OF AMERICA

Raj Roop Tank's *Indian Gemmology* is a unique combination of Indian culture with gemmology To simply describe this book as out-of-the-ordinary or most unusual would be insufficient The author uses a totally different approach by giving his readers an overwhelming experience of the timelessness of the Eastern culture—merging the past with the present—in a manner that very few have been able to achieve

There are numerous books in the market today, dealing specifically on the subject of gemstones, with excellent guides for both the experienced gemologist and layman as well *Indian Gemmology* does not pretend to match these books already in print that give detailed accounts of modern scientific investigations or accounts of the physical and chemical properties of all the stones Instead, Raj Roop Tank covers a total of 84 stones and classifies them according to their utility under the following categories "(1) those suitable for jewellery, (2) those required for medicinal purposes, (3) those considered efficacious for propitiating adverse planets, and (4) those required for the manufacture of mortar, toys, etc "

Indian Gemmology takes us back, in ancient times, to society in India, when by classical law, a division of the human activities was organized There was an intellectual class, namely of Brahmins or the learned, to give advice on religious, spiritual and political matters Then, there was the warrior class of the Kshatriyas, which guarded the social structure against outside aggression and inner dissensions The trader class of Vaishyas carried on various occupations in the field of exchange of commodities, and

lastly, there was the service class—known as he Shudras—that carried on small occupations of service to the society

At that time this division was not rigid Gems, having a close relationship and influence on human affairs, came to be distributed according to the professions under the four classes Brahmins, Kshatriyas, Vaishyas and Shudras The author picks gems that are the most commonly in use and groups them throughout his book at various places under what he terms 'the Four Established Varnas' This is one of the many things in *Indian Gemmology* that is so different from what we expect that any reader in the West is sure to find it very fascinating

It is difficult to say when the use of gems came into vogue in the civilized world and many people have written biblical stories on gemstones which have always been and continue to be of interest to readers In this vein, Tank is no exception but he does cover various fascinating accounts in his introduction

Raj Roop Tank's book is certain to be quoted as a "one-of-a-kind" publication As stated previously, *Indian Gemmology* covers 84 stones He takes the most important ones and arranges them in the sequence of the week days—astrologically ! His first chapter begins with "Manikya (Padmarag) Ruby"—ruby to be worn in the morning at sunrise on Sunday Tank's second chapter deals with pearl—to be worn on Monday in the evening—ending with Rahu (Dragon's head)— hessonite—and Ketu (Dragon's tail)—cat's-eye—with each appropriate gem governed by their respective planets

A brief account of the remaining stones arranged in Hindi alphabetical order comprises the remainder of the book Each stone contains items of interest from a purely gemmological viewpoint as well as many more from the human interest point of view For example, under hessonite the section entitled "Medicinal Utility" reads as follows "Hessonite is crushed and powdered finely in

rose, 'Keora,' or 'Bedmushk' water and then taken by mouth It is indicated in acute gastritis, piles, fever with cough, foul breath, rheumatism, suicidal tendencies, rheumatic tumours, swelling of the uterus and constipation" One can imagine how effective the latter information could be over the counter in selling hessonite

The following are partial excerpts taken from Raj Roop Tank's first chapter on ruby .

MANIKYA (PADMARAG) RUBY

"Ordinarily the gemstone (of the corundum family), which possesses the brilliance of lotus petals, is crystal clear and transparent, is free from spots, stains, cracks, striations (the lines seen on the surface of crystal), and dullness of colour, which has got the smooth and delicate lustre of the clarified butter, which is solid, of high specific gravity, of blooming colour, is of a regular shape and appears to be flattening out in a circular fashion, is free from bends and fissures and is not uneven, such a gem is known as an excellent Ruby'

"Ruby is a gem of the Sun Just as the Sun occupies the foremost place amongst the nine planets, so also Ruby finds precedence among the nine most important jewels It is of scarlet red colour resembling the seeds of the 'Kandhari' pomegranate, blossom of the 'tesu' red lotus, or the beak of the parrot Delicate rosy colour, like that of the eye of a living 'chakravak' (goose) and cuckoo, is also to be found in Ruby (of the finest quality) It is a gem of the corundum family, and is a compound mainly of aluminium and oxygen Its red tint is derived from a light combination of iron and chromium"

"In a specimen of Ruby we look for transparency, clarity and strength of colour, the clear, bright, dark crimson called 'pigeon blood"

(A section entitled *"Flaws of Ruby"* follows, giving 14 steps where blemishes may be detected in the specimens

of ruby Then, a helpful guide is given in the *"Varieties of the Native Mineral or Rough of Ruby"* where essential facts in determining the proper use of the rough stone is discussed In addition, there are sections entitled *"Identification of Real or Genuine Rubies"*, and *"Ruby Mines"* which are fascinating)

GROUPING OF RUBIES ACCORDING TO THE FOUR ESTABLISHED VARNAS

"Brahmin (the learned class)

Rubies having the colour of rose petals

Kshatriya (the fighting or the governing class)

Rubies of blood red colour or of the colour of red lotus

Vaishya (Commercial or the trading class)

Rubies of crimson colour resembling that of the seeds of Kandhari pomegranate or the pigeon's blood

Shudra (the serving class)

Rubies having the mixed colour of bluish or dirtish tinge with the red "

WHEN TO WEAR THE RUBY GEM

"According to the astrologers Ruby is worn in the phase of the Sun It is put on the neck, arm, or ring-finger with due regard to the vocation the wearer is following or to the group to which he belongs, in the morning at sunrise on Sunday "

MEDICINAL UTILITY

"Very finely powdered Ruby, and Ruby ash are both utilized for the preparation of medicines to be taken by mouth with suitable vehicles or combinations of drugs for specific diseases Ruby is prescribed for loss of blood, gastric troubles, headache, diseases of the heart, diminished vision, indigestion, prolonged fevers, loss of appetite and various mental troubles "

"The flaws of Ruby do not count in the preparation of medicine A specimen of fine colour and fire and water needs to be selected

"It may, however, be noted that it is only the Burma Ruby which has been found to be useful for medicines "

In addition to ruby, Rajroop Tank's book covers—in similar fashion—pearl, coral, emerald, white or golden sapphire, diamond, blue sapphire, hessonite, cat's-eye, and tourmaline, with a brief account of seventy-five stones (previously mentioned) given in Hindi alphabetical order

Upon opening *Indian Gemmology*, one journeys from West to East—experiences yesterday with today, in eye-opening fashion—and obtains a knowledge of gemmology en route Rajroop Tank has certainly written a most unusual publication It is a fascinating book that should of interest to all

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PREFACE

About ten years back, some Hindi journalists met me and asked for literature on Gemmology I placed before them a number of books in English and other foreign languages, on the subject, and briefly explained to them some relevant details as best as I could I also advised them to pay a visit to the office of the Jewellers' Association They appeared to be keenly interested in the subject, and enquired whether any book in Hindi was available on the subject As there was none, I had to keep mum This incident pricked my heart That very moment, I decided to make an attempt to produce a book in Hindi on the subject But I was doubtful about my capacity to undertake the work

The fact is that neither I am a writer nor very much interested in writing But somehow the book took the form Relevant material on the subject collected from various books and supplemented by my personal knowledge was compiled in the form of a book I felt that it could go to the press and might be of some use to those who are interested in the subject

One day I casually mentioned to the Jain Sadhvi (nun) Reverend Shri Vinai Shriji, from whom I have had the great privilege to learn a lot in my life She encouraged me to write the dissertation on gemstones and was kind enough to furnish me with relevant extracts from a book in Prakrit Some of them have been incorporated in the manual

Thus "Ratna Prakash" in Hindi saw the light of the day I do not know why, but it is natural, I remember my late respected father Shri Manik Chand Ji by whose blessings to-day I am flourishing in the business It is a common saying

that nothing lasts in this transient and ever-changing world but I feel that my late revered father's benign benediction has been with me every moment throughout my life How ardently I wish, he were alive today !

Bharat, ancient land of ours, has from times immemorial been a pioneer in all branches of learning It has been our great privilege to be foremost in the field of Gemmology In the hoary past our Rishis and Maharshis, and our learned Jain Acharyas and Philosophers unfolded before the world the secrets about the gemstones, but this knowledge having been handed down traditionally by the learned ones by the word of mouth, detailed and reliable literature in Hindi on the subject is almost non-existent—the deficiency has all along been keenly felt It has dogged us till the very modern times, so much so, that no original Hindi book was available on the subject This in brief is the history of my attempt at writing the book "Ratna Prakash" which was originally published in the Samvat year 2016 (A D 1960) A revised and enlarged edition was issued in the Samvat year 2023 (A D 1967)

I feel that it is necessary for me to record my great indebtedness to the late Shri Ratan Lal Ji Phophaliya from whom I derived the knowledge regarding gemstones

As regards the English edition of this modest book, I may say that I had an occasion to give a talk on gems before the Rotarians of Jaipur The audience included the intelligentsia of the Capital and also some foreign dignitaries Curiously enough they evinced keen interest in the subject and suggested that an English edition of the manual should also be published This inspired me to produce the English version I hope the present English edition may satisfy the inquisitiveness of average person, for whom the book is intended

The Sanskrit sutras are extracts from RATNA PARIKSHA by Augustya

Raj Roop Tank

Indian Gemmology

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INTRODUCTION

Today, when the tempo of scientific investigation is at its zenith, the fundamental principle has been fully established that the mass out of which the Earth emerged, originated from that mass of which the Sun is formed This planet of ours is the ultimate resultant of the clash between the element of fire of the solar mass and the prevailing 'soma' or the lunar element of the firmament—Ultimate, because prior to the formation of the Earth a number of other heavenly bodies had already come into existence in the heavens, which like the earth are sustained in their orbits by the gravitation of the Sun

Every night we see an infinite number of stars in the sky, but not all of them can be called planets Only those stars which have close relationship with the Earth are considered planets Hence, the astrologers deem the nine stars, namely the Sun, the Moon, Mars, Mercury, Jupiter, Venus, Saturn, Rahu (Dragon's Head) and Ketu (Dragon's Tail) as the planets of the Sun Other stars may be in fact the planets of some other heavenly bodies, but they have no identity as such, so far as the Earth is concerned The Sun and the other planets mentioned above have such an intimate and profound relationship with the terrestrial beings that when in their natural course these powerful heavenly bodies come into clash with our own course, we feel more intensely the adverse and prejudicial effects in our lives, while if their course is favourable to ours, not only our ailments come to an end, but we are blessed with great prosperity and happiness Every living person can experience this fact in his life

In this strange and mysterious creation of the Nature, man is the only living being who by virtue of his intellectual

faculty and never-ending urge for scientific investigation has attained in this sentient world the highest pinnacle of glory

The human being by his natural power of inquiry into the reality of things and as a result of his scientific insight, having studied the close and inevitable kinship between the nine planets and the happiness and grief of his own day-to-day life, has discovered potent things in the womb of mother Earth, which owe their creation to the influence of the special properties of each of the nine 'Grahas' or planets

Gems, amulets, and medicine, under these three categories the learned philosophers have classified the materials which they consider effective to avert the evil and unfavourable aspects of life According to the circumstances obtaining in each particular case, and the resources of the person concerned, all the three methods combined, or any one of them singly are tried to mitigate the adverse effect caused by the current phase of the planet concerned

It is believed that the origin of the principal nine Gems, viz Ruby, Pearl, Coral, Emerald, Pukhraj (White and Yellow Sapphire), Diamond, Sapphire (blue), 'Gomedak and Cat's eye, is due to the effect of the rays directly falling in the sphere of the influence of the Sun, the Moon, Mars, Mercury, Jupiter, Venus, Saturn, Dragon's Head (Rahu) and Dragon's Tail (Ketu) respectively according to the specific elements contained in each of them This explains why the colour of a gem varies according to the colour of the planet governing it

Hence it is that the gem concerned possesses the particular propensity attributed to the planet governing it This can be felt practically by the resultant joy or grief on wearing the gem concerned or propitiating the corresponding planet It would thus be seen that the gemstones produced in the womb of mother Earth possess great utility for moulding human destiny. And this fact is fully borne out by scientific investigations, for both the elements viz of 'Agni' (Fire)

and 'Soma' (Moon) referred to above in connection with the formation of the Earth planet are in essence the life and marrow of the gem world The elements of water and light are of the utmost significance in the case of the precious stones as well, and their value is determined by the quantity of each contained in them

It is very difficult to say since when the use of gems came into vogue in the civilized world References to the Nava Ratnas, the nine principal gems are found in the most ancient of the Shastras (sacred books) There is difference of opinion as to their origin In his celebrated treatise 'Vrihat Samhita' Varahmihir has dealt with in great detail regarding the properties of the precious stones As to their origin he writes thus —

रत्नानि बलाद्दैत्याद्दधीचितोऽन्ये वदन्ति जातानि ।
केविद्भुव स्वभावाद्वैचित्र्यप्राद्वुरुपलानाम् ॥

It is said that the gems were produced by the Demon Bali Or may be, they had their origin in the bones of Maharshi Dadhichi Or possibly they were produced in the womb of the Earth herself

The founder of the Jain religion, the First Tirthankar (God) Swami Rishabhdeoji's mother is believed to have seen a number of gems in her dream, before her son, the great preceptor was born The gems have been enumerated in Shri "JAMBUDWIP SHANTI CHANDRIYAVRITTI" (Page 61) and also in "Vakshaskar Jambudwip Agamodaya" (Precept No 8)

विजयस्सरण दारस्स उवरिमागारे सोलस विहेहिं
रयणेहिं उवसोभिये तेजहारयणेहिं वईरेहिं वेरुलिएहि
लोहि अक्खेहिं मसारगल्लेहिं हसगब्भेहिं सोगधि एहिं अकेहि
अक्षरणेहिं रयएहिं जायरुवेहि अजणपुल एहिं फलिहेहिं
रिट्ठेहिं पुलएहिं ।

In the above quotation

तेजहारयणेहिं	Means	Gem
वइरेहिं	,,	Diamond
वेरुलिएहिं	,,	Cat's-eye
लोहि अक्खेहिं	,,	Ruby
मसारगल्लेहिं	,,	Turquoise
हसगब्भेहिं	,,	Pearl
सोगधिएहिं	,,	Ruby of Bangkok (Thailand)
अकेहिं	,,	Emerald
अजणेहिं	,,	Sapphire
रयएहिं	,,	Silver
जायरूवेहिं	,,	Gold
रिट्ठेहिं	,,	Crystal
पुलएहिं	,,	Garnet

The following extracts from "Quartz family Minerals" by Dake Fluner and Wilson on 'gemstones in the Bible' will be read with interest

"The Biblical story of gemstones begins in the Second Chapter of the first book of the Bible, with the mention of bdellium (probably opal) and the onyx stone, in the Land of Havilah, just outside the Garden of Eden In Revelation, Chaps XXI & XXII we read a glorious description of the Holy City, the New Jerusalem with walls of solid jasper and streets of gold Between the first and last chapters of the Bible a total of 1,704 references are made to gemstones and minerals, under 124 different Hebrew and Greek names A number of these stones are minerals of the quartz family

"Seemingly, there were many gem mineral localities in the Garden of Eden The Holy spirit, in describing the glory of this dominion, states "Thou has been in Eden, the

Garden of God, every precious stone was thy covering, the sardius (Carnelian), Topaz, Diamond, Beryl, Onyx, Jasper, Sapphire, Emerald, Carbuncle (Garnet and Sard) and Gold

"In the Bible we read a fascinating account of the directions given to the High Priest for a marvellous breastplate he must wear 'And thou shall set in it settings of stones, even 4 rows of stones, the first row shall be a sardius, a topaz and a carbuncle And the second row shall be an Emerald, a Sapphire and a Diamond, and the third row a Ligure, an Agate, and an Amethyst. And the fourth row a Beryl, and an Onyx and a Jasper' 'Thus, of the 12 cut stones in the breast-plate of the High Priest, at least half were of the quartz family, counting the two onyx gems which were attached to the chain of pure gold by which the large plate was suspended over the neck In all probability, the quartz gems were in Biblical times the most plentiful of all gems, even as they are in our own time

"The stones of the breastplate were all engraved with the names of the tribes of the children of Israel, like the engravings of a signet The significant feature about the breastplate is the amazing fact that the individual gemstone chosen by God to represent the individual tribe bore within the very nature of that stone itself the nature of the tribe it represented Thus these twelve gems held considerable religious meaning at that time

"In the description of the City of New Jerusalem (Rev XXI 19-27), the Bible goes into the realm of gems and minerals, with those of the quartz family, taking a conspicuous part The foundations of the wall of the City were garnished with all manner of precious stones The first foundation was Jasper, the second, Sapphire, the third, Chalcedony, and so on down including Emerald, Sardonyx, Sardues, Chrysoprase, Jacenth and Amethyst Again, the quartz minerals appear to be given a prominent part

"Table of Biblical Quartz Gems

Scriptural References			*Biblical Name*	*Modern*
Isiah	54	12	Agate	Agate
Revelation	21	20	Amethyst	Amethyst
Genesis	2	12	Bedellium	Opal
Revelation	21	19	Chalcedonius	Chalcedony
Revelation	21	20	Chrysoprasus	Chrysoprase
Revelation	21	20	Chrysoprasus	Citrine
Revelation	4	6	Crystal	Quartz Crystal
Deuteronomy	8	15	Flint	Flint
Revelation	21	11	Jasper	Jasper (Jade)
Exodus	28	19	Ligure	Opal (Zircon)
Genesis	2	12	Onyx	Onyx
Revelation	4	3	Sardine	Carnelian
Revelation	4	3	Sardius	Sard"

There is an old treatise 'Ratna Pariksha' (Identification of Gems) written by one, Agastya It is not known who the learned author was and at what date he flourished The book contains the names of various gems and their attributes have been eulogised, but nothing further has been written therein as to their detailed properties

During the reign of Sultan Allauddin Khilji of Delhi, his jeweller Thakkar Pheru wrote a book in Prakrit "Ratna Pariksha" (Examination of Gems) for the use of his son Hempal (Samwat year 1372 or A D 1315) He belonged to the Dhandhiya 'gotra of Shrimal caste The book is at present in the possession of Shri Agar Chand Nahata of Bikaner and has recently been published by the Institute of Oriental Research, Jodhpur This book contains more detailed information about Precious Stones than other books by contemporary authors or those preceding it

Thakkar Pheru has included 84 Gems (inclusive of 75 Semiprecious Stones) in his treatise This is the traditional number Some additions have been made to his number in

recent times, but on closer examination it would be found that the new additions are only the variations of the gem-stones already enumerated by the aforesaid learned author

Shri Abhaya Chand Jaju Maheshwari, Jeweller, too has written "Ratna Pariksha" in Hindi verse It sets forth a systematic account of the conditions appropriate for wearing the particular gem or gems, and their medicinal utility

There are important books in Sanskrit written by learned authors relating to the Investigation of Precious Stones One of these is the great Acharya Varahmihir whose Astronomical treatise "Vrihat Samhita" contains an account of the original varieties of minerals and Precious Stones such as Kurvind The Western Scientists have borrowed a lot from the aforesaid authors and have based their observations mainly on them "Kurvind" has undergone a metamorphosis and taken the form of 'Corundum' in the West Such variations are bound to occur as a result of difference in places and languages The classification made by our great Indian Savants has generally been adhered to by the modern Western Scientists There are some differences here and there which is of course natural

The learned Urdu author Shri Amarnath Tehsildar has written a book "Aaine Jawahar" or the "Mirror of Gems" It contains a comprehensive description of Gems and Semi-Precious Stones The medical profession has relied mainly on the 'Nava Ratnas' and to some extent on other mineral stones for the treatment of diseases, and renowned physicians have written books on the subject

The late Masihulmulk Ajmalkhan, a physician of international fame, relied greatly on gemstones in preparation of his medicines for the treatment of chronic diseases According to the Unani School of medicine 'Jawahar Mohara' and 'Yashav' (Jade) are of great efficacy for curing the ailments of the heart

In our ancient land learned persons have from time to time written books on Gems and other Stones

The Western authors have also done monumental work in this direction and have written numerous books on the subject The present writer has derived his knowledge of gemstones to a notable extent from them and relied greatly on the following

G F Herbert Smith	"Gem Stones"
Robert Webster	"Practical Gemmology" or Gemmologist's Compendium
R G Rojers	"A Dictionary of Gems"

In the aforesaid books the authors have recorded the results of modern scientific investigations and given detailed accounts of the physical and chemical properties of Precious Stones The formulae of the chemical analysis of these minerals and the elements which give specific colours to the particular varieties of the crystals of the gemstones have also been included in them However, a detailed account of all the 84 varieties of mineral stones is not available in them In the present book I have dealt with those gems and Semi-Precious Stones as are most commonly in use

Fortunately, I belong to a family of Jewellers whose hereditary profession has been trade and business in Precious Stones Hence I had occasion to gain the practical knowledge in all the branches of this vocation, following the family tradition and experience of my forefathers However, to an appreciable extent I have relied on the following works in compiling the present book

Varahmihir	"Vrihat Samhita"
Vagbhatt	"Ras Ratna Samuchchaya"
Abhai Chand	"Ratna Pariksha"
Thakkar Pheru	"Ratna Pariksha '
Agastya	"Ratna Pariksha'
Deverdhigani (A Jain Saint)	"Kalp Sutra"

The Western Scientists of today have laid great stress on the study of the properties of minerals especially of the category of Precious and Semi-Precious Stones, as they had never done before New Instruments have been invented and methods devised for determining accurately specific gravity, comparative solidity, hardness etc for identification of the specimens with a view to find out whether they are genuine or only synthetic products In our own country from times immemorial these very factors have received the closest attention The method in vogue here of testing the density, solidity, and hardness is by handling and feeling the specimen, and by discerning eye in its colour, water and flaws inherent in its composition and structure Experienced hands can examine and tell them instinctively as if by intuition and their judgements are generally correct Even in this age of mechanical advancement and invention of accurate scientific instruments correct decisions cannot be arrived at without the aid of experienced fingers and penetrating eye An instrument can only assist the eye The real test and identification of a Gem or Gem material depends entirely on observation by discerning eye and skilful fingers Experienced Jeweller even today determine the density and hardness of a gem by handling it and detect its flaws and shortcomings by examining it minutely with the aid of eye The detection of these flaws and impurities alone helps in the determination of the fact whether a gem is real or artificial

Feathers, clouds, spots, streaks, silk, fractures and inclusions are the flaws which, of course, detract from the value of any transparent crystal, as they interfere with the light, transparency and colour But such flaws are inherent in its composition and structure and are the inevitable adjuncts of a precious stone A flawless gem or gem material is extremely rare It is the flaws of a Precious or Semi-Precious Stone that distinguish the genuine from the synthetic or imitation The inclusions in the minerals serve

as a means of gemstone identification "As you look at a flawed crystal through a microscope a whole new world of design opens up The fine rutile needles called silk often show up particularly in Rubies, and Sapphires—where it can actually improve the shade Under a microscope the stone looks as if a skein of delicate silk had flown through it" ** The imitation jewels are artificial and can easily be detected by the absence of flaws and streaks in their texture The existence of natural blemishes, is indeed the best criterian for judging the genuineness of the Precious Stone under observation The flaws and blemishes are, however, of consequence only where gems are selected for wearing or for propitiating the stars whose adverse influence is sought to be neutralized They are of no importance in preparation of medicines for treatment of specific diseases

The eighty-four stones are classified according to their utility under four categories (1) Those suitable for jewellery, (2) Those required for medicinal purposes, (3) Those considered efficacious for propitiating adverse planets, and (4) Those required for the manufacture of mortar, toys etc They have been dealt with in this book at appropriate places The most important nine gems have been dealt with in the sequence of the week days beginning from Sunday, and ending with Rahu (Dragon's head) and Ketu(Dragon's tail), with the appropriate gem governed by the respective planet The rest of the Gems and Semi-Precious Stones have been detailed in alphabetical order according to their Hindi names

In ancient times society in India was organised on a scientific division of the human activities There was an intellectual class, namely of Brahmins or the learned, to give advice on matters religious, spiritual and political Then there was the warrior class of the Kshatriyas which guarded the social structure against outside aggression and inner

**Mab Wilson 'Gems

dissensions The trader class of Vaishyas carried on various occupations in the field of exchange of commodities Lastly there was the service class carrying on small occupations of service to the society and was known as the Shudras This division was then not rigid The gems which as we have already noted having close relationship and influence on human affairs, came to be distributed according to the professions under the four categories of Brahmins, Kshatriyas, Vaishyas and Shudras This classification has been retained in the body of the book and the principal nine gems have been grouped under the aforesaid categories, to help the readers in selecting a gem according to the profession which they may be having in actual life, and for propitiation of the adverse effect of the governing planets

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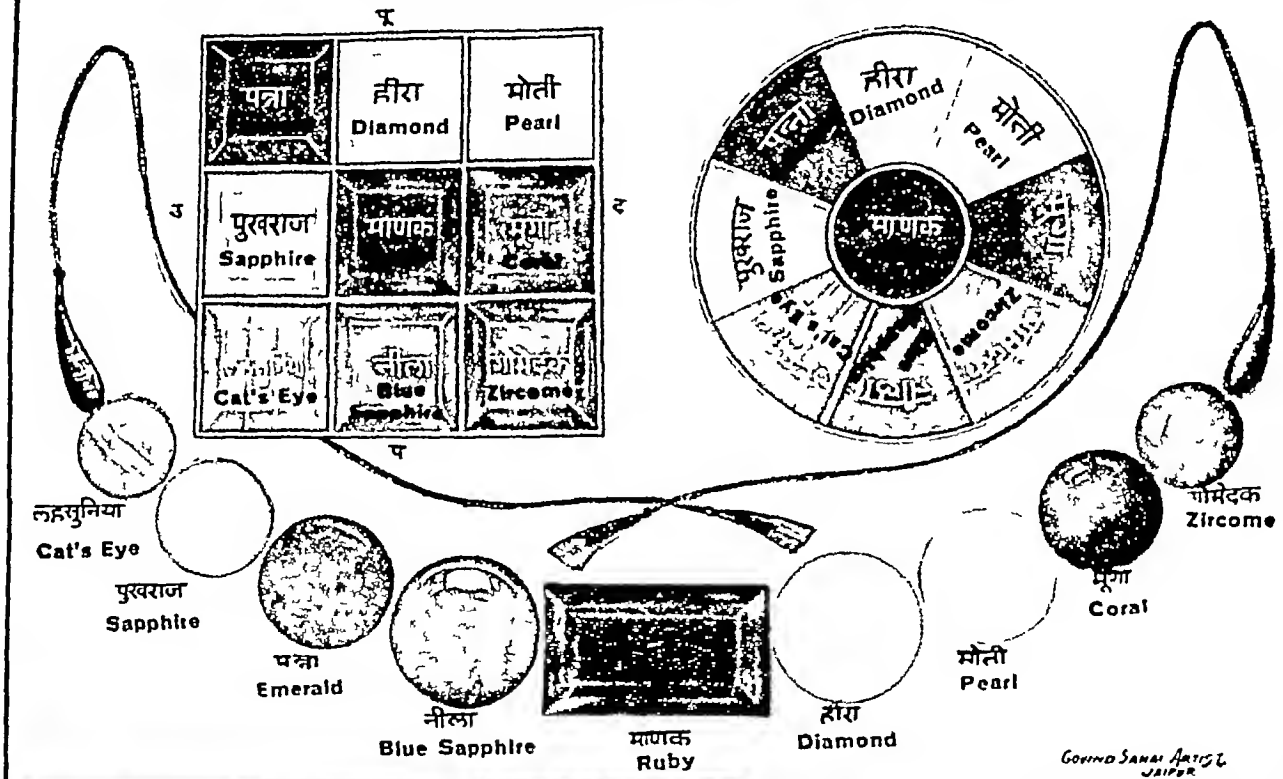
Setting System of Nine Gems



माणिक्य (पद्मराग)

MANIKYA (PADMARAG)

RUBY

लाक्षारसनिभञ्चैव, पद्मवर्णं च दूरतः ।
दाड़िमी बीज संकाश, लोध्रपुष्पेन सन्निभम् ।।
माणिक्यं पद्मरागाख्यं, द्वितीय नीलगन्धि च ।
कुशेशयदलच्छाय, स्वच्छ स्निग्धं गुरु स्फुटम् ।
वृत्तायतसम गात्रं, माणिक्य श्रेष्ठमुच्यते ।।

The Gem, which on being examined from distance, emits the radiance and colour of boiled scarlet solution of lac contained in a transparent vessel of glass or crystal, or possesses the tint and brilliance of a blooming scarlet lotus, or gives out the sparkling brightness of the seeds of 'Kandhari' pomegranate, or has the hue of the fresh blossoms of 'Pathani Lodhra', that gem is called Ruby That gem is designated as the Ruby or 'Padmarag', corundum The precious stone which possesses all the aforesaid excellence but emits blue sheen, is known as 'Neelgandh', Sapphirine Ruby

Ordinarily the Gemstone (of the corundum family), which possesses the brilliance of lotus petals, is crystal clear and transparent, is free from spots, stains, cracks, striations (the lines seen on the surface of crystal), and dullness of colour, which has got the smooth and delicate lustre of the clarified butter, which is solid, of high specific gravity, of blooming colour, is of a regular shape and appears to be flattening out in a circular fashion, is free

from bends and fissures and is not uneven, such a gem is known as an excellent Ruby

Ruby is derived from the Latin 'rubeus', meaning red

Ruby is a gem of the Sun Just as the Sun occupies the foremost place amongst the nine planets, so also Ruby finds precedence among the nine most important jewels It is of scarlet red colour resembling the seeds of the 'Kandhari' pomegranate, blossom of the 'tesu' red lotus, or the beak of the parrot Delicate rosy colour, like that of the eye of a living 'chakravak (goose) and cuckoo, is also to be found in Ruby (of the finest quality) It is a gem of the corundum family, and is a compound mainly of aluminium and oxygen Its red tint is derived from a light combination of iron and chromium

In a specimen of Ruby we look for transparency, clarity and strength of colour, the clear, bright, dark crimson called 'pigeon blood'

SCIENTIFIC ANALYSIS

Chemical Formula	Al_2O_3
Specific Gravity	Burma Ruby 3 97 to 4 01 Thailand Ruby 3 99 to 4 05
Hardness	9
Refractive Index	1 76 to 1 77

FLAWS OF RUBY

Any one or more of the following blemishes may be detected in specimens of Ruby —

1 It may be dull, that is, devoid of brilliance and lustre

2 It may be silky

3 It may not be homogenous, that is, it may display an ambiguity of colours

4 It may be brittle, apt to break

5 There may be lack of water and fire in it

6 It may be flimsy

7 It may be feathery

8 There may be a crack in its texture

9 There may be dirtiness in colour

10 It may be smoky

11 It may be having black or white spot in its composition

12 It may be honey-coloured or having a spot like a drop of honey

13 There may be bluishness in its tint

14 It may be having a slit or cavity or hole inside

VARIETIES OF THE NATIVE MINERAL OR ROUGH OF RUBY

1 'Niman'

Niman Ruby is of yellowish tint and is full of blemishes, its water lacks in brilliancy

2 'Jaat bund' (good quality)

Ruby of 'Jaat bund' variety is of crystal clear and limpid water, and of dazzling brightness resembling that of the seeds of the 'Kandhari' pomegranate or red lotus, or the beak of a parrot, and has the delicate tint of the petals of rose

3 "Niman Jaat bund"

This variety of Ruby is of a bluish tint It lacks in fire and appears to be greasy

It is essential to see these facts in the rough stone as it helps to determine as to the proper use that stone may be put to for example 'Niman' may be utilized for cutting cabochons, leaves, drops and beads

'Jaat bund' Ruby may be used for cuts If, however, there are slits or crevices in its texture or it has got some other flaws, it may be suitable for unfacetted cut 'Niman

Jaat bund' Rubies are suitable for all types of cuts It all depends on the nature and quality of the stone

Rough Ruby stone of 'ledi' colour. This is considered to be the best variety of Ruby It is of crimson colour resembling the seeds of the 'Kandhari' pomegranate

A flawless Ruby of the finest variety weighing more than 25 carats is designated by the name of 'Chhatrapati'

IDENTIFICATION OF REAL OR GENUINE RUBIES

1 When placed on the eyelid the real gem gives a feeling of coolness Glass or imitation gets warm instantly

2 Ruby is of a higher density

3 If the material is light or there are bubbles in its composition, the specimen is glass or imitation stone.

4 If the specimen has a silky spot with a blue shade and that spot is stationary and does not emit a flickering glamour, it is a synthetic stone

5 If there is a crack in the composition of the specimen, it is necessary to determine whether it is a Ruby or a piece of glass In a glass piece the crack would shine The natural crack in the texture of a real gem is quite different from that in an artificial one It does not emit light It is inherent in its very nature and is not straight but zigzag, whereas the crack of an imitation stone is quite straight and clearly visible Because of the presence of inclusions, tension cracks, and peculiar structure lines, cut synthetic gems can in most cases be easily distinguished from natural stones

6 Bubbles in a glass piece or imitation stone are round, bare, white and sometimes hollow, whereas in a Ruby they are of the colour of the gem and not round in form As a matter of fact bubbles are

Un-Facetted Cuts

Engraved Long Bead

Mridang Shape Long Bead

Long Bead

Round Bead

Drop

Horizontal Hole

Vertical Hole

Engraved

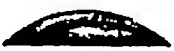
Takhi

Flat Cut

Square Flat Cut

Round Flat Cut

Cabochons



Highly Domed Cabochons

Hollow Cuts

Tabiz

rarely to be found in real gems, and if they are present at all, they can easily be distinguished by close observation

7 There is a vast difference between the layers of a Ruby and those of an imitation stone The layers of Ruby are straight while those of an imitation stone circular This is a sure criterion

Core and fibres are met within the specimens of imitation products also but they are rough and white, while the core and fibres of Ruby are smooth and coloured If the lower part of raw material of a synthetic stone happens to be included in the cut and polished specimen, the raw and white particles in the form of powder will be clearly visible

There are two varieties of artificial Rubies, one is called Imitation Ruby, the other Synthetic Ruby The main difference between the two varieties is that in a synthetic stone the flaws resemble those of the genuine gem, but the main difference between a synthetic and imitation is, that the silk which seems in synthetic is of bluish tint in texture while in imitation the silk seems white and dull When examined under an ultraviolet lamp both would appear to be of an orange colour, while under microscope the flaws of imitation as well as synthetic stone would appear similar. The structure of genuine Ruby is quite different from that of synthetic

RUBY MINES

Ruby mines are generally found in Ahwa (old name of Mogok in Burma), Thailand, Ceylon, Kabul (Afghanistan), Tanganyika (Africa) and Kangium (Southern India)

DISTINCTIVE FEATURES OF RUBY MINES

(1) Mines of best Rubies are situated in Burma Rubies extracted from these mines vary in colour from that of rose petals to crimson

(2) Rubies derived from the mines in Thailand are of an inferior quality as compared to those of Burma The Rubies of Siam are darker in tint, and dull in texture The clear, limpid, deep crimson-red of a fine Mogok Ruby is simply incomparable

The silk and fire of Thailand Ruby is diffused in its structure and so it does not show the star lines when the rough stone is cut and polished On the other hand in Ruby of Burma mines the silk and fire is concentrated in its composition and so when the specimen is rotated from one side to another it emits a flickering glamour This is the fundamental difference between the two varieties mentioned above

It is, however, worthy of note that a good die for the manufacture of silver wire is made only of the Thailand Ruby

(3) Rubies extracted from the mines at Ratnapur in Ceylon contain more water, but less fire in comparison to the Burma Rubies, and most of them are of bluish tint Rough stones of small size are not found in Ratnapur mines

(4) In the Kabul Rubies there is less water Moreover, they are brittle There are more white spots in them but they are of a very fine colour Sometimes a specimen of very fine water is obtained and such a gem is superior even to that of Burma But this happens very rarely The produce of this mine is used for cutting beads and cabochons

(5) A Ruby mine has been discovered at Kangiyan in Southern India, and its produce is known by the name of Kangiyan Rubies They are of a dull red colour and dark blue and pale tint, somewhat dirty Some specimens are indeed of a very fine quality which on being cut emit brilliant lustre The gems of this mine may be dark or translucent or transparent Some of the pieces are of really very fine

water But they are of lighter colour and resemble the Siam Ruby In this respect, sometimes they look like the spinel

(6) Tanganyika Ruby is very crisp It is of red colour with a dark tinge When it has yellow tint it shows a reddish yellow colour It differs from Siam Ruby in the respect that it contains yellow tint

Recently, Ruby has been found out at Alipur, near Hyderabad in South India The quality of Ruby of this mine being opaque and transluscent However, a few are very transparent, with brilliant lovely colours and lustre

GROUPING OF RUBIES ACCORDING TO THE FOUR ESTABLISHED VARNAS

Brahmin (the learned class)	Rubies having the colour of rose petals
Kshatriya (the fighting or the governing class)	Rubies of blood red colour or of the colour of red lotus.
Vaishya (commercial or the trading class)	Rubies of crimson colour resembling that of the seeds of Kandhari pomegranate or the pigeon's blood
Shudra (the serving class)	Rubies having the mixed colour of bluish or dirtish tinge with the red

WHEN TO WEAR THE RUBY GEM

According to the astrologers Ruby is worn in the phase of the Sun It is put on the neck, arm, or ring finger, with due regard to the vocation the wearer is following or to the group to which he belongs, in the morning at sunrise on Sunday

MEDICINAL UTILITY

Very finely powdered Ruby, and Ruby ash are both utilized for the preparation of medicines to be taken by

mouth with suitable vehicles or combinations of drugs for specific diseases Ruby is prescribed for loss of blood, gastric troubles, headache, diseases of the heart, diminished vision, indigestion, prolonged fevers, loss of appetite and various mental troubles

The flaws of Ruby do not count in the preparation of medicine A specimen of fine colour and fire and water needs to be selected

It may, however, be noted that it is only the Burma Ruby which has been found to be useful for medicines

SPECIAL REMARKS

Ruby is the most valuable of all the precious stones It tends towards the red While cutting a gem from the rough stone this fact has to be specially borne in mind as it is of great importance in distinguishing the real from the spurious The real gem when seen from the front would appear to be crimson while from the side it would indicate some variation in colour On the other hand an imitation Ruby would appear of the same uniform colour from all angles No special distinction would in that case be visible The scientists have tried their utmost to remove this shortcoming and to bring the artificial Rubies as near to the real as possible but they have not met with success This is the fundamental difference between the real and the unreal

There is a similarity of colour between Ruby and other gems and semi-precious stones such as the Spinel, Garnet, the Topaz, Tourmaline, the Sinduria and Rubellite The main difference is that the Ruby is the hardest of all The other stones are softer than Ruby In Ruby there are silky and milky inclusions, while in other stones they are not to be found There is vast difference between the colour of Ruby and that of other precious stones The distinguishing feature is that when one is rubbed against the other there would be no effect on the Ruby while the Ruby will scratch the others

Sometimes a silky specimen is met within Rubellite and Garnet, but it is at once identified by the difference in its colour and hardness

To sum up

"It is the Rubies of the Burmese Empire which are its greatest boast, as both in brilliance and clearness they are the best in the world", wrote Father Sangermano, who lived in Ava between 1783 and 1806 Rubies do come from other countries notably from Siam and Ceylon but the clear, limpid, deep crimson-red of a fine Mogok Ruby is incomparable The shade which is most prized is a transparent, carmine-red, with a slight bluish tint which yields the famous 'Pigeon's blood' stone, the term being derived from Sanskrit, and Indian Jewellers compare the colour of a faultless Ruby with the blood-red colour of a living Pigeon's blood Compared with the Burmese stones Siamese Rubies are generally darker in colour, inclining to a claret red, or with a purplish brown tinge, while Ceylon Rubies are, as a rule, bluish in colour with an uneven distribution of tint which may appear as spots and streaks of blue in the stone itself A delicate, whitish sheen on the surface of a cut stone is a characteristic of Burmese Rubies

It is a common-place remark that the Ruby is a more valuable stone than the Diamond This applies only to perfect Rubies of larger size A fine Ruby begins to rival a diamond of the same class when it is about 2 carats in weight, but beyond that the Ruby exceeds the Diamond in value A perfect Ruby of 10 carats is a most exceptional rarity Large Rubies of superb quality are perhaps the most valuable minerals known to mankind The great 'Peace Ruby' of 1919, a superfine stone of magnificent colour weighed 42 carats and except for a fracture estimated to necessitate the removal of a slice of about 8 carats, was in every way perfect It was sold in the rough, on the spot, in Magok, to an Indian dealer for Rs 3 lakhs In October 1932, a fine stone weighing about 30 carats valued at

£ 7,000 was found in Burma at Magok In February 1933, a stone weighing 20 carats from Burma was cut at Hatton Gardens to a weight of 7½ carats and valued at £ 10,000/-

Once a Ruby weighing about 400 carats was found in a Burma mine It was cut into two finished Gems weighing 70 carats and 40 carats respectively and the third piece was sold at Calcutta for Rs 7 lacs Similarly another fine ruby weighing 79 5 carats was found there

Ruby and Sapphire are used extensively for Gem purposes They are produced artificially in good quality and are used mainly in cheap jewellery and bearings in watches, in electrical and scientific instruments Synthetic Star Rubies and Sapphires have also been produced since September 1947

These can, however, be easily distinguished from the real ones

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मोती (मुक्ता)

MOTI (MUKTA)

PEARL

सुतार च गुरु-स्निग्ध, सुवृत्त निर्मल स्फुटम् ।
पठन्ति रत्नशास्त्रेषु, मौक्तिक चापि षड्गुणम् ।।

द्विप भुजग शुक्ति, शखाभ्रवेणु-तिमि-सूकर-प्रसूतानि ।
मुक्ताफलानि तेषा, बहु साधु च शुक्तिज भवति ।।

हलादि श्वेत लघु स्निग्ध, रश्मिवान्निर्मल महत् ।
ख्यात तोयप्रभं वृत्त, मौक्तिक नवधा शुभम् ।।

रौक्ष्याग निर्जल श्याव, ताम्राभ लवणोपमम् ।
अर्द्ध शुभ्रं च विकट, ग्रन्थिल मौक्तिक त्यजेत् ।।

A real Pearl has got the brilliance of a star Like a star shining during the night in the blue firmament it emits sparkling light intermittently, its shimmering glow seems to find its way from the very depth of its core A genuine Pearl according to the ancient scientists has got the following six predominant features —

(1) It is big,

(2) It is of high specific gravity,

(3) It possesses a peculiar lustre and delicate play of surface colour called its 'Orient',

(4) It is globular and perfect in shape,

(5) It is spotless and free from blemishes,

(6) It is smooth and regular

Pearls are derived from eight sources

(1) From the temple of an elephant,

(2) From the hood of a King Cobra (de capello),

(3) From conch or the lining of the shell of marine molluscs,

(4) From the Pearl-oysters,

(5) From the clouds,

(6) From the brain of fish,

(7) From the hog's head,

(8) From the core of a bamboo

The most valuable Pearls, however, come from the Pearl-oysters

A fine Pearl invariably delights the on-looker, it is of a whitish colour, it possesses soft glamour, never gives a disagreeable sensation to the eye, on the other hand it attracts constant attention, it emits lustre, it is pure, unspotted and clear, a big, circular perfectly round bead, which displays the gleam of circulating water in its composition That Pearl alone which possesses the aforesaid nine characteristic features is to be considered auspicious

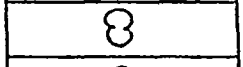
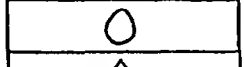
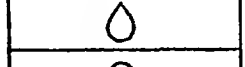
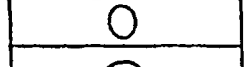
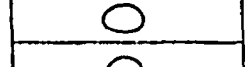
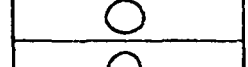
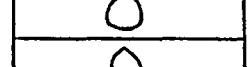
And a Pearl which is lacking in Pearl lustre, which is devoid of the gleam of circulating water in its texture, which is black or copper coloured, which glitters like a crystal of salt, only the half part of which is white, the other half presenting a different colour, which is of an irregular shape of oddly formed—such defective specimens are to be rejected altogether

The word 'Pearl' is derived possibly from the Greek for "Pear", later from the Latin 'Perna', although Pliny called the big ones 'Unio' and the lesser pearls "maragarila' from the Persian "child of the sea"

In Pearl we look for size, symmetry, lustre and colour

Pearl is a gem of the moon Out of the nine most important gems, Pearl alone is to be found within the living

Pearl Shapes

Name	*Shape*	*No*
Kalki		20
Sira		19
Chokhasira		18
Sujani		17
Khada Gabha		16
Teer Gabha		15
Gabha		14
Aaan		13
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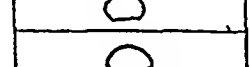
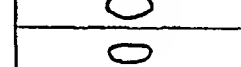
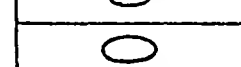
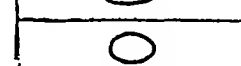
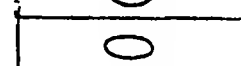
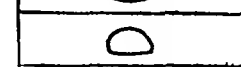
Kamar		11
Baithi Kamar		10
Batia		9
Simta Ansar		8
Chikna Ansar		7
Ansar		6
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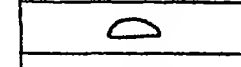
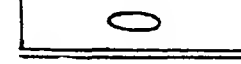
Chokha Paya		4
Karkar Paya		3
Paya		2
Talia		1

organisms It is derived from eight sources and consequently it is classified under eight categories All the eight types of Pearls which are listed below are not available to every one They are within the reach of those alone who toil hard incessantly for them and devote all their life to secure them Most of the types are not at all to be had nowadays, and some of them are met with only rarely Pearls found inside the shells of oyster alone are readily available and commonly used these days

EIGHT TYPES OF PEARLS

1 **Sky-Pearl** This variety of Pearl is formed in the clouds and comes to the earth along with the raindrops It is of a brilliant yellow colour

2 **Cobra-Pearl** It has its source in the hood of King Cobra, is very bright and of a blue tint It is known as the 'Naga-Mani' or the 'Snakestone' The Tantrics say that the King Cobra when it crosses its hundredth year, becomes 'Ichhadhari Naga', then it acquires the power to transform itself into any form animate or inanimate It also acquires 'Naga-Mani' a magic Pearl Gem which it keeps in its mouth and takes out in dark nights to play with The gem emits brilliant light and can fulfil desires for material wealth if one is lucky enough to possess it We do not know whether there is any truth in what the Tantrics say

3 **Bamboo-Pearl** This is derived from the hollow of the bamboo It is of a greenish colour and is like a berry, elliptical in form

4 **Hog-Pearl** It is nurtured in the hog's head and has the yellowish tinge resembling that of the mustard oil

5 **Elephantine Pearl** It has its origin in the temple of the Elephant of the classical Erawat breed and is of the size of myrobalan It is devoid of glamour, and is believed to cure the disease of scrofula

6 **Conch-Pearl** It is found inside a conch shell It is of ochre-brown and white colour and lacks in brilliance,

but is very smooth (We have got a specimen of a Conch-pearl with us in our collection)

7 Fish-Pearl Fish-pearl is formed in the womb of Pisces It is of a greenish or yellowish white tinge or of the colour of jasmine flower A myth is current that if a diver carries a fish-pearl in his mouth, everything under the water is visible to him

8 Oyster-Pearl It is found in bi-valve molluscs chiefly in the pearl-oysters (Moleagrina) and the fresh water mussels of the genus 'Unio' Pearls of this type are available without difficulty and are commonly in use They are found in various Pearl fisheries

The writer has had an opportunity to see with his own eyes all the eight varieties of Pearls mentioned above at the place of Shri Dhanroop Mal, the renowned Jeweller of Ajmer

PEARL FISHERIES

1 The Persian Gulf Pearls obtained from the Island of Bahrein in Persian Gulf are known as the Basara Pearls They are the finest and most valuable, as they are very durable and resist wear and decay They are of great brilliance and have got fine epithelium

2 Gulf of Manaar in Ceylon Pearls obtained from Ceylon are known as the Pearls of Kahil These too are of a very bright radiance, but as compared to the Basara Pearls, they are of a slightly smoky tinge and are lighter too

3 Venezuela In the United States of America Pearls obtained from the fisheries in Venezuela resemble those of the Persian Gulf They, however, differ from the Basara Pearls in this respect that they are rarely globular, and are more whitish

4 Bay of Bengal Pearls obtained from the fisheries of this Bay are of rose colour They are globular but softer than the Basara Pearls When worn they become whiter on account of the perspiration emitted from human body Due

to lack of evenness in colour these Pearls are subjected to some chemical processes to make them uniformly white, but in the course of this action they become less durable and some of their glamour is lost A little negligence in washing results in their destruction

5. Darbhanga (Mashi) The Pearls of this fishery resemble those of the Bay of Bengal but they are of an inferior quality and are utilized more for medicinal purposes Similar Pearls are obtained from the bed of the river Gomti

6 Oran Island Bombay Pearls obtained from this fishery are not fully ripe They are light and without lustre They are of a lovely form but when rubbed on a piece of cloth they lose weight and so they are considered to be of a very inferior quality

Recently fisheries are being worked in Madras State in Southern India Pearls obtained from there resemble those of Basara and are known by the name of Tuticoran Pearls

7 Australia Australian Pearls are white but they are very hard and are of the shape of teeth Though white they are not attractive and beautiful

All the varieties of Pearls are found in their various colours, but only the prominent ones of the particular fishery have been enumerated here

Pearls come in many colours All occur in delicate shades The following are the notable ones —

Blue, white, rose, grey, green, black, yellow, lavender, mauve and copper coloured Those valued are rose, cream, white and black The copper coloured Pearls are the inferior-most

FLAWS OF PEARLS

1 There may be a crack in the epithelium

2 There may be a thin line like a wave in the surface

3 There may be pouch formation, giving the Pearl the shape formed by joining two pieces A circular line like a bangle may be seen round the body of the Pearl

4 There may be a formation like a mole, and if it is of a dark colour, it is considered to be most inauspicious

5 There may be tiny spots like the marks of smallpox on its surface

6 It may be dull, devoid of lustre

7 There may be a blister or a swelling

8 There may be a stain

9 It may be dusty, that is dust may be visible in the layers of the Pearl

10 It may resemble in form a scabbard of a sword The inner structure resembles wood, and its epithelium is like a membrane The woodish material inside is clearly visible even to the naked eye While drilling the upper crust is easily bored along with the woodish part There is a sombre glow on its membrane, The usual layers which are invariably present in a normal pearl are rarely to be found in a sheathy Pearl The reason is that its interior contains wood instead of calcium The finest Pearl is that which has no foreign matter in its core It is also more efficacious as a medicinal specific There is very little difference between the Sheathy and the Horny Pearls These semi-mature Pearls are devoid of lustre and their density is lower than that of the normal Pearls Continuous use of a Sheathy Pearl wears out its cuticle and the woody substance appears on the surface and displays its inherent and natural colour Sheathy and semi-mature Pearls are not durable and lasting

'Neebru' is the vernacular name given to hemispherodal Pearls They are dome-shaped like a ball that has cut in two The upper half is of Pearl and the lower half is formed of layers of foreign matter This happens when the growing Pearl becomes attached to the shell

'Majid' is the vernacular name for used Pearl

Not all Pearls are perfectly round Some are irregular in shape and these are called baroque Pearls The most beautiful baroque Pearls are the pear-shaped ones Sometimes a

parasite will bore through the shell and the mollusc will try to protect itself by covering the invader with nacre creating what is called a Blister Pearl, round and rather flat with a hollow in the centre where it covered the parasite These oddly shaped Pearls are often made into beautiful pendants, brooches, rings and other jewels, but they are not so valuable as the round Pearls

Unsymmetrical or irregular pearls can also be made round, shapely, flawless and lustrous There are different methods of doing that Not all defective specimens, however, can be refined Those alone can be subjected to such a process which have got a natural tendency towards refinement

An auspicious Pearl has got the following six qualities

It is : (1) round, (2) smooth, (3) without blemish, (4) has the brilliant and lovely splendour of the moon, (5) is so skilfully drilled that the bore is as fine as a hair, and (6) has got a delicately polished surface Such pearls alone are considered to be pure and when worn bring happiness and prosperity

The merits and defects referred to in the Sanskrit verse quoted at the beginning of the chapter on Pearl, relate to the Pearls derived from Pearl oysters, and not to those obtained from other sources

The finest Pearls come, as has already been stated, from the Persian Gulf in the waters near the island of Bahrein

The Pearls are assorted according to size and shape From the Persian Gulf and the Pearl fisheries in the Indian Ocean most of the Pearls find their way to our country, where the great pearl market exists Here they are washed and polished and those which are to be used in necklaces are drilled by hand according to a three thousand year old method that requires great skill and delicacy A necklace of true pearls costs thousands of rupees and at times hundreds of thousands, but it takes several years to collect

the Pearls that go into it The Pearls selected are the perfect ones in shape and quality and exactly the same in size and colour Shorter strands are graduated in size, the Pearls at each end near the clasp are small and each succeeding Pearl is a little larger, the biggest one being in the exact centre of the string

It is believed that the Pearl was the first gem to be discovered by man and we find it mentioned in most ancient writings Many legends and stories are current about the Pearl in its long history and in many countries Pearls have been prized above all other gems

CULTURE PEARLS

Culture Pearls are not an imitation They are entirely a natural growth and the finest of such Pearls are quite beautiful and costly too As far back as the thirteenth century the Chinese knew that Pearls could be grown by putting a piece of mother-of-Pearl or fresh water mussel or some other foreign substance inside the shell of a river mollusc The mollusc would at once start covering the object and in due course Pearl would be formed

'It may, however, be noted that to put the foreign matter into the shell amounts to performing a difficult and painful surgical operation and many a time it is not successful Japanese have greatly developed the Pearl culture industry and the head of this industry once estimated that no less than forty-five percent of the molluscs died and a monument was erected to the dead molluscs

Scientists working carefully and skilfully like great surgeons and using anaesthetics have been successful in developing Pearls so perfect that only experts using scientific instruments or by their great personal experience could tell that the Pearl was not the real and natural, unassisted product of the Pearl Oyster "*

* Grolier The Book of Knowledge, Vol 13

NATURAL PEARLS

These are not genuine Pearls As in the case of culture Pearls a substance is injected in the interior of the shell, but the foreign substance escapes during the drilling Consequently the specimen produced by this method appears like a true one on the machine but there is a world of difference between the texture and colour of the genuine Pearl and the "natural" Pearl and they could be identified by experts Such "natural" pearls, that is the artificial ones, have bluish tinge

(Here by genuine Pearls we mean the Pearls found in the oysters in the ordinary course without any interference in their formation by a human agency)

IMITATION WAX PEARLS

The scale of fresh water fish is digested in ammonia and injected into the glass balls till the film is formed on the inner surface Wax or gum is then injected to provide a solid interior while the glass is removed by hydrofluoric acid Such artificial Pearls are heavy and lose their brightness very soon

SCIENTIFIC ANALYSIS

Specific gravity of .

An ordinary Pearl	2 40 to 2 78
Fine Pearl	2 67 to 2 75
Blue Pearl	2 40 to 2 65
Australian Pearl	2 72 to 2 78
Culture Pearl	2 70 to 2 78
Hardness	2 50 to 3 50

Methods of Identification of Genuine Cultured and Imitation (man-made) Pearls

1 Culture Pearl has got in its cyst a ball of foreign matter resembling glass which is visible through the bore when the specimen is drilled, sometimes the ball becomes loose and it moves inside the Pearl

2 There is a difference in the bore of the genuine and the culture Pearls The bore of a culture Pearl is wider in the middle When drilled, the ball of foreign matter either falls out of the Pearl or if it remains inside, the bore becomes wider at the middle than at the top, that is, at its starting point The ball inside glows and can be seen by the aid of nacrescope (Pearl illuminator) and endoscope (an instrument for the detection of culture Pearls) It depends upon the difference between the concentric structure of real Pearls and the parallel structure of the mother-of-Pearl, bead in cultured Pearl It can only be used for drilled Pearls, which provides an enlarged image of the hole drilled through the Pearl for stringing

3 The epithelium of culture Pearl is somewhat harder while that of the genuine Pearl soft and delicate

4 When placed under cow's urine and saltpetre and allowed to stand for twenty-four hours, the genuine Pearl will retain its brilliance while the culture, imitation or artificial Pearls would grow dim and lose some of their lustre

5 When rubbed with rice the genuine Pearl will have its lustre augmented, while the non-genuine ones will lose their glow and become paler

6 Genuine Pearls are of concentric construction, while the culture Pearls are shown to be composed of parallel layers of nacre upon their mother-of-Pearl matrix

Medicinal Properties of Pearl

Pearl is specifically prescribed for diseases caused by the deficiency of calcium in human body and for the diseases of the heart It is also indicated in diabetes, micturition, insanity and other mental diseases Unbored pearls of good quality are crushed finely for eleven days in rose or Keora water When reduced to a very fine powder and no granule remains, the paste is allowed to dry in shade and the powder is then taken as medicine with suitable vehicle according to

the directions contained in the well-known books of Ayurvedic and Unani systems of medicine

When to put on the Pearl

Pearl is worn as an auspicious gem in the phase of the moon. It is initially worn on Monday in the evening on the neck or arm or finger It is considered to be more beneficial when worn in accompaniment of silver

Historical Pearls

A big Pearl weighing 178 grains was recovered from the Persian Gulf in the year 1901 It was sold for £ 3,000/- in Australia The biggest Pearl of the world is among the collection of Henry Philip Hope It is 2" long 3¼" thick and 4½" in circumference Three-fourth of the body of this Pearl is white, and the remaining one-fourth of bronze colour. It weighs 454 carats and is valued at £ 12,000/-

A Pearl weighing 300 carats is studded in the Austrian Royal Crown Another Pearl having the shape of a drop is in the possession of the Shah of Persia A fine precious Indian pearl named Za pellegrana is treasured in the museum at Moscow

Methods of Refining Pearls

There are a number of methods, ancient and modern, of refining Pearls, and a full and detailed account of these would fill a volume in itself It would hardly be expedient or even possible to enumerate them here in this little book Stated very briefly, the old method of repolishing the used Pearls was to soak the Pearls in soap-nut water or to cut a hole in a radish and after putting the pearls within, close it with sugar By this method all the dirt was removed and the natural lustre of the Pearl was restored

The modern method is to cleanse the Pearls by washing them with hydrogen peroxide and ether By this method the Pearls regain their brightness within twenty-four hours, but

if proper care is not taken the Pearls may lose their natural lustre Before placing the Pearls for refining in the liquid, the liquid should be carefully examined and it should be ascertained whether it is quite fit for use and altogether harmless The Pearls should also be examined several times while under the liquid to make sure that the treatment is not overdone

Determination of Weight of Pearls

The weight of Pearls is measured by a special method It is not measured by 'Carats' as is the case with other gems but by 'Chav' which is determined as follows —

The Pearl or the Pearls may be weighed by 'Rattis' The number of Rattis so obtained be multiplied by the same number and then divided by 3/4 The quotient may again be divided by 3/4 To the result thus obtained, the number of points derived after multiplication of 'Rattis' in the first instance may be added, and this will be the weight of the Pearl in 'Chav'

For example, a pearl weighing 4 'Rattis', multiplied by 4, comes to 16 points This figure divided by 3/4 comes to 12, which again divided by 3/4 results in 9 The weight of the pearl is 9 Chav, 16 points

If the Pearls are more than one, the aggregate 'Chav may be divided by the number of Pearls and the quotient would determine 'Chav' of these Pearls

The following is the detailed table

16 Almonds make one point
6¼ points make one Anna
100 points make one Chav

Grouping of Pearls according to the Four established 'Varnas'

Brahmin	White
Kshatriya	Pink (Rose)
Vaishya	Yellow
Shudra	Black

Pearls should not be placed in cotton. The heat of the cotton would produce waves and cracks in the epithelium of the pearls, nor should pearls be kept in a damp spot. Pearls studded in the nose ring get discoloured on account of the breath exhaled from the nostrils

Pearls washed with hydrogen peroxide (H_2O_2) and acids, lose a part of their essence and consequently become less effective for use in medicine For medicinal purposes pearls should be cleansed by putting them for a few minutes in lime-juice and then they may be crushed to a fine powder in rose-water

Basara Pearls are best suited for medicinal purposes Venezuela Pearls have also got similar properties but the Pearls obtained from the Bay of Bengal are inferior in quality Other Pearls lack in brilliance and consequently they are considered less suitable for medical preparations

As a matter of fact Pearls which possess lustre are more beneficial for treatment of diseases The Pearls which get broken in drilling can also be utilized for the purpose, although they lose some of their essential property The Pearls found in the form of moles, though unsuitable as gems serve well for medicine as they contain a lot of calcium

The powder, obtained when Pearls are drilled, is also serviceable for medicine though it is less effective The Sheathy Pearl is not suitable for this purpose at all

The culture and 'natural' pearls as distinguished from the genuine Pearls are of no use for medicine

Genuine Pearls of very tiny size known as seed Pearls ('Khakha' or 'Buka') are very effective as medicine for deficiency of calcium in human body

Nowadays semi-culture pearls are also being manufactured in Jaipur They resemble the culture pearls but are very cheap

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मूंगा (प्रवाल-विद्रुम)

MOONGA PRAVAAL-VIDRUM)

CORAL

पक्वविम्बफलच्छायं, वृत्तायतमवक्रकम् ।
स्निग्ध च व्रणक स्थूल, प्रवाल सप्तधा शुभम् ।।
पाण्डुर धूसर सूक्ष्म, सव्रणं कण्डरान्वितम् ।
निर्भारि शुभ्रवर्णं च, प्रवालं नेष्यते खलु ।।

The Coral gem is the one which possesses the following seven merits —

1 It is of an opaque red pigment of cinnabar or the well-ripened 'Bimb' fruit (the fruit of a tree which when ripe is ruddy)

2 It must be perfectly round or oval

3 It ought to be very regular in shape

4 It emits a lovely and delicate splendour

5 It must be without any hole or perforation

6 It should be large and smooth

A Coral, which is white or has got a whitish yellow tinge, or a smoky colour, is thin, bears marks on its surface resembling sore or ulcer, displays veins of blue or other colour in its texture and is very light, is inauspicious according to the Shastras and may be rejected, so far as the object of warding off the evil influence of the planets is concerned

The Sanskrit verse quoted above refers only to the finished Coral gem It does not apply to the raw material obtained from the Coral Reef in its natural condition

Out of the nine most important gems, Coral is the only gem which grows in the sea Coral is found at depths ranging from 20 to 1,000 feet. The finest quality, however, is generally found at depths of 100 to 160 feet. Coral is attacked by worms and sponges that bore into it and cause discolouration and decay

The famed Precious red Coral is found in the Mediterranean waters The richest yields of Coral come from the coastal waters of Algeria and Tunisia Other profitable deposits are found off the coast of Spain, France, Sardinia, Corsica, Sicily (Italy) in the Bay of Naples, and the Coral Sea and the Great Australian Bight Red Coral is also obtained in the Red Sea and the Persian Gulf It also occurs off the northwest coast of Africa and the seas around Japan

Colours of Coral

Precious Coral usually ranges in colour from white, thorough pink to deep red It is devoid of water and is opaque Corals of cream chocolate colour are also found They are quite beautiful and are used as gems and for medicinal purposes, but they are less efficacious as compared to the red Corals Colour in single pieces of Coral tends to be uniform and variations in shade are rare White Corals are more popular in Bengal

Flaws of Coral

Coral specimens may suffer from any one or more of the following defects —

(1) There may be a white or black spot in the composition

(2) There may be a bore or a crack on the surface or in the body

(3) There may be more shades of colour in the same piece

(4) There may be a depression, bend or twist on the surface

Scientific Analysis

Specific Gravity	2 6 to 2 7
Hardness	3 5

Imitation Corals

Imitation Corals are also produced artificially A synthetic Coral is of higher specific gravity than the real one When examined under an eyeglass an imitation Coral reveals small but conspicuous granules in its texture resembling those of a moulded glass When rubbed it emits a distinct sound like that produced by rubbing a piece of glass If rubbed against a piece of turmeric, the turmeric will turn red

Grouping of Corals according to the established Varnas

1	Brahmin	Of vermilion colour
2	Kshatriya .	Of scarlet red colour
3.	Vaishya	Of orange red or ochre colour
4	Shudra	Of a dark and dull colour

In astrology, Coral is deemed to be governed by Mars Consequently, this gem is worn in the phase of that planet The auspicious hour for putting it on initially is an hour after the sunrise on Tuesday It may be worn on the neck, or arm or in the finger

Medicinal Properties of Coral

A branch of Coral pulverized in rose-water or 'Keora' water is applied to the navel of a pregnant woman to prevent miscarriage

As a general tonic and for body building Coral is reduced to a very fine powder in rose-water, dried in the shade and taken with honey To cure cough it is taken with betel As a specific for palpitation of heart it is to be taken with milk or cream Thus consumed it keeps the body warm It is also indicated in diseases of the liver, measles, smallpox, high blood pressure, ulcers, piles, fistula, idleness and depression

General Remarks

"The famed precious Red Coral is found in Mediterranean waters and has been used for centuries as an ornamentation The Gauls decorated their helmets and weapons of war with Coral The Romans not only prized it for its beauty but also attributed magical and medicinal virtues to it Roman children wore necklets of Coral to ward off danger It was valued greatly in India and far east where a great trade was carried on from the beginning of the Christian Era "* Throughout the medieval ages belief in its potency as a charm was entertained. Indeed the belief still continues India provides a large and lucrative market for Coral. In Italy even today Coral is worn as a preventive from an evil eye The range of value of Coral varies according to colour and size and its price is considerably affected by the fluctuation of fashion Rose-pink Coral is also considered very valuable Good coloured Coral commanded high price in China where it was in great demand for the button of office worn by mandarins It is also a favourite ornamental substance with the Negroes of Central Africa and America.

Coral is processed largely in India Italian craftsmen are also skilled in the art of cutting, polishing, and carving material Small pieces of different shapes are perforated and strung in Corals as bracelets and necklaces Beads, some of them carefully facetted, are fashioned, and domed pieces are formed to set in brooches The skill of the craftsman is demonstrated best in the expertly carved cameos and small figurines of Coral.

Skilful Japanese craftsmen have created a considerable demand for their finely wrought products

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* Encyclopaedia Britannica, Vol 6, page 486

पन्ना (मरकत)

PANNA (MARKAT)

EMERALD

हरिद्वर्ण गुरु स्निग्ध, स्फुरद्रश्मिचय शुभम् ।
मसृण भासुर तार्क्ष्यगात्र सप्तगुण मतम् ।।
कपिल कर्कश नील, पाण्डु कृष्ण लघुगुणम् ।
चिपट विकट कृष्ण, रुक्ष तार्क्ष्यं न शस्यते ।।

A fine Emerald possesses the following seven merits —

1 It is of a rich green colour
2 It is weighty, of high specific gravity
3 It is lovely luminescent
4 It twinkles, sparkles with brilliance
5 It captivates the heart and brings a feeling of peace to the mind It has a quality of almost physically soothing the eye
6 It is transparent
7 It is of a velvety reflection

An Emerald of a brown or blackish-yellow colour of dark or harsh appearance, which emits bluish reflection, displays shimmering inclusions, is light in weight, that is to say, of low specific gravity, layers in its texture give the appearance of being shrivelled or flattened as if beaten with hammer, is of an odd form, and lacks in fire and water, has no merit and is of negligible value

In Sanskrit, Emerald is called Markat, also Tarkshya It is, however, from its Persian name Zamurrad, which travelled its way to Greek as Smaragdos, then to Latin as Smaralda, whence through Common Roman to Latin as Esmaurde, Esmaralde and finally took shape as Emerald in the sixteenth century.

Emerald (grass-green) takes the first place of pride in the family of Beryl Gems of which the other members are the Aquamarine (Sea green and Sea blue), Morganite (Pink or rose-coloured), Goshenite (colourless), Heliodor (Yellow or Golden) and Beryls of other colours namely, blue, violet, and orange Emerald is a gem of rich green variety It has got the yellowish green colour of the leaves of the Neem (Margosa-'melia azedirachta') tree or of the Parrot's tail Fine transparent Emeralds are said to be the most desirable of all precious stones and like the finest Rubies surpass even the Diamond in value

In Emerald we look for homogeneity of colour, cut, shape, transparency and purity

In our country Emeralds have always been held in very high esteem There are references to Emerald in the great Sanskrit epic Mahabharat The ancient book on Gems, 'Agastya', which is dated earlier than the tenth century, mentions eight varieties of Emeralds, the finest of them being 'transparent, without dust, pure as a drop of dew on a lotus leaf', of a velvety reflection and so brilliant that when exposed to the sun on the palm of the hand, it sheds lustre on the entire surroundings Such a gemstone would really be most remarkable Flawless Emeralds of more than a few 'rattis' in weight are very rare As R Webster observed 'an eye clear Emerald is far from an impossibility'

The following flaws are of common occurrence in Emerald gems .

1 It may lack in water and fire

2. It may have a micaceous glitter Such Emeralds are found in association with mica-schist A part of mica is included in the composition of the gem and is distinctly visible
3 It may be devoid of brilliance
4 There may be a hole inside
5 There may be a fissure on its surface
6 It may present dichroism or ambiguity of colour
7 It may be dull, without lustre
8 There may be black or yellow spot or spots in its texture
9 There may be foreign matter in its tissue resembling a yellow insect, 'Swarna makshika' or golden fly
10 It may be brittle

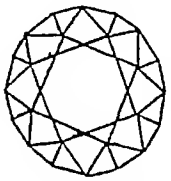
Scientific Analysis

Specific gravity	2 65 to 2 76
Hardness	7 50 to 8
Refractive Index	1 56 to 1 59
Chemical formula	$Be_3Al_2Si_6O_{18}$
BeO 14,	
Al_2O_3 19,	
SiO_2 67 Percent	

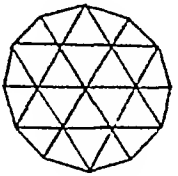
Grouping of Emeralds according to the Four Varnas

Brahmin	Of the colour of 'Sirish' (*Albizzia procera*) flower.
Kshatriya	Of the deep green colour
Vaishya	*Of yellowish green colour*
Shudra	Of dark green colour

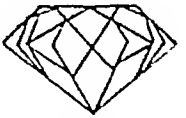
Cuttings



TOP PLAN
कैंवल गिरदा सीधा रुख

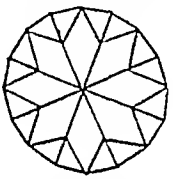


पोलकी चौबीस पट्टी

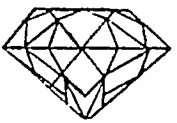


SIDE ELEVATION
गिरदा बगल का रुख

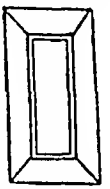
TOP ELEVATION ROSE CUT
गिरदा चोटी का रुख



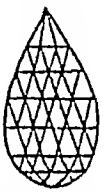
BRILLIANT CUT
कैंवल



SIDE ELEVATION
बगल का रुख



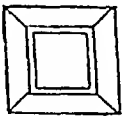
BAGUETTE
लम्बी चौकी



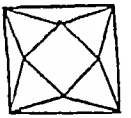
BRIOLETTE
तिलकड़ी दार गोशवारा

MARQUISE
तावड़ा नेत्र घाट

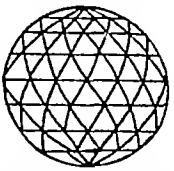
PANDELOQUE PEAR
तावडा पान घाट (सरो)



SQUARE
कुत्तबी

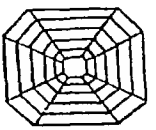


FANCY STAR
बगल चौकी बर्फी कट

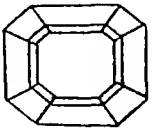


FACETTED ROUND BEAD
तिलकड़ीदार गोल मणी

FACETTED OVAL BEAD
तिलकड़ीदार लम्बी मणी



BASE PLAN
चोटी का रुख



TOP PLAN
तल का रुख अठवास

Emerald When to be Worn

According to Astrologers Emerald is a gem of the Mercury and is beneficial when worn in the phase of that planet It is to be studded in gold and put on the neck, arm, or finger, on Wednesday, in the morning, two hours after sunrise

Medicinal Utility of Emeralds

Emerald finely crushed in rose-water or Keora water is taken by mouth as a medicine It is prescribed for purification of blood, for curing urinary diseases, colic pains, leucoderma, dumbness, deafness, and especially for the treatment of the diseases of the heart.

Panni (Elaeolite) is considered to be the softer variety or spinel of Emerald

Elaeolite is in fact a massive or granular variety of the mineral Nepheline $(Na, K)_8 Al_8Si_9O_{34}$

Its specific gravity is		2 55 to 2 65
Hardness	. .	5 to 6
Refractive Index		1 538 to 1 542

Its crystals are hexagonal, Colours green, red, brown, blue and grey

Sources of Emerald

1 Colombian Mines in America —(a) *Columbian* · Emeralds of good quality occur in limestone at Muzo and Chivon in Colombia The Colombian Emeralds are known here by the name of 'Box' Emeralds, due to the reason that formerly Emerald was brought from Colombia in raw form inside the boxes They are compact and display fine colour and water Some of the crystals contain golden spangle in their texture The ore extracted from the old mines contained more colour, water and fire It was found in the form of lumps while the material obtained from the more recent mines resembles reed pens or pencils The product of the new mines is, however, not so rich as that of the old ones

(b) *Trapiche* Very recently Emerald ore known by the name of Trapiche has been received from Colombia It is in the form of six buds Gems are prepared from the ore by cutting the stone out of the buds and finishing them by grinding on the wheel The specimens of the Trapiche variety contain fewer flaws and their internal structure is markedly different from the older material It was for the first time that this new type of material was received in the Indian market At the outset the jewellers doubted its genuineness But on closer examination it was revealed that they were real gems

2 African Mines · The raw material of the African mines is of dark hue and there are black spots in its composition While modelling it has to be cut into very small pieces In slang it is termed as "bottly" as it exhibits a mixture of green and black colours like that of a bottle

However, there are Emerald mines in Sendewana in Africa and the Emeralds produced there are known by that name (Sendewana) The product of these mines is of the finest quality It is of a rich yellowish colour and resembles the fine Emeralds of the ancient world

The Emeralds found at Kenya in Africa are of Colombian type, and the raw material is soft and clean Some emerald mines have recently been excavated in Tanzania, Zambia, Mozambick also, where the goods found are black-spotted

3 Rhodesia Emeralds produced in Rhodesian mines in Africa are rather of a thicker water They are small and never achieve the size of the Colombian stones There is a marked difference between these Emeralds and those referred to above as "bottly" Emeralds of Africa in as much as they do not have the darker hue nor the greenish black colour resembling the bottle

4 Egyptian Mines The ancient emerald mines of the Jabel Zebara and Jabel Sikait in North Egypt were worked since well before 2500 B C , and it was there that the stone first received its name The Cleopatra mines situated about

twenty Kilometres north of Aswan were lost for thousands of years till they were re-found in 1818 by Caillaud on the orders of the then British Governor of Egypt Egyptian Emerald is pale and often cloudy and it could not compete with the American stones

5 Brazil There are Emerald mines in Brazil They are of a very recent origin The Emeralds of Brazil are yellowish, usually of a somewhat lighter hue There are more cracks in them They are crisp The finished products are of yellowish green colour

The Emerald mine at Karniba is the best mine in Brazil which gives nice rough of very superior quality Another mine is in Campoformido, which is known as 'Black Pit'

6. Ural mountains in Russia All types of Emeralds are produced in the Ural Mountains Compared to the Colombian Emeralds, however, they are less attractive There is also slight difference in the texture of the material obtained in the two countries There is more water in the Russian Emeralds, than in those of Brazil and Rhodesia

7 India · Emeralds are produced in the district of Udaipur and Rajgarh mines of Ajmer in Rajasthan They are of first class deep-green colour, those of Rajgarh possess rich and lovely yellowish tinge Formerly they were considered to be somewhat inferior to the Colombian Emeralds, but the stones extracted from the Rajgarh mines more recently are reported to be of richer yellowish colour than even the Colombian Emeralds

8 Pakistan · Emerald mines have been discovered in Pakistan too The Emeralds found in them are crisp and of deep green colour

In addition to the countries mentioned above Emeralds are also found in Norway, New South Wales (Australia) and Transvaal (Africa) Recently, Emerald has been found out in Afghanistan, in the interior forests of Kabul The quality is

very fine and transparent, possessing beautiful, shining and lovely colours, alike old Emeralds

The Emeralds of "The Cups" and the Emeralds of the 'Jagat Seth'

Apart from the Emeralds obtained from the mines, referred above, we have come across two other varieties which deserve mention

One of them is known as the "Emeralds of the Cups" The story goes that Emperor Humayun possessed cups made of Emerald in which he used to drink wine They were accidentally broken Fragments of those cups are still occasionally available The material of which the cups were made was Emerald of the finest quality

The other variety, equally good, is known as the Emeralds of the "Jagat Seth" The Jagat Seth was a wealthy man of Murshidabad A foreigner, who had brought a large quantity of mineral which happened to be Emerald ore, sold the same to the Jagat Seth at a very low price, perhaps without knowing himself anything about the quality and richness of the raw material The Jagat Seth prepared gems out of the rough stones which were Emeralds of the finest quality Some of those are available in our country even today, of course at fabulous prices

Noteworthy Emeralds

1 By far, the biggest collection of Emeralds in the world was treasured in the Crown of the Andes, which is now in the United States of America It was made in 1593 by Popayan, a local chieftain, in gratitude to the Blessed Mother by whose benediction his colony escaped the devastating plague in 1590 The frame of the Crown was made of a solid piece of gold weighing one hundred pounds and in it were set 453 Emeralds Seventeen large pear-shaped Emeralds hung from the Crown The chief stone which is exceedingly beautiful weighs 45 carats All the

Emeralds added up weigh 1500 carats The Crown is as beautiful as ever, with gold glowing softly and Emeralds dangling this way and that are marvellously impressive

2 The Duke of Devonshire in England has got an enormous crystal which is a two-inch cube and well over one thousand carats It is of a splendid colour but has got flaws and inclusions in its texture It has never been cut, and unless it was cut into smaller stones, nothing could be done with it It is no more than a curiosity, a stone treasured in a museum.

3 His Highness Maharaja Tej Singh of Alwar (a constituent unit of the United State of Rajasthan) is in possession of an Emerald weighing 365 'rattis' It is said to be a flawless gem and is valued at Rs 30 lacs

Synthetic Emeralds

Emeralds have been produced synthetically from a fusion by a secret process It was in the year 1930 that German firm Hermann Espig and Max Jaeger gave out that they had produced synthetic Emerald Crystals $Be_2Al_2Si_6O_{18}$ of fine colour in their laboratories of the I G Farben-industries, (now in East Germany) The manufacture of synthetic Emeralds was, however, later on given up by the firm

In the same year, 1930, Carroll F Chatham of San Francisco, California produced Synthetic Beryl and in 1935, Emerald crystals having the distinctive form of the hexagonal real Emeralds The largest crystal produced by Chatham weighs 1,275 carats It is kept in the Mineralogical Museum of Harvard University Another synthetic Emerald of fine quality which weighs 1,014 carats is treasured in the National Museum at Washington

During the last few years several new commercial synthetic Emeralds developed by Lechleitner Gilson and Zerfass have entered the market along with the product of Chatham Of special importance is the new Linde Hydrothermal Emerald which possesses an exceptionally high optic

quality, brilliance and colour Although the optical and density characteristics of the Lechleitner Beryl-Emerald composite resemble the new Linde product, the sandwich or wafer make up can be discerned without any difficulty when examined in a fluid of like refractive index The Linde Hydrothermal Emerald no doubt represents a fresh source of synthetic Emeralds of excellent quality which can be compared in beauty to the fine Chivor, Muzo and Uralian Emeralds

Distinctive Features of the Synthetic Emeralds and Natural Emeralds

1 The synthetic Emeralds first produced in Germany in 1936, and later on in the U S A while not exhibiting the curved lines and gas bubbles characteristic of the Vernuil process do show curious, strongly twisted wisp-like markings which are altogether different from the internal markings seen in the natural Emerald

2 The specific gravity of the synthetic Emerald (2 66) is distinctly lower than the natural stones (2 76)

3 The refractive indices of the synthetic products are lower than that of the natural ones

4 Similar is the case with birefringence

5 The Synthetic Emeralds show a more intense absorption spectrum, dichroism and fluorescence under ultraviolet light than the natural stones

6 The new Linde Hydrothermal Emerald can further be distinguished easily from other fully synthetic Emeralds by its higher refractive index, birefringence and density These properties of the former resemble those of the natural Emerald, but the bright-red fluorescence and colour through the Chelsea filter should differentiate it from most natural stones Glass would appear green under Chelsea filter

New Non-Fluorescent Synthetic Emeralds

Pierre Gilson of France has discovered a process of making synthetic emeralds that have higher properties than

the Chatham synthetics and the Lechleitner Gilsons These new Gilson synthetics do not fluoresce to long wave ultraviolet light, as do all other known synthetic emeralds

In the past the low refractive indices, birefringence specific gravity, wispy inclusions and the fluorescence easily proved an emerald to be synthetic But these new Gilson synthetics have refractive indices, specific gravity and birefringence nearly the same as those of most natural stones. Therefore, these new Gilson synthetics are identified on the basis of inclusions absorption spectrum and X-Ray transparency test.

Some salient features of the new Gilson Product —

1. Refractive Index	—	1 571 to 1.579
2 Birefringence	—	0 008
3 Specific Gravity	—	2 68 to 2.69

These stones sink slowly in a liquid of specific gravity 2 67, as do most natural stones and the Linde Hydrothermal All other synthetics including Chathams float in a 2 67 liquid.

4 In addition to the usual flux-fusion inclusions, short needle like inclusions are found in some of these stones.

5 In the absorption spectrum a line at 4270 Å is seen This line is best seen in a direction other than parallel to the optic axis So far, this line has not been encountered in any other emerald either natural or synthetic

6 These are opaque to the X-Rays.

As a matter of fact, it is the addition of iron to the new Gilson product that is responsible for the lack of flouresscence, and a line 4270 Å in the absorption spectrum The increase in the refractive index and specific gravity is also due to the presence of iron Iron has also caused the stones to become opaque to X-Rays

One other interesting and useful fact is that some of these stones are transparent while others opaque to short-wave ultraviolet light. Therefore, transparency to short-wave ultraviolet no longer remains a reliable test for separating synthetic from natural stone

Hence it becomes increasingly important to identify the non-fluorescent Gilsons from natural stones on the basis of the inclusions, absorption spectrum and X-Ray transparency test

Doublets & Soude' Emeralds

For long time skilled Indian cutters have been making doublets and soude' emeralds which are very common in Lucknow A doublet is made of two pieces of real stone cemented together in such a way that the plane of joining lies along the girdle The so called soude' emeralds are constructed with a crown and pavilion of two pieces of rock crystal cemented together with a thin layer of gelatine between Generally the gelatine turns yellow after some-time but Dhuppal (Doublets) made by Lucknow cutters, remain in their original colour for a long time The rock crystal is used because of the presence of inclusions similar to that of natural emerald

These stones have a good emerald green colour and due to the dyestuff used, they show a red colour through the Chelsea filter like that of real emerald When immersed in water in a white cup and seen from side all the three parts are clearly seen Thus, when they are unset, detection is easy The soude' emeralds are known as triplets in United States of America and "Dhuppal" in India

पुखराज (पुष्पराग)

PUKHRAJ (PUSHPARAG)

WHITE OR GOLDEN

SAPPHIRE

पुष्पराग गुरू स्निग्धं, स्वच्छं स्थूलं सम मृदु ।
कर्णिकारप्रसूनाभं, मसृण शुभमष्टधा ।।
निष्प्रभं कर्कशं रूक्षं, पीतश्याम, नतोन्नतम् ।
कपिशं कपिलं पाण्डु, पुष्पराग परित्यजेत् ।।

The 'Pushpa Rag' possesses the following eight merits —

1 It is of a high specific gravity;
2 It has got a rich velvety lustre,
3 It is transparent, clear as crystal,
4 It should be free from flaws,
5 Various colours are found in Pushpa Rag,
6 It is even, smooth and magnificent,
7 It is of the colour of the light-yellow 'Kaner' flower (Cascaria ovata),
8 It possesses a tenuous lustre sparkling all over its surface

On the other hand a Pushpa Rag devoid of lustre, which is unattractive and lacks in fire and water, is uneven and of a mixed dark yellow colour, or has an auburn colour like that of a partially dried grape, or is of a brown or mixed reddish-yellow colour or of a yellowish white or pale colour, is of no merit

Pushpa Rag is the Sanskrit and Pukhraj Hindi name for colourless or white, and yellow, golden or orange Sapphire

The Rubies and the Sapphires belong to the corundum family In fact the Ruby and the Sapphire are identical twins The only difference is that the Ruby derives its red colour from a trace of Chromium and the Sapphire is pigmented by iron and titanium As by Sapphire is generally meant the blue corundum, it is necessary to qualify the English name for Pukhraj by the adjectives 'colourless' or 'white', and 'yellow', 'golden' or 'orange' Hence it is that the Pukhraj is termed as White or Yellow or Golden Sapphire In order to avoid ambiguity or confusion of thought and the repetition of the words 'white', 'colourless', 'yellow', 'golden', or 'orange' throughout this section, we shall use the word 'Pukhraj' to denote the beautiful gem under consideration

Pukhraj has been widely used in this country throughout the ages and for long it was considered by the laymen as Diamond Pukhraj Gems of lemon-yellow or brilliant white colour and good cut are lovelier than any stone except the Diamond The shade of Pukhraj has a coolness and gaiety that are fascinating But one has to be very particular in selecting the Pukhraj of the right colour, that is good yellow colour of lemon shade not pale or thick yellow, and in colourless specimens dazzling bright faultless crystal, otherwise it may look like glass

Specimens of Pukhraj may suffer from any one or more of the following flaws —

1 A crack in the substance of the gem
2 Dullness,
3 Silk,
4 Ambiguity or mixing of colours,
5 May be milky,
6 May be flimsy,
7 A stain,
8 A hole may be visible inside,
9 There may be fibres in its texture

Old Cutting of Gems

Table Side

Thick Back Side

Flat Cut
Table Side

Flat Cut
Back Side

Square

Back Side

Table Side

Round

Table Side

Back Side

Rose Cuts

Three Facets

Six Facets

Twelve Cuts

Twenty four Cuts

Square Table Cut

Round Table Cuts

Scientific Analysis

Specific Gravity	3.99
Hardness	9
Refractive Index	1 76 to 1 77
Chemical formula	$Al_2 O_3$

Pukhraj is to be distinguished from other gemstones of similar colours

White Sapphire is quite distinct from other colourless gems such as Goshenite (Beryl), Moonstone (Colourless Orthoclase or Felspar), Quartz (Rock Crystal) synthetic, Spinel Topaz and Achorite (Tourmaline)

All other white gems except the Diamond are of lower specific gravity and less harder than Pukhraj, and they have different refractive indices With propertests—scrutiny, sight and touch, experienced hands can distinguish one from the others in no time The Golden Sapphire somewhat resembles the Topaz, but not exactly The former tends more to gold than the Topaz, but as it is the harder of the two gems, its high polish makes it look more compact and fizzing with life

The peculiar and lovely Orange Sapphire, also called 'PADPARADSCHAH' gives an impression of a 'blazing ice-cold bonfire' Then there is an amazing variety of Sapphire sometimes called 'Phenomenal'Sapphire' or 'Alexandrite-Sapphire' which appears purple-red by day and reddish at night, as the artificial light eliminates the blue in it

Indeed Pukhraj is a favourite among the males and is the first gem a person thinks of after the Diamond

The Imitation or Synthetic Pukhraj

No doubt there is only a small difference between the specific gravity of the genuine Pukhraj and that of the synthetic one, but the former is harder than the latter and possesses more fire and water The lustre of the synthetic compound resembles more that of glass than that of the real gem In fact there is no opalescence in the imitation crystals

which characterizes the Pukhraj, and if there be any it is markedly different from that of the true gem The silky star in Pukhraj is of a rich flickering lustre and has got the gleam of fresh milk of cow, on the other hand, the milky spot in the synthetic stone is still dry and lacks in brilliance If some powder is included in its composition, it displays very minute and parched white sparks The distinctive flaws in the real and imitation Pukhraj are identical with those found in the real and synthetic Rubies

Pukhraj is cut into flat roses, button flowers and jewels

Grouping of Varieties of Pukhraj According to the Four Varnas

Brahmin	White
Kshatriya	Rose coloured or pink
Vaishya	Yellow or golden
Shudra	Dark green
Chemical Formula	Al_2O_3 (Al_2O_3)

When to Wear Pukhraj

Pukhraj has all along been considered as a great talisman stone In the West it was thought of as a stone capable of reducing sexual appetites No wonder Bishops put on Pukhraj rings and spoke with great enthusiasm about the "beauty and nobility" of the gem

Pukhraj is the gem governed by the planet Jupitar one of the most important of the celebrated 'Nava Grahas' It is worn on Thursday in the afternoon an hour before the sunset

Principal Sources of Pukhraj

Pukhrajlike all other corundum crystals is found in rocks or in the beds of streams The finest Pukhraj stones come from Mogok in upper Burma but not in such abundance as in Ceylon, although the Ceylon Sapphires are not of that high water and dazzling fire as those of Mogok The

'Oriental Topaz' referred to by the Western writers was nothing but the Yellow Sapphire, a variety still called in Ceylon as the 'King Topaz' Yellow and White Sapphires are also found in Thailand, Indo-China, New South Wales and Queensland

In Thai language it is called Budh Salakam With good lustre in body, it is hard The colour is smoky yellow, having a little blackish tint It is sold up to Rs 2,000/- per carat

Gems resembling Pukhraj in form and colour, but less hard than it may be the corresponding Spinels, that is the Spinels of the yellow and white colour, are much cheaper than the coveted gems

Medicinal Utility

For use as a medicine Pukhraj is crushed very finely in rose-water or Keora water and then allowed to dry up in shade It is taken by mouth with suitable adjuncts

Pukhraj is indicated in jaundice, gastritis, constipation (chronic), flatulence, cough, colds, asthma, nose-bleeding, apoplexy, tumours, etc

White Sapphire of the finest quality, these days, costs about Rs 100/- per carat while the price of the Yellow Sapphire is no less than five times of it

वज्र-हीरा-अल्मास

(VAJRA-HEERA-ALMAS)

DIAMOND

नीलकान्तियुत श्वेत रक्तं वा नीलकान्तिमत् ।
कृष्ण वर्ण पृषद्धीन वज्रमाहुः प्रशस्तकम् ।।
शंखान्नभः स्फटिकप्रभः शशिरुचिः स्निग्धश्च वर्णोत्तमः ।
आरक्त द्युति पिंगु चारु शशदृक् सकाश ऊर्वीपतिः ।।
वैश्यःस्यात् सित पीतवर्ण रुचिरो धौतासि दीप्तिर्भवेत् ।
शूद्रोपि प्रतिभाति श्यावरुचिरो वर्णश्चतुर्धामिताः ।।

A fine Diamond emits a very light and delicate blue radiance, or a similar reddish glamour or a blue and red tint dazzling with glittering lustre and entirely free from red, black or white spots and inclusions

And the Diamond, which is bright as a conch shell, has the brilliant lustre of a crystal, is delightfully magnificent as the moon, effulgent, radiant and lovely, is the finest

And the Diamond, which is white but emits bright red glamour all around, which has a fine pale colour-mixture of red, yellow and white, or is of a pink colour like that of the eye of the rabbit, is also considered fine It falls in the category of Kshatriya Varna A person who puts on such a Diamond is inspired by courage and valour

And the Diamond having a whitish yellow gleam resembling that of the edge of a sword sharpened on a grindstone, heated red hot and quenched in water or oil, is also excellent It finds place in the category of Vaishya Varna, and is worthy of being worn by the mercantile class

And the Diamond gem which is white and has a dark shimmer, though real, is classified under the category of Shudra Varna When worn it generates the spirit of service in the heart of the person who puts it on

When a Diamond of the Brahmin category is worn it develops and refines mental power, engenders purity of thought and action

The Sanskrit name for diamond is 'Vajra' meaning impenetrable, also thunderbolt which is indicative of instant illumination 'Vajra' thus conveys the exact idea of the hardness and brilliance which Diamond possesses

The Persian 'Almas' for the Diamond means as invincible The word Diamond has, however, been derived from the Latin 'adamas', from the Greek for 'unconquerable'

There are some special characteristics which distinguish Diamond from the other gems When recovered from the mine the common forms are the octahedron (a crystal form having eight faces), rhombic dodecahedron (a geometrical solid having twelve lozenge-shaped faces), cube, and hexoctahedron (a crystal having 14 faces) Sometimes Diamond crystals in their natural state are covered with a black coating which is not a foreign matter, but is a sort of membrane of the same substance as the Diamond is made of So long as this covering membrane is not removed the main body of the Diamond remains invisible and it cannot be determined as to which category the Diamond belongs Diamond being the hardest of all Gems, in the olden days it was not modelled into jewels Up to the thirteenth century the Indian gemmologists gave Diamond less importance than Ruby, Emerald, Pearl etc , though as a matter of fact Diamond possesses some distinctive features of its own as compared to all other gems

It was in the thirteenth century that the Indian jewellers for the first time invented the art of cutting facets upon the Diamond by grinding a Diamond with another piece of Diamond on the wheel, whereby the fire was greatly

increased To-day the same method has been evolved into what is known as the 'Brilliant Cut' of Belgium

At present various fancy cuts are also in vogue such as 'baguette', 'cut-corner triangle', 'epaulet', 'half-moon', 'hexagon', 'keystone', 'kite', 'lozenge', 'marquise', 'pentagon', or 'bullet', 'square', 'trapeze', 'triangle' These new cuts are well-adapted to the designing of modern jewellery The 'baguette', 'marquise' and 'square' cuts are most popular

The octahedron, either natural, or obtained by cleaving and sawing, is made the basis for the 'brilliant' style of cutting Usually there are 58 facets, but in some cases as high as 74 are cut Depending upon the character of the rough stone, from one-third to one-half of its weight remains after cutting Amsterdam and Antwerp are the most important Diamond cutting centres Recently, there has been phenomenal development of this art in India as well Thousands of Diamond cutters are engaged in the gem-industry at Navasari in Gujarat

To-day, Diamond occupies the foremost place amongst the gems Its special feature is that it is the brightest of all the gems and its brilliance is permanent Pearls and some other gems lose their lustre when worn continuously for some time on account of the warmth and perspiration of the body

Scientific Analysis

Specific Gravity	3 15 to 3 53
Hardness	10
Refractive Index	2 417 to 2 420

Diamond is the element which contains only Carbon in its composition Its Chemical symbol is, C

Excellent Diamond

A Diamond with white and blue, or red and blue glamour is the most prized one The specimen should be entirely free of dark spot, and possess adamantine lustre

Flaws of Diamond

Any one or more of the following flaws may be found in the specimens of Diamond which one may come across:–

(1) It may have a red spot in its body Such a Diamond is to be discarded altogether,

(2) It may have a black, or

(3) a white spot in its texture,

(4) It may have a blemish resembling the black feather of a crow,

(5) It may be greasy,

(6) It may be pale, or

(7) Brown,

(8) There may be a hole, or

(9) a fissure in its body,

(10) It may be earthy i e dull, without lustre

(11) It may be extremely hard and may, consequently, make cutting and polishing all the more difficult

Colours of Diamond

(1) Greenish, black, colourless (white) or slightly yellowish

(2) With a pink blue shade

(3) With a pink shade

(4) With a yellow shade

(5) With a yellowish green shade like that of vegetable

Grouping of Diamonds according to the Four Varnas

1.	Brahmin	Colourless
2.	Kashatriya	Pink
3	Vaishya	Yellow
4	Shudra	Dark

Diamond when to worn

The governing planet of Diamond is Venus It is, therefore, worn in the phase of that planet on Friday at sunrise

Medicinal Utility of Diamond

Diamond should not be used in the form of 'Pishti' that is, reduced to a finely powdered form It is the Diamond ash which has great utility as a medicine If by chance a particle of Diamond gets into the stomach, the patient should be fed with a mixture of milk and ghee so that the particle may be thrown out with the vomit, otherwise it may cause wound in the entrails and may result even in death

Diamond ash is indicated in chronic diarrhoea and chronic dysentery, epilepsy, paralysis, insanity, hernia, premature old age, sterility, uterine diseases etc

Diamond Mines

Until the discovery of diamond in Brazil about 1725, India was the earliest source that supplied the world with the gems and had done so far the preceding 2500 year References to Indian sources are found in the works of ancient Greek and Roman writers, and in early Sanskrit literature the actual producing regions of this country have been broadly indicated Indian Diamond fields had been alluded to by early European visitors to India from the thirteenth century onwards They are grouped in three main localities —

(1) The most southerly track known as "Golconda" which embraces parts of Anantpur, Cuddapah, Guntur, Krishna, and Kurnool districts of Andhra as well

(2) The second tract lies further north between the Mahanadi and Godavari rivers

(3) The third tract comprises the Diamond fields of Vindhya Pradesh In this tract it is mainly around Panna in Bundelkhand (M P) that Diamond mining still continues

The Golconda mines have now ceased working Small Diamonds are still found in Tamilnadu State

In 1725 Diamonds were discovered in Brazil and the gems began to arrive from there in India for cutting and polishing In Brazil the provinces of Minas Gerais and Bahia are the most important producers

In 1867 Diamonds were discovered on the south shore of the Orange River near Hope Town in Southern Africa At present Africa furnishes over 95% of the world's production

There is vast difference between the Diamonds that were found in the Golconda tract and those that are brought from Africa The former were of very fine water, far more magnificent and attractive than the latter It is not at all surprising that most of the great historical and world famous Diamonds such as the Koh-i-Noor, Pitt (or Regent) Orloff, Florentine and many others are of Indian origin Today the production of Diamonds in India is relatively insignificant

Panna Diamonds

"Panna Diamonds belong exclusively to a few modifications of the hexakisoctahedron, the most complex form of the cubic system bounded by 48 similar faces, and so called from its resemblance to an octahedron having a low, six-sided pyramid raised upon each face The average weight of 240 stones examined by Vredenburg was 0 63 'ratti' or 0 59 carat, the Panna 'ratti' weighing 09418 carat Fifty-nine of these stones weighed one 'ratti' and over, 181 weighed less than a 'ratti' The majority were remakably perfect crystals, either brilliant white or blue white in colour, of beautiful water and lustre and very seldom clouded or flawed, their commonest defect being 'spots'–black, opaque inclusions of jagged outline The outer surface of crystals with a colourless interior is sometimes of a very pale straw-yellow, but being only a thin film, it disappears

on cutting The same is true of the very beautiful pale sea-green stones of exquisite delicacy in their natural state, which are known as 'banspat' (bamboo leaves), but greenish crystals of a far less pleasant hue are fairly numerous and are of inferior value as the colour spreads throughout the stone "**

Historical Diamonds

The Koh-i-Noor is the most renowned of the Diamonds It is attributed to the age of Mahabharat and is said to have been found in Golconda First of all it was with the Pandavas In 1304, it came in the possession of the Moghal Emperors and remained in Delhi In 1739, when Nadirshah sacked Delhi, Koh-i-Noor fell in his hands On his death it found its way to Afghanistan and from there it came in the possession of Maharaja Ranjit Singh of the Punjab In 1849 Punjab was occupied by the East India Company and the Koh-i-Noor came to Lord Dalhouse who presented it to Queen Victoria and since then it adorns the British Crown Originally it weighed $186\frac{1}{16}$ carats It was re-cut to 'Brilliant Cut' when its weight reduced to $106\frac{1}{16}$ carats It was then valued at one lac pounds

Another Diamond of the name of Pitt or Regent was found in 1701 at Krishna, a place at a distance of 150 miles from Golconda It originally weighed 410 carats Its cutting was undertaken in England and then it weighed $163\frac{1}{8}$ carats It is now treasured in France in the Appolo Gallery of Lauvre-Paris It is valued at Rs 4 lacs 80 thousand

The third famous Diamond is the Orlaff It was studded in an eye of the idol of Brahma in temple at Trichnapalli A French sepoy got employment in the temple as a guard He spirited away with the Diamond and sold it to a Captain of an English Ship at £2,000/- The Diamond then came into the possession of Raphael Khoseh, an Iranian merchant He

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sold it to Prince Orlaff at £90,000 It was afterwards presented to Katherine Second Its weight was 194$\frac{3}{4}$ carats

The fourth reputed Diamond is named the 'Great Moghal' It was recovered in 1650 from the Kolar mine of South India It originally weighed 787$\frac{1}{2}$ carats and on cutting was reduced to 240 carats

The Shah of Iran (Persia) has got a Diamond of the name 'Dariyayi Noor' (Beauty of the Sea) It was presented to the Shah by Nadirshah, and it weighed 186 carats

The largest Diamond ever found was the "Star of Africa" also called the 'Cullinan' or 'Premier' discovered on January 25, 1905, at the Premier mine in the Transvaal This stone weighed 621 2 grams or 3,106 carats It measured about 10 by 6 5 by 5 Cm and was a cleavage fragment of a larger stone It was purchased by the Assembly of Transvaal and presented to King Edward VII and subsequently cut into 9 large and 96 smaller stones The largest two stones are called Cullinan I and II and weigh 530 2 and 317 4 carats respectively

In the year 1853 a big Diamond was recovered from a mine of Bagagem in Brazil It weighed 254$\frac{1}{4}$ carats It was sold at £ 40,000/- and on cutting weighed 125$\frac{1}{2}$ carats

There are many valuable Diamonds in the world and it is hardly possible to describe them here Mention may, however, be made of 'Jubilee' 245 3 carats, 'Tiffany' (Yellow) 128 5 carats, 'Hope' (Blue) 44 5 carats, 'Dresden' (Green) 40 carats, 'Star of the South' 125 5 carats In January 1934, the 'Jonker' Diamond weighing 726 carats was found on the Elaudsfontein farm adjacent to premier mine near Pretoria The 'Vargas' Diamond weighing 726 6 carats was discovered in Minas Gerais, Brazil, in July 1938 There is no doubt that most of the famous Diamonds had their origin in India

The Hindi Maganine "Navaneet" (July, 1969) gives the following account of "The Idol's Eye" given by D J R Brukner, which would be read with interest

The Idol's Eye, the famous historical Diamond which had its origin in the Golconda mines, was put on auction once again in March last It is in the possession of Harry Lavinson of Chicago for the last 6 years and the minimum price fixed by him for that Diamond is 10 lakh Dollars (Rs 75,00,000/-)

Idol's Eye was mined in Golconda in the year 1600, and was cut and polished by some skilful Indian Diamond Cutter It weighs 70 20 carats and has got a blue sheen The platinum Necklace in which this Diamond is studded contains 86 other Diamonds, but their aggregate weight is only 32 50 carats

Lavinson claims that the price of Rs 75,00 000 put on the Diamond by him is in no way excessive, as all the renowned jewellers are agreed that it is one of those Diamonds of the world which are altogether flawless

Lavinson is of the view that the Indian Gem Cutter who cut the Diamond in the 17th Century must have been exceedingly skilful in his art and highly resourceful His technique was the same as is prevalent nowadays He has cut it in the form of a round pear and the facets have been so cleverly done that the depth and fire of the gem has been brought out to its best advantage

The original owner of this Diamond was the Persian Prince Rahab In 1607 the East India Company took it from him in payment of the debt which he owed to the Company

The history of the Diamond for the last three centuries is not known as there is no record of its sale It was then found in a mosque at Benamaji in Turkey This mosque was the property of Sultan Abdul Hasid

Diamond is not cut like other Gems It is grinded by another Diamond and is polished on a wheel made of steel Diamond is cut into Gems of the following names —

'PALKI' (Rose cut), 'PARAB' (Flat cut), 'AD-DHA' (Half-cut), 'MUKALASI' (Flat-cut on both sides), and 'KANVAL' (Brilliant cut)

The Kanval (Lotus) cut is of three varieties —
(1) Single cut, (2) Double cut, and (3) Michael cut

General Remarks

Diamond is the crystalline form of Carbon. It is found in nature as water-worn pebbles, or grains in river-gravels and other alluvial deposits, also in conglomerates and sandstones in South Africa, Brazil, India, Borneo and elsewhere The crystals belong to the cubic system and occur in octahedra and dodecahedra often with curved faces They are usually white, but yellow, red and other colours also occur The Diamond is one of the most popular gemstones, owing chiefly to its lustre It is the hardest substance known and, therefore, is used as an abrasive

The index of refraction, and the dispersion of the Diamond are high, 'n' for red light being 2 402, for yellow 2 417, for green 2 427, and for violet 2 465 The dispersion is 2 465–2 402=0 063 The characteristic fire of Diamond is due to this unusually strong dispersion Anomalous double refraction, caused by internal strains, is often noticeable The diamond is an excellent conductor of heat and consequently it is cold to the touch On the other hand, it is a poor conductor of electricity and becomes positively electrified when rubbed Many Diamonds fluoresce or phosphoresce on exposure to ultraviolet, cathode, and X-rays or to radio-active examinations Thus ultraviolet rays may cause some colourless stones to show a light-blue luminescence, while others may glow with a greenish or yellow colour Similar effects are sometimes observed on exposure to sunlight By exposure to radium examinations or cyclotron bombardment colour changes are introduced The mineral is transparent to X-rays, but glass, strass, or paste imitations of the stone are not An X-ray photograph will at once distinguish the genuine Diamond from these imitations

The Diamonds which are not used as gems are utilized in industry because of their extreme hardness They vary from well-formed crystals to irregular shapes and from compact masses to semi-porous aggregates Some are clear and transparent, others are opaque to black Industrial stones are off-colour and contain more flaws and inclusions than gem Diamonds

In contrast to gemstones, industrial Diamonds are entirely consumed by use and have got to be replaced They constitute the bulk of the world's annual production of mined Diamonds Johannesburg in Africa is the centre for industrial Diamonds

Since the outbreak of the Second World War a better understanding of the properties of Diamonds and a sounder technology in their uses have been developed These advances have led to a tremendous increase in the consumption of Industrial Diamonds As a result outlets have been established for the entire output of the Diamond mines, and it will give greater stability to the Diamond industry as a whole

During three months in early 1966 the crown jewels of Iran were studied by a team of scientists for the royal Ontrio Museum, the first scientific study made of this collection

The bulk of the treasure was acquired in the sack of Delhi by Nadir Shah in 1739, along with the historic diamond Koh-i-Noor

In the crown the most important diamonds are the Darya-i-Nur and the Taj-i-Mah, both India stones with long histories There is also a third named stone the Nur-ul-Ain

Darya-i-Nur (Sea of light), rectangular, step cut table, 41 4×29 5×12 15 mm Off-center culet about 25 mm Sq 175 x 195 carats (estimated), pink, flawless, blue fluorescence (3600 A), extraordinary limpidity Golconda Stone inscribed on a pavilion facet "Fath Ali Shah, 1834", thought to be major portion of Tavniers Great Table

नीला (इंद्र नील)
NEELA (INDRA NEEL)
BLUE SAPPHIRE

एकच्छायं गुरु स्निग्ध स्वच्छं पिण्डित विग्रहम् ।
मृदु मध्योल्लसज्ज्योति सप्तधा नीलमुत्तमम् ।।

The Gem, (1) which appears from distance of one uniform colour, (2) which is of a high specific gravity, (3) which is fine, and (4) absolutely clear and pure, that is, perfectly transparent, (5) which has got a solid compact body (it should not be diffusive or inflated, that is to say, it should appear to be a complete whole in itself and not seem as if it has been cut out or is only a part of another rock or stone It appears as if nature meant it to be a single and complete unit in itself), (6) which is lovely and smooth, and (7) which shows asterism, that is it exhibits a star like effects from the interior when viewed in reflected light, such gem alone is an excellent Sapphire

The degree of excess of deficiency of each of the aforesaid seven qualities in a specimen would determine the higher or the lower class to which the gem in question may belong

The word 'Sapphire' is derived possibly from the island Sapphirine in the Arabian Sea

In a Sapphire we look for •

The velvety cornflower blue, or the bright-navy satiny colour or a dark electric blue, in lighter colours, vitality and good cut

Sapphire is a gem of the Corundum (Al_2O_3) family The Sapphire proper is a transparent blue Corundum It has the colour like that of the neck of the peacock, and is of remarkable brilliance, perfect, and faultless

Scientific Analysis

Specific Gravity	3 97 to 4 01
Hardness	9
Refractive Index	1 76 to 1 77

Sapphire is a compound of Aluminium and Oxygen
The slight mixture of Cobalt gives it the blue colour

Flaws

Any one or more of the following flaws may be found in a Sapphire —

(1) It may be of a greenish and milky shade,
(2) There may be capillary (hair or thread-like inclusions in its body),
(3) It may be silky,
(4) It may have a fissure in its structure,
(5) It may be multi-coloured,
(6) It may have a film, like a cobweb,
(7) There may be a hole,
(8) a cavity in its body,
(9) It may be opaque, or
(10) dull, and
(11) might display a 'window' in its texture

Mines of Sapphire

The mines of Sapphire are found in—

(1) Kashmir,
(2) Salem (Tamilnadu State, Southern India),
(3) Burma,
(4) Ceylon,
(5) Siam (Thailand),
(6) Queensland (Australia), and
(7) Cambodia

Kashmir · The Sapphires of Kashmir form an exclusive class of their own In the Jewel trade it is customary to attach the appellation 'Kashmir' to any fine Sapphire regardless of its geographical origin This is an indication of the outstanding qualities of Kashmir Sapphires The colour of these Sapphires resembles the beautiful hue of the peacock's neck. Even a small concentration of that fine colour illumines the entire structure of the gem.

It may, however, be noted that the product of the Kashmir mines suffers more from flaws and blemishes than that of many other mines The gems of Kashmir mines often have window, hole, or cavity in their texture, and they also suffer at times from ambiguity of colours It requires special skill to cut the jewels as the crystals are covered with a hard crust of earth and it is difficult to know beforehand the internal structure If a specimen is free from cavity or window and does not exhibit ambiguity of colour it can be cut into an excellent gem The produce of the old mine in Kashmir did not suffer from so many blemishes, but the Sapphires of that mine are no longer available The Sapphires of the old mine are, however, unsuitable for medical purposes as they occur in association with other minerals, and the foreign matter adheres to them as crusts or in layers Kashmir Sapphires generally remain thick after cutting Stars are not found in them.

Salem (Tamilnadu State in Southern India) : A new mine of Sapphire has been discovered in Salem The Sapphires of this mine display a fusion of yellow and blue colours like those of the Bangkok mines in Thailand, with this difference that they have got a deeper greenish tinge

Burma . The Sapphires of the Burma mines are of a fine colour There is very little greenish tinge to be found in them The product contains crystals of all sizes, small as well as big, and they are free of foreign matter, so that their merits and faults can be ascertained in no time and the

cutting of gems can be easily accomplished Fine six-lined stars are found in Burma Sapphires

Ceylon · The Sapphires of the Ceylon mines are of an inferior quality than those of Kashmir and Burma, although the crystals are comparatively of a larger size There is lot of 'water' in them but they are not so fine as their colour is less attractive They are called 'Raktmukhi' (blood-like) as their blue colour has got a mixture of reddish tinge The nucleus that is the 'Chambi' or the colour spot of these Sapphires differs from that of the Kashmir Sapphires In the Kashmir Sapphires even a tiny colour-spot makes the entire gem radiant The Ceylon Sapphires do not possess such powerful radiant colour spot Moreover they also exhibit dark tinge and have less of 'fire' in them

However, a characteristic feature of the Ceylon Sapphire is that the crystals show steep pyramidical faces with a blue base, the rest of the crystal being colourless When the crystal stands on its base the entire gem appears to be blue When turned sideways the blue base and the colourless facets are distinctly visible Six-lined stars are frequently found in Ceylon Sapphires

Siam The Sapphires of Thailand have also got a darkish tinge with a mixture of greenish hue The deeper the colour of the specimen the darker appears the gem These Sapphires are quite hard and tough and smooth like silk, and hence they are quite suitable for making a die for drawing very fine silver wire Star Sapphires are not to be found in the Thailand mines

Australia The Sapphires of Queensland in Australia are similar to those of Thailand but they are of a darker hue and possess less fire

White Sapphire, Ruby and Blue Sapphire are sometimes found in the same mine This is the reason why there is a mixture of colours in the crystals of these gems The natural colour of Pushparag is white, of Ruby red and of Sapphire

blue, but the crystals of one are affected by the colour of the others, so that there may be blue or pink shade in Pushparag, blue shade in Ruby and red shade in Sapphire Sometimes a specimen of one may contain colours of all the three It may, however, be noted that notwithstanding this similarity in blending of colours, each gem possesses its distinct hardness Ruby is harder than White Sapphire and Blue Sapphire harder than Ruby The Sapphires of Thailand are the hardest and toughest

Cambodia · Cambodian Sapphires are of very beautiful and lovely colour Apart from the mines mentioned above deposits of Sapphires are found in Montana (America) Cawee Greek North Corolina, Russia (near Troitsk Miesk) Ural Mountains, and Rhodesia (South Africa) but being of very inferior quality, they are not popular

The biggest Sapphire weighing 951 carats was found in the possession of the king of Ava (Burma) in the year 1827 That dignitary had also got with him another flawless Sapphire weighing 132 carats

A third Sapphire 2 inches long and 1½ inch thick is in the collection of Gardindes Paintes

Grouping of Sapphires according to the Four 'Varnas'

1	Brahmin	Blue lustre in a white Gem, that is, brilliant blue colour.
2	Kshatriya	Reddish tinge in a blue body
3	Vaishya	Deep blue colour in a white body
4	Shudra	Blue colour with a dark tinge

Sapphire when to be worn

Sapphire is governed by Saturn, one of the nine 'Grahas ' Consequently the gem is to be worm in the phase of Saturn, at two hours and forty minutes, before the sunset Before putting it on, the gem should be tied in a piece of

blue cloth and worn on the right arm for three days by way of experiment In case it gives pleasure it should be studded in a gold ring or other ornament

Medical Properties of Sapphire

Sapphire should be powdered finely and sieved through a piece of cloth and then crushed in rose-water or water of Bedmusk, when reduced to superfine powder it may be taken with honey, cream, ginger juice, or betel It is indicated in chronic fever, epilepsy, softness of brain, insanity, hiccups, hysteria, neuritis, pain in the joints and mental diseases

Soft variety of Sapphire is known as Sapphirine of Blue Spinel

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गोमेद-मेदक

'GOMED MEDAK'

Zircon, Hessonite, Cinnamon Stone

स्वच्छ गोजलच्छायं स्वच्छं स्निग्धं सम गुरु ।
निर्दलं मसृणं दीप्तं गोमेदं शुभमष्टधा ।।
विच्छायं लघु सूक्ष्मांगं, चिपिटं पटलान्वितम् ।
निष्प्रभं पीतकाचाभं गोमेदं शुभावाहम् ।।

The Gomedak (Hessonite or Cinnamon Stone) which possesses the following eight merits is considered to be of excellent quality .—

1 When seen from a distance it reflects the colour like that of limpid (clear) cow's urine
2 It is perfectly transparent,
3 It is of a delicate hue,
4 It is of a uniform even surface, that is, it should not be deformed, bent or twisted,
5 It is weighty, that is, of high specific gravity,
6 It should not be lamellar (consisting of small thin plates or layers, curved or straight),
7 It feels tender even to the touch, and
8 It possesses a brilliant lustre

And a Hessonite which when seen from a distance does not reflect light, is not weighty, is without fire and water, appears tabular (flat) as if squeezed and lamellar

(consisting of layers), is neither lustrous nor transparent, and resembles a piece of pale yellow glass, is no good and not worth having

Hessonites of red, cinnamon brown and yellow shades are considered to be fine The lustre of a Hessonite resembles that of honey, cow's urine, or red hot coal This Gem is of a soft body

Scientific Analysis

Specific Gravity	3 55 to 3 67
Hardness	6.5 to 7
Refractive Index	1 742 to 1 748

Hessonite is a compound of Aluminium, Calcium, Oxygen and Silica Its Chemical formula is $Ca_3 Al_2 3(SiO_4)$

A specimen of Hessonite may include any one or more of the following blemishes

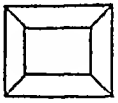
(1) It may lack in water and fire,
(2) It may have a blister in its matrix,
(3) It may be micacious, composed of very thin plates or scales like those of Mica,
(4) There may be a hole, or
(5) a fissure, or (6) a spot in the mineral,
(7) Its colour may be anomalous, or ambiguous,
(8) There may be red, black, or white stains in its texture,
(9) It may be dull, (10) fibrous, or (11) flimsy

Mines

Burma Hessonite gems recovered from the Mogok mines in Burma are of fine water and there is lot of fire in them, while those of Ceylon have them in less degree Hessonite of Burma is considered to be of the best quality, but the output of the Mogok mines is very limited

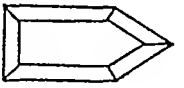
Ceylon The mines in Ceylon contain Hessonites in ample measure, but product is of an inferior quality as compared to that of Mogok

Shape of Cuts

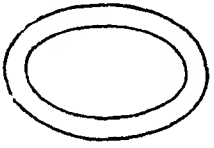


CALIBRE
चौकी

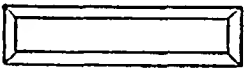
LUNETTE
अर्ध चन्द्राकार



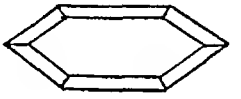
OBUS
पचकोण



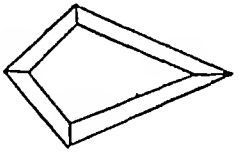
OVAL
बेजई



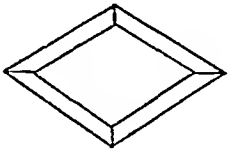
BAGUETTE & BATON
तुलानी कुलबी



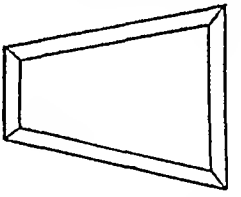
NAVETTE
तुलानी व घास



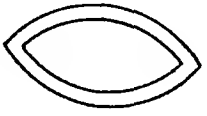
KITE
पतग



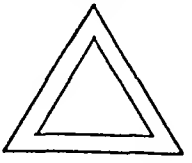
LOZENGE
सकरपारा



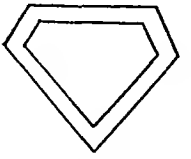
KEY STONE
चतुष कोण (कूघाट)



MARQUISE OR NAVETTE
मारकीस नेत्र घाट



TRIANGLE
तिकोना



CUTCORNERED TRIANGLE
सिघाड़ा

Formerly Hessonite was found in Switzerland also, but these mines appear to have been exhausted

Grouping of Hessonites according to the Four Varnas

1	Brahmin	Of light yellow, red, or cinnamon brown shade
2	Kshatriya	Of deep yellow, or crimson shade with red colour predominating
3	Vaishya	Of reddish-brown shade with predominance of yellow colour
4	Shudra	Of reddish yellow shade with predominance of cinnamon brown colour

When to wear

Out of the nine planets, Rahu, the Dragon's head, governs the Hessonite Hence, it is in the phase of Dragon's head that Hessonite should be worn, two hours after the setting of the sun

Flawless Hessonites are rarely available Most of the specimens do suffer from some blemishes The flaws enumerated above are those which have to be noted and the specimens containing the same are to be scrupulously, avoided as they are very harmful

Hessonites which are fibrous or flimsy, however, are not considered harmful

Medicinal Utility

Hessonite is crushed and powdered finely in rose, 'Keora', or 'Bedmushk' water and then taken by mouth

It is indicated in acute gastritis, piles, fever with cough, foul breath, rheumatism, suicidal tendencies, rheumatic tumours, swelling of the uterus and constipation

as a line, but is diffused over the body it is termed as a 'sheet' A Cat's-eye which is devoid of the fibre is known as Chrysolite The Chrysoberyl or true Cat's-eye also called Oriental Cat's-eye, in former days Cymophane, invariably possesses a white gleam and opalescence due to inclusions of fibres or to a fibrous structure

Scientific Analysis

Specific Gravity	3 68 to 3 78
Hardness	8 50
Refractive Index	1 750 to 1 757

Cat's-eye is a compound of Berylium, Aluminium, with traces of ash, Iron and Chromium It is infusible and insoluble in acids The chemical formula for Cat's-eye is $Be\,Al_2\,O_4$

Flaws

Specimens of Cat's-eye may have in them any one or more of the following blemishes —

(1) There may be a spot in the crystal,
(2) There may be hole in it,
(3) There may be a crack in it,
(4) It may be micaceous,
(5) It may be flimsy,
(6) There may be a stain inside, and
(7) It may be of a dull colour

Generally stains of four colours are found in Cat's-eye, (1) white, (2) black, (3) red, and (4) honey-brown

When a Cat's-eye is dull, without lustre it is called a bony stone Then it is neither transparent nor bright nor smooth

Varieties of Cat's-eye

1 Of a golden hue	This is the finest type and its colour is exactly like a Cat's eye

2	Of a smoky hue	: It is of the colour of smoke, with white fibres
3	Of a dark hue	: It is of a brown shade with white fibres

In Indian terminology the three varieties are known as 'Kanak Khet', 'Dhum Khet', and 'Krishna Khet' respectively

Sources

Cat's eye is found in the mines of Mogok (Burma), Ceylon, and Trivandrum (Southern India) The material from Mogok is considered to be of the best quality The rough stones are cut into cabochon forms, and not in faceted cuts

Colours of Cat's-eye

The line of light in a Cat's-eye is perfectly visible in the direct light of the sun or lamp A fine Cat's-eye possesses the yellowish or greenish tinge of the eyes of cats It is smooth like glass and at the hardness of 8½ it takes a very fine and brilliant polish The prized colour is yellow-gold-beige (like whipped honey) the line of light being pale clear and distinct The intensity of the line appears and disappears, and this makes the gem appear as if it were really alive

A big Cat's-eye weighing more than 313 carats was given to Queen Victoria by the King of Kandy when the latter was conquered by the British

Grouping of Cat's-eye according to the Four Varnas

1	Brahmin	Chatoyant of a bright white and silky lustre
2	Kshatriya	Of a cream colour
3	Vaishya	. Of a yellowish green colour
4	Shudra	Of a smoky dark colour

Tiger's-eye

The Tiger's-eye is a crystalline variety of quartz ($Si O_2$) It is yellow brownish or blackish in colour and of a pronounced chatoyant lustre like that of eye of a tiger

It contains fibres of deep yellowish brown colour It is, however, quite distinct from a Cat's-eye

Scientific Analysis

Specific Gravity	2 65 to 2 66
Hardness	7
Refractive Index	1 544 to 1 553

Cat's-eye when to be worn

Cat's-eye is governed by Ketu (Dragon's tail) It is, therefore, worn in the phase of that planet at the dead of night

Medicinal Utility

This stone is used as a medicine in the form of a very fine paste prepared by crushing it thoroughly in 'Keora' water

It is indicated in cough, colds, foul breath, piles, boils, skin diseases, cholera, dropsy, asthma, etc

Cat's-eye of $2\frac{1}{2}$ lines ('sut') is considered to be of the highest quality, but it is very rare

Sometimes Moon-stones of Indian mines resemble Cat's-eye, but their hardness is less than 8 50 The line on the Cat's-eye is like white milky thread, in other stones it is rather diffused Cat's-eye without the thread is known as 'Kerketak'

The most important nine Gems have been dealt with in the preceding pages A brief account of the remaining seventy-five stones, which are not so valuable and are known as semi-precious stones is given in Hindi alphabetical order in the following pages

अजूबा (Graphite)
Ajuba (Granite)

'Ajuba' is an opaque stone of white brown colour and it has got stains of various colours in its body It is not a hard stone

आतसी
Aatasi
Sun-Stone

Aatasi comes from Persian Atash which means fire or light It is a reddish or bronze coloured variety of Aventurine Oligoclase felspar showing a golden sparkle due to the presence of minute scales or spangles of haematite or goethite diffused through the mineral The Sun-stone is non-transparent

It contains 70% to 90% of albite ($Na\ Al\ Si_3\ O_8$) and 10% to 30% of anorthite ($Ca\ Al_2\ Si_2\ O_8$)

Scientific Analysis

S G	2 63 to 2 67
H	6 to 6½
R I	1 54 to 1 55

It is found in Norway

अहवा
Ahwa (Rhodonite)

'Ahwa' is a pink stone, a variety of marble with white and black spots in its texture It is not hard and is utilized in the manufacture of mortar and for the pavement of floor

अमलिया
Amaliya

'Amaliya' is a pink variety of marble with dark shade It serves the same purpose as the 'Ahwa'

अबरी
Abri

Abri stone has a blend of yellow and black colour in its texture, and is utilized for manufacture of mortar and for the pavement of floor like 'Ahwa' and 'Amaliya'

The 'Ahwa', 'Amaliya', and 'Abri', are three different varieties of marble having their own special characteristics 'Ahwa' and 'Abri', are found at village Motipura in Jaipur District of Rajasthan

The 'Aleimani', the 'Suleimani', and the 'Jajemani' are the three varieties of onyx with slight variations Onyx is the name given to certain kinds of agate in which there is a parallel blending of structure, the milky white layers alternating with dark or coloured chalcedony Owing to this structure onyx is used for cameos, the white layer being cut in relief upon the darker material When black layers alternate with white the stone is 'Suleimani', when cream coloured layers alternate with black it is called 'Jajemani' and when brown layers alternate with white it is known as 'Aleimani'

All these three varieties of onyx are non-transparent The stones of finer quality are translucent, the rest are opaque

उपल
Opal

The word Opal is a variation of the Sanskrit 'Upal' which means stone or gem

Opal is a mineral consisting of hydrated silica and occurring in non-crystalline form of layers, nodules, stalactitic masses, or filling cavities in rocks It has a greasy lustre and hardness lower than that of quartz, while the colour of common Opal is bluish-white, milky or yellowish In the precious Opals there is a remarkable play of colours due to fine cracks filled with material possessing a slightly different index of refraction than the original substance and

also to an unequal distribution of the water content The gambol of colours in Opal is due to the fact that it was formed of a series of solutions, sliding over each other at different times and drying out at different speeds Light refracts on the inner layers and fissures, and the result is the variety of colours Some opaque Opals show an opalescence, especially after immersion in water Luminescence is sometimes observed

There are three main varieties of Opal —

(1) Precious Opal—Yellowish-white, dark-grey, or bluish with an excellent play of colours Those with the lighter colours are called white Opals, while the dark-grey, blue and black Opals are designated as 'black' Opals

(2) Fire-Opal—Orange yellow to flaming red in colour, and semi-transparent to transparent, may show a play of colours

(3) Common Opal—It is translucent to opaque and of many colours When milk-white, yellowish, bluish or greenish it is called Milk-Opal Wood petrified by Opaline material is called Wood-Opal Opal Jasper is red, reddish brown, or yellow-brown in colour, and resembles Jasper

In Opal we look for vitality of colour, brilliance of play, good polish, no visible cracks, size and depth

Scientific Analysis

Specific Gravity	2 10 to 2 20
Hardness	5 to 6 5
Refractive Index	1 444 to 1 464
Chemical Formula	$Si\ O_2\ n\ H_2\ O$

The amount of water present may vary from 1 to 21 per cent but is usually between 3 and 13 per cent

Opals are dried and hardened gelatinous silica, soluble in hot caustic, potash or soda

Precious and Fire-Opals are used for gem purposes, Only Fire-Opals can take a brilliant cut Wood-Opal, being

of soft structure, when worn it loses its colour very soon, and cracks appear in its body

Common Opal occurs widely distributed Precious Opal is found near Czerwenitz, Rumania, Queretaro and elsewhere in Mexico, Humboldt County Nevada, Latat County, Idaho, Honduras, New South Wales, especially at White Cliffs, and at Lightening Ridge as Black Opal, Queensland, South Australia, Ceylon, Mogok (Burma), and in many parts of the Deccan and Rajmahal Traps in India

Opal as a gem has had a very chequered history At one time it was regarded as very precious, next only to the Emerald Pliny saw in Opal "the living fire of the Ruby, the glorious purple of the Amethyst, the Sea-green of the Emerald, all glittering together in an incredible mixture of light" But gradually it lost its popularity, and by 1920 it almost became an outcaste

However, it is again coming into fashion and beautiful Opals are becoming scarce, hard to get

Black-treated Opals

It has come to light that white Opals are being blackened artificially To an uninformed jeweller and to the unaided eye these stones do not present a suspicious appearance The most reliable means of detecting them is the microscope Although in white and black Opals of natural colours the gelatinous body material appears rather homogenous, the treated specimens teem with granular black dots resembling black dust These are formed by the dried residue of the artificial colouring agent

It is a very soft stone and cracks are formed in it after being used for some time

उदाऊ
'Udau' (Black Tourmaline)

Udau is a variety of Tourmaline, and is of a very high specific gravity It is of a very tough material

ऐमनी
Aimani
Red Agate

Agate found in Yemen (Arabia) is known by the name of Aimani It is of a red colour with dark shade

कटेला
Kataila
Amethyst

Amethyst is derived from Greek 'Amethystos, meaning 'not drunken' Kataila is a Hindi name for the popular gem-stone Amethyst It is a crystalline variety of quartz (SiO_2) It is of purple, violet or blue colour and is found in veins of iron and manganese It is mined in India, Ceylon, Burma, and some parts of South America The colouring of Indian Amethysts is often uneven, patchy, striated and zoned, but better stones without these defects have been seen at Mogok (Burma)

Scientific Analysis

Specific Gravity	2 66
Hardness	7
Refractive Index	W 1 544 to E 1 553 (×)

In Amethyst we look for strength or gaiety of colour, purple to violet, violet to red, flawlessness, even distribution of colour

It is believed that Amethyst represents those qualities which would keep a man from worldy intoxication, keep him from falling headlong into life, error, tempers, and infatuations And it represents detachment, judgment, self-discipline and high standards "By its charm it giveth good understanding"

Amethyst is also known as 'Jamunia' It is worn in the phase of Saturn instead of Sapphire

कुदरत
Kudrat (A variety of Marble)

'Kudrat' is a non-transparent black stone with white and black spots on its surface

कसौटी
Kasauti
Basanite

'Kasauti' is the Hindi word for the 'Gold Tester' also called touch-stone or Basanite It is used for testing the purity of gold alloys It is a velvet black variety of quartz When rubbed across it, the gold leaves a streak which is then moistened with a solution of 78 4 per cent nitric acid, 1 6 per cent of hydrochloric acid and 20 per cent of water On examination an expert is able to detect the nature of the alloy It is sometimes called Lydian stone because a quartz from Lydia (Kingdom that existed in Asia Minor before the Christian Era began—in 133 B C it was included in the Roman Empire) was used for this purpose

Scientific Analysis

Specific Gravity	2 65
Hardness	7
Refractive Index	W 1 544, E 1 553 (+)
Chemical formula	SiO_2

Basanite in the form of water-worn pebbles is found in stream gravels with Jasper and is common to many localities in America The best Basanite, however, is exported from India to all countries

कहरुआ
Kaharua
Amber

The Hindi, Persian, and Urdu name for Amber is Kaharua In Persian 'Kah' means grass and 'rua' to pick up

Amber is a fossil resin hydrocarbon It is used for ornamental purposes as it is polished easily In colour it is of a golden hue Reddish-brown, whitish, and black colours are also available sometimes, but not always, it is transparent Flies and other insects are often found in it and its source is carniferous trees that have been rotting in the ground When rubbed Amber produces negative electricity, and attracts straw like a magnet, a quality known to the early Greeks who like many other ancient peoples used Amber as an ornament Due to its magnetic property it is named as 'Trinkant Mani' a jewel that attracts straw When rubbed with cloth it emits odour like the lime

Green and blue Amber is also found, but is very rare

Amber is found in great quantities on the Southern or Prussian shores of the Baltic Sea, and Sicily, and occasionally on the East Coast of England It is found in East Prussia, Greenland, Sicily, China, Thailand and other countries

Burmese Amber or Burmite, is slightly harder, tougher and of higher specific gravity than Baltic Amber or Succinite It occurs in many shades of colour varying from pale yellow, through reddish tints to very dark browns, no less than fourteen separate varieties being recognized in the local trade, depending mostly on variety of colours Some of these, translated by Chhibber are named 'Honey', 'Flame', 'Sesame', 'Horse-hoof', and 'Light-red', while in the darker shades there are at least four distinct kinds Characteristic of Burmite is its strong fluorescence, which appears as a bluish tinge in daylight and is powerful enough to impart an unpleasant greenish smeariness to some fine yellow specimens when viewed at a certain angle, on the other hand it adds to the beauty of medium browns Much of the raw material is opaque, discoloured and crossed by calcite-filled hair cracks, rendering it of little economic value

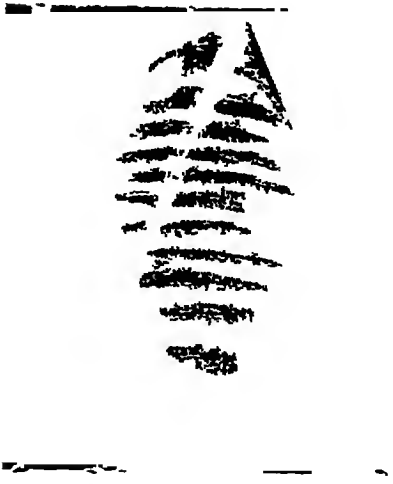
Structure of Synthetic Corundums

नकली रत्न में वलयाकार रेखायें व भुनके

Structure of Genuine Corundum Stones

असली रत्न के धूधक और उसकी रेखायें

कुरविन्द जाती के रत्नों की आन्तरिक रेखायें



नकली रत्न में वलयाकार रेखायें

North German Amber is Succinite Rumanian Amber is Rumanite and Sicilian Amber is Simetite named on the basis of the countries of their origin

Amber is used for beads, tobacco-pipes, cigarette-holders, umbrella-handles, etc The powder obtained from it is of great medicinal utility It is finely crushed in rose or keora water and made into a paste, which is indicated in menorrhagia and leucorrhoea Amber is not reduced to ash for medical purposes

Scientific Analysis

Specific Gravity	1 10
Hardness	2 50
Refractive Index	1 540

Artificial Amber

Amber is also made by artificial means by compounding of copal, camphor, and turpentine, and unlike the genuine article it will dissolve in ether Another feature to distinguish the real from the artificial one is that the latter is of higher density and when broken presents a glassy glitter The former is far lighter and smoother

कांसला
'Kansla' (A Kind of Tourmaline)

Kansla is a variety of Tourmaline It is of a greenish and dark (cloudy) shade of white colour It is hard and tough and transparent Blue and green varieties of Tourmaline have been found in the mica bearing pegmatites of the Hazaribagh district

Kansla, along with Dantla, and yellow-green Tourmaline also called 'Brazilian Peridot', and Udav are different varieties of Tourmaline Due to slight differences in their colours and also to their origin from the different mines, they have been given distinct names by gem experts

कुरंद
'KURAND'
Emery

Emery is dark-brown or greyish-black variety of Corundum It is composed of alumina mixed with the iron-oxide, magnetite and haematite or hercymite and is used as an abrasive on account of its extreme hardness It is found in bands of irregular granular masses in crystalline limestones associated with metamorphic rocks in the Greecian Island of Naxos in the Aegean Sea, and in Asiatic Turkey but the Chief Commercial sources are Ontario, New York State and the Transvaal The rock is reduced to varying grades of powder, which is used for grinding, cutting and polishing precious stones

Scientific Analysis

Specific Gravity	3 9 to 4 1
Hardness	9
Refractive Index	W 1 768 E 1 760 (—)
Chemical formula	Al_2O_3
Al 52 9	047 1 per cent

गवा
Gava
(A Kind of Agate)

This is a white stone, non-transparent, and comparatively soft in texture It is utilized for polishing the gems, as agate powder

गौरी
Gauri
(A Variety of Agate)

'Gauri' is a variety of agate, semi-precious chalcedony, made up of strata or bands of light slate and milky colour indicating successive stages of deposition It is quite hard and is used for the manufacture of mortar

The 'Gauri' stone mentioned in the books of Ayurvedic system of medicine is, however, arsenic, but it is a different stone

गुदड़ी
Gudari

'Gudari' is a non-transparent stone of high specific gravity There are spots in it of various colours resembling the small pieces of stones in a mosaic flooring

This is a compound of many stones of different colours

गोदन्ती–चंद्रकान्त मणि
Godanti-Chandrakant Mani
Moonstone (Adularia)

Moonstone is a variety of Adularia, and is sometimes called Wolf's Eye, Fish's Eye or Water-Opal It is translucent colourless felspar chiefly orthoclase It possesses an excellent opalescence and reflects a bluish milky light, sometimes slightly cloudy It is soft and very smooth It is used for gem purposes 'Potas' (Cabochon cuts) are made out of it.

One-line or two-line Moonstones, which are of white colour, or yellow, brown etc , also, though resemble with "Cat's-eye", yet their hardness, and specific gravity are of Moonstone and not that of Cat's-eye Green colour Moonstones of Cat's-eye type and Apetite stones are also found

Amethyst is found in South India, which specialises in its colour, depicting less water, but having clarity too

Scientific Analysis

Specific Gravity	2 55 to 2 58
Hardness	6 00 to 6 50
Refractive Index	1 53 to 1 54
Chemical Formula	$K A l Si_3 O_8$

Mines

Adularia is a low temperature hydrothermal felspar formed below 400°C and is usually found in cracks and veins in gneiss and mica schist

Burma · The Moonstone is plentiful in the Ruby Mines Tract of Upper Burma A large pegmatite vein several feet thick is composed of quartz and orthoclase with an unusually remarkable schiller and was formerly worked for Moonstone on the Myo Taung 4 miles east-north-east of Mogok Moonstone of Burma is of the finest quality with a lot of water and fire in it It is found in a variety of colours such as blue, rose-pink and white

Ceylon is also the chief source of supply of Moonstone, but the material obtained from the Ceylon mines is inferior to that of Burma mines

For many years Moonstone was recovered from leptynites of the Khondalite series in the Dumbara district of the Madhya Bharat But this material is inferior even to that of Ceylon as it contains less of water and fire and lacks in lustre

Nowadays it is also found in Southern India Many colours are found in it, such as light orange, slight green, milky, smoky etc A thread like that of a cat's-eye may also be present on its surface

'Godanti'

'Godanti' is a stone of lemon-yellow colour It may be translucent to opaque

Scientific Analysis

Specific Gravity	3 5
Hardness	1 5 to 2
Refractive Index	2 4 to 2 87
Chemical Formula	As_2S_2 (As 61, S 39 per cent)

The mineral is not important commercially

चकमक
'Chakmak'
Flint

Chemical Formula SiO_2

Flint is a cryptocrystalline variety of quartz It is a mineral mainly of silica More opaque and less lustrous than chalcedony, another variety of the same family of quartz, it is dark grey or dark brown in colour, breaks with a shell-like fracture and occurs in nodules with a white coating Because of its readiness to pulverize, it is utilized in pottery and flint-glass manufacture Fire making by striking flint with iron pyrites, an important discovery of the later Stone Age (when ground or polished stone weapons and implements prevailed) was long used The artificial flaking of flints by sharp blows of hammer stones, led to the invention of flint implements which during the Stone Age laid the foundations of human progress

Rounded pebbles of flint, quartz and tough quartzite are required for tube and conical ball mills of various types, grinding such materials as pottery clays and paint mixtures in which colour contamination from the more usual, steel grinding balls is not permissible, solid blocks of flint, chert or quartizite are also needed for their linings In India there are various places where flint is found Dr Sahni has listed 14 localities spread over Bihar, Orissa, Madhya Pradesh, Vindhya Pradesh, Bombay, Andhra and Uttar Pradesh where such pebbles are obtainable, and there are doubtless many more Large masses of flint occur near the base of the Nummulitic limestones of the Sukkur and Rohri Hills, to the east of Khairpur, in Pakistan Similar concretions are also found in the Cretaceous Limestones of the Bolan Pass in Baluchistan A band of flints, resembling those of chalk formations of Europe occurs in clays and shales near Coorchycolum and Senderai in the Tiruchirapalli District of Madras Flint has also been reported from the infra-Triassic limestones of Hazara, Pakistan

Scientific Analysis

Specific Gravity	2 651
Hardness	7
Refractive Index	1 54-1 55

चित्ती
Chitti
Tiger Stone

It is a stone of cloudy brown and yellow shades into clear bands of white It is also known as 'Dariyai Lahsunia' (Marine Cat's-eye) The white band in the material of 'Chitti' or Tiger Stone is concentrated in a line across the stone

The Chemical formula for Tiger Stone is Be Al_2 O_4

Beads, Cabochons, and toys are manufactured from Tiger Stone It is an opaque stone

चुम्बक
Chumbak
Loadstone

Loadstone, magnetic iron ore, is designated as 'Maknatis' in Persian and 'Chumbak' in Hindi It is opaque, iron black or deep red in colour and of dull lustre It is strongly magnetic and acts as a natural magnet

Scientific Analysis

Specific Gravity	5 2
Hardness	5 5 to 6 5
Chemical Formula	Fe Fe_2 O_4 Often written Fe_3 O_4 or Fe O Fe_2O_3
	Fe 72 4, O 27 6 per cent Fuses with difficulty

Large deposits of magnetite are found in Norway and Sweden, the Ural Mountains, Brazil, Warren, Essex and

Clinten Counties New York, Cornwall Pennsylvania, Oxford, New Jersey Magnetite from Magnet Cove, Arkansas, is usually very strongly magnetic

Magnetite is an important iron ore Mixed with cement magnetite is used as ballast in ships

घृतमणि – जबरजद
Ghrit Mani — Zeberged
Peridot

Peridot is the transparent olive green or bottle green variety of the mineral olivine, a silicate of iron and magnesium

Emerald and Topaz are also of green colour but Peridot differs from them in this respect that it has got a pale shade whereas the colour of Emerald varies from a grass green with a yellowish tinge to a deep Emerald green, and the Topaz has a characteristic greenish yellow colour Peridot is found in various shades of green, also yellowish, brown, greyish or colourless Its specimens are transparent Peridot is used for gem purposes

In Peridot we look for . clarity, velvetiness, strength of colour

Scientific Analysis

Specific Gravity	3 3 to 3 6
Hardness	6 5 to 7
Refractive Index	
	α 1 653 to 1 681
	β 1 676 to 1 706
	γ 1 689 to 1 706

Optically positive when Fe O content is less than 13 per cent, otherwise negative

The specific gravity and the indices increase with the iron content

Chemical Formula $(Mg, Fe)_2 SiO_4$

The composition varies between that of forstritee ($Mg_2 SiO_4$) and fayalite ($Fe_2 SiO_4$)

It is comparatively a soft stone, being somewhat softer than quartz and the pieces when recovered are slightly rounded and show their crystal outlines

Easily decomposed and gelatinizes with acids

Peridot occurs in Egypt, on Mount Visuvius, in Burma, Norway, Arizona, Vermont, New Hampshire, Virginia, Pennsylvania, North Carolina, Oregon, New Mexico, Canada and Brazil

The greater portion of the world's supply of Peridot has for centuries been derived from the Island of Zeberged (St John) in the Red Sea, from which the gem derives its name in Persian There deep yellowish-green stones occur in veins of serpentinized peridotite The gem occurs in the gem gravels of Bernardmyo valley, ten miles north of Mogok, Burma It is of the best quality

Peridot is used as a jewel, in two shades The lighter version when flawless and well cut, looks like a glistening golden syrup lightly reflecting some mild, cool green sea We are not fully aware of the green, it is just that the colour is the exact opposite of brash and not yellow Burmese Peridots vary from shades of yellowish green to olive green, and large gems are cut from them in 'Step' style for pendants and necklaces

The second variety when well cut has great gaiety and a high, clear note

A handful of faceted green Peridots sparkling together suggest a twittering of green birds There is no blue in the green, even in its darkest version of itself when placed in shade it still remains suntouched

Medicinal Utility

Peridot is used as medicine in the form of a fine thin paste It is indicated with suitable accompaniments for hicupps, dysmehorrhea, mettorrhea and other female ailments It is also prescribed for strength and vigour

जजेमानी
Jajemani
Agate

'Jajemani' is a variety of onyx in which there are black parallel bands alternating with milky-white layers It belongs to the same group as 'Aleimani' and 'Suleimani' It is a cryptocrystalline variety of quartz

Scientific Analysis

Specific Gravity	2 65
Hardness	7
Refractive Index	W 1 544
	E 1 553 (+)
Chemical Formula	SiO_2

सगे जराहत; घीया पत्थर
'Sange Jarahat–Ghiya Patthar'
Soapstone

Soapstone or Steatite is a very soft sectile mineral compact and massive form of talc, a hydrated silicate of magnesia, $3MgO, 4SiO_2, H_2O$. It is found in white, grey or greenish colour It is opaque.

Scientific Analysis

Specific Gravity	2 6 to 2 8
Hardness	1 5 to 2 5

Soapstone is used in toilet powders and soaps, for dressing skins and leather, in waterproof cement, in ceramic products, as a lubricant, non-conductor of heat, and as a mineral pulp for filler in paint, paper and roofing material Over 40 industries use talc or soapstone in some form

It is also used as medicine, especially for healing wounds 'Sange Jarahat' means surgeon's stone.

जहर मोहरा
'Zahar Mohara'
Serpentine

Serpentine is the name of a mineral consisting of magnesium silicate and regarded as a decomposition product of igneous rocks rich in ferro-magnesian silicates Precious serpentine is massive, more or less homogeneous In colour it has various shades of green, sometimes yellowish It is translucent

Scientific Analysis

Specific Gravity	2 5 to 2 8
Hardness	2 5 to 4
Refractive Index	1 49 to 1 57 (+)
Smooth to Greasy Feel	2 V is variable sometimes large
Chemical Formula	$Mg\ 6\ (OH)_8\ Si\ 4\ O_{10}$

Serpentine occurs at many places, some of which are Sweden, Silesis Chester County and Easton, Pennsylvania, where it is mined, Milford, Connecticut, Hoboken and Montville, New Jersey, Syracuse, New York, Vermont, Northern New York, Washington In our country it is found in Ladakh (Kashmir), and Jaisalmer (Rajasthan)

There is a place known as Khatoon in Persia, and Serpentine of Khatoon is considered to be the best It is known as (Zaharmohara Khatai)

Polished massive Serpentine is used for ornamental and interior decorative purposes Translucent yellowish Serpentine is cut and polished for gems Mortar and cups are also made of it Turmeric crushed in a Serpentine mortar turns red If a thread is wrapped around a Serpentine and touched with fire, the thread does not burn

In medicine it is indicated for stomach troubles, and is very efficacious for the treatment of typhoid fever It cures the ulcers of intestines

झरना
Jharna

In Hindi 'Jharna' means to leak or to trickle The stone of this name is of a dark, earthy or brown colour If water is filled in a cup made of 'Jharna', it trickles down drop by drop and gets filtered A variety of this stone which floats on water is found in Rameshwaram in Southern India

टोपस
Topaz
Rubellite

'Topaz' is derived from the Sanskrit 'Tap' meaning shine or 'tapas' which means fire In English, however, it is believed to have its origin in old French 'Topaze' which in its turn borrowed it from the Greek 'Topazos' or 'Topazion' According to Pliny Topaz has reference to the island to Topazos in the Red Sea

Topaz is a precious stone and it belongs to a family of crystals which are termed as 'Orthorhombic' Its characteristic colour is yellow varying from a pale tint to a deep orange It is also white, greenish or blue and some specimens become pink or red when heated Precious Topaz is perfectly transparent In Topaz we look for purity, as its crystals are prone to inclusions The best colour in Topaz is a light dazzling gold with a hint of red

Scientific Analysis

Specific Gravity	3 50 to 3 60
Colourless	3 55 to 3 5
Yellow	3 53 to 3 58
Brown	3 50 to 3 60
Pink	3 50 to 3 54
Blue	3 55 to 3 60
Hardness	8
Refractive Index	1 607-1 619 to 1 629-1 637

Topaz is a fluo-silicate of aluminium Its chemical formula is $Al_2 (OH, F)_2 SiO_4$ It is found in the form of pastels or rolled fragments, with streaks in its composition which disappear when the ore is grinded and given the form of gem Fired or red Topaz may be mistaken for spinel or 'Lalri' (Spinel Ruby)

All along people have admired the gem and historically it has been very popular with the people of India Egyptians, Romans, Greeks and Sexons knew it, and is believed to be the foundation stone of new Jerusalem

Topaz occurs in crevices and cavities in highly acid igneous rocks such as granites and rhyolites, also in gneisses and schists It is found in Japan, Sweden, Mexico, California, New Hampshire, Ceylon and various other places, but the finest stones are found in the sands and gravels of Brazil, Ural Mountains in Siberia, and at Schneckenstein in Saxony (Germany)

Topaz being very hard (it has the hardness of 8) it takes a very fine polish Both brilliant cut or the step cut are suitable for it If, however, its colour is on the darker side, the round or the Emerald cut may be more suitable

In the Indian terminology, it is the Rubellite which is called 'Topas' It is of green colour also, which the Western scientists speak of as 'Brazilian Emerald'

डूर
Dur
Epidote

'Dur' is a stone of deep brown colour like that of catechu, the astringent vegetable extract which is eaten with betel leaf It is non-transparent It is used for the manufacture of toys figurines, etc

It is found in Italy, France, Germany and Alaska Its alternative name is 'Pistacite'

Scientific Analysis

Specific Gravity	3 25 to 3 50
Hardness	6 to 7
Refractive Index	1 735 — 1 765
Chemical Formula	$Ca_2 (Al, Fe)_2 (Al OH) (SiO_4)_3$

ढड़ी
'Dhedhi'

'Dhedhi' is a black stone It is opaque and hard Signet rings are made of this stone

Four Lines

These are black colour stones, found in South India They have good polish, lustre and are opaque There are one-line as also four-lines, which are called as Indian Black stars Four Lines Some lines reflect greenish shade also

तामड़ा
Tamda
Garnet

The word 'Garnet' is derived from Latin 'Granatus' meaning 'having seeds' and so is related to pomegranate By 'Garnet' is meant a group of gemstones of varying composition and colour but possessing certain characteristics in common The Garnets crystallize in 12 or 24 sided forms, have a greasy lustre and imperfect cleavage They are complex silicates of various oxides Commonly found in red, brown, yellow, green or black, less frequently white or colourless Light-coloured Garnets are generally transparent to translucent, dark coloured varieties translucent to opaque Garnets of light red colour resemble the Spinel In Prakrit it is known as 'Pulak ratna'

Garnet of the finest quality looks like Thailand Ruby and Spinel, but Garnet is tough, Spinel soft and Ruby very hard There is great difference in their scientific properties The specific gravity of Garnet is higher than that of Spinel

According to the Western Astrologers, Garnet is useful for persons born between 20th of January and 19th of February In Garnet we look for liveliness or clarity of colour, transparency The rare Demantoid Garnet, (a grass green variety of Andradite) has a flaw which is used as an identity mark

Scientific Analysis

Specific Gravity	3 40 to 4 20
Hardness	6 50 to 7 50
Refractive Index	1 740 to 1 890

The Garnet group embraces minerals possessing the general formula $M''_3 M'_2 (SiO_4)_3$ in which M'' may be Calcium, Magnesium, Manganese or Ferrous Iron, and M''' Aluminum, Ferric Iron, or Chromium Sometimes Titanium may replace a portion of the Silicon

Six varieties depending upon composition have been distinguished

1 Almandite (Carbuncle) The name has been derived from Alabanda where in ancient times Garnets were cut and polished Deep red to brownish red in colour, it is Iron-Aluminum Garnet

Specific Gravity	4 05
Hardness	7 50
Refractive Index	1 766 to 1 83

Transparent red varieties known as precious Garnets are used as gems, translucent varieties are called common garnets

Chemical Formula $Fe_3 Al_2 (SiO_4)_3$

2. Andradite (named after the Portugese mineralogist J Andrada), Calcium-Iron Garnet The yellowish or greenish variety is called 'Topazolite', grass-green variety 'Demantoid' and black variety 'Melanite'

Specific Gravity	3 7 to 3 90
Hardness	6 50
Refractive Index	1 865 to 1 95
Chemical Formula	$Ca_3 Fe_2 (SiO_4)_3$

3 Hessonite or Grossularite (The name Grossularite has been derived from the botanical name of gosseberry, in allusion to the light-green colour of the original Grossularite) Calcium-Aluminium Garnet Calcium may be partially replaced by Ferrous Iron, and Aluminium by Ferric Iron White, various shades of yellow, Cinnamon brown, rose red, also green and colourless

Specific Gravity	3 84
Hardness	6 50
Refractive Index	1 735 to 1 763
Chemical Formula	$Ca_3 Al_2 (SiO_4)_3$

4 Pyrope. The name has been derived from Greek meaning 'fire like') Magnesium-Aluminium Garnet Calcium and Ferrous Iron may replace, partially, Magnesium

Deep red to almost black in colour

Scientific Analysis

Specific Gravity	3 78
Hardness	7 25
Refractive Index	1 705 to 1 749
Chemical Formula	$Mg_3 Al_2 (SiO_4)_3$

When clear and transparent it is used as a gem

5 Deep red coloured garnet Adelaideruby, derives its name from Adelaide capital of South Australia, from where it is mined

6 Rhodolite is a pale violet variety of Garnet Some scientists consider it a variety of Almandite

Specific Gravity	3 84
Hardness	7 25
Chemical Formula	$Fe_2 Al_2 (SiO_4)_3$

7 Spessartite is a Manganese-Aluminium Garnet It is brownish to hyacinth red May contain Ferrous and Ferric Iron

Scientific Analysis

Specific Gravity	—	4 2
Hardness	—	7 25
Refractive Index	n =	1 774 to 1 814
Chemical Formula	—	$Mn_3 Al_2 (SiO_4)_3$

8 Uvarovite, named after Russian Count Uvarov is a Calcium Chromium Garnet It is Emerald green in colour, small pieces of Uvarovite Garnet are seldom found The prices go up to even Rs 2000/ per carat

Scientific Analysis

Specific Gravity	..	3 46
Hardness		7 5
Refractive Index		n=1 94
Chemical Formula		$Ca_3 Cr_2 (SiO_4)_4$

The aforesaid varieties of Garnet are more or less theoretical simple compositions In nature these varieties grade over into one another, the composition of a given specimen being usually rather complex

Sometimes the specimens of Garnet with bluished transparent colour are so beautiful that they may be taken for Ruby, but they are distinguished by their specific gravity, hardness and refractive index

In Western countries Garnet is symbolic of love and is therefore given as a present to the ladies in pledge of constancy

Pope Innocent III (1198 to 1216) presented a fine specimen of Garnet to Richard Coeur de Lion for his bravery

Places of Occurrence

Almandite—occurs in India, Ceylon, Minas Novas, Brazil, Bodo, Norway, Tirol, Uruguay, Australia, Solida, Colorado, Fort Wrangel, Alaska, Benewah County, Ivah or Charlemont, Massachusetts, Gore Mountain, Warren and Essex Counties, New York

Andradite—is found at Dobschau, Czechoslovakia, Tirol, the Island of Elba, Arendal, Norway, the Ural Mountains, Franklin, New Jersey, Magnet Cove, Arkansas, Henderson, North Carolina

Hessonite—Ceylon, Mussa Alp, Piedmont, Wilni River, Siberia, Morelos, Mexico, Monzoni, Tirol, Rumford, Maine, Warren, New Hampshire

Pyrope—Important localities are Teplitz, Aussig, and Bilim, Bohemia, Kimberley and other localities in South Africa, various places in Southern Nutah, Arizona, New Mexico, Madagascar, Ceylon, and Brazil

Adelaideruby—Australia

Rhodolite—is found in Macon and Jackson Counties, North Corilina

Spessartite—Occurs in Tirol, Piedmont, Ceylon, Haddam, Connecticut, Amelia Court House, Virginia, Bethel, Maine, Salem, North Carolina

Uvarovite—Some of the localities are Ural Mountains, Western Transvaal, Union of South Africa, Oxford, Canada, New Idria, California

Abrasive Garnet

Red and brown garnets are common in the crystalline rocks of the Indian Peninsula and, when they possess the necessary transparency and are sufficiently free from flaws,

are cut as gemstones The iron Garnets particularly of the Almandite variety are also used as abrasive material, an application which they owe to their hardness, brittleness and property of fracturing into small, uneven, sharp-edged, angular fragments under pressure The abrasive properties of Garnet have been known to Indian craftsmen for centuries and were utilised widely at one time as a substitute for Corundum After being crushed, classified and prepared, Garnets are used as coatings for paper, cloth and discs in the same way as Corundum or Emery, the finished products reaching the market in very similar forms Small quantities of superfine Garnet powder are used for surfacing plate glass as well as the softer ornamental stones such as Serpentine or Marble Garnet papers and cloth are said to be indispensable for finishing purposes in the wood-working and leather trades They are also used in the final stages of the preparation of rubber and celluloid goods as well as for scrubbing down varnished surfaces and various other purposes, but the demand is a limited one, only capable of absorbing a few thousand tons per annum and, as a consequence, industrial specifications are unusually exacting Most of the world's abrasive Garnet comes from the United States of America, the principal source of supply being Adirondack Mountains of West County, New York Garnets intended for abrasive purposes should be clean, fresh and free from marked inclusions or decompositions It may also be noted that badly weathered, shattered and impure crystals are not wanted in the trade

Early History

Garnets were cut in India long before the Christian Era and the country furnished stones to both Greek and Roman merchants Jewels of Garnet, Topaz, Carnelian and Rock Crystal were found in the Stupa at Piprahva where remains of Lord Gautam Buddha were interred about 483 B C The Carbuncleof the ancients, wrote N Ball "is Garnet cut, as

it is called, **en cabochon** The art is still practised in India, and the stones, when of good quality and well cut, are very beautiful and would meet with more esteem, were it not that they happen to be cheap, which has put them within the reach of so large a circle that they are made but little use of "

Garnet in Rajasthan

Precious Garnet is found in certain parts of Rajasthan viz, Jaipur, Udaipur, Kishangarh and Ajmer Merwara The 'real Jaipur Garnets' extensively sold to tourists come from various localities in Ajmer and Kishangarh The stones are found in the soil covering hollows of the surface of Aravalli schists, especially where these are traversed by granitic intrusions, from shallow working on the outcrops, and from the beds of rivers draining these rocks Mining is carried on intermittently, and the returns may be blank for several years and then show the production of a few tons, which it takes the market a considerable time to absorb The finest stones come from Sarwar an important town of the former Kishangarh State They are cut at Jaipur and Delhi, and a portion of the cut stones still finds its way to foreign countries Most Rajasthan Garnets belong to the Almandine group, but the variation in their colour from deep red, through reddish-purple, to purple seems to indicate some intermediate varieties in the series which begins with the blood-red Pyrope and, by replacement of its magnesium content with iron ends with the nearly pure, violet coloured Almandine Rhodolite is in fact a Rhododendronred variety, corresponding to a mixture of one unit of Almandine and two of Pyrope

Gem Garnets of these types occur at various other places such as Gharibpet, Kaketla and Palonka in the Warangal district of Hyderabad

Though possessing no value as gemstones, the deep red to dark chocolate and black Almandines of the

Rajasthan mica belt may be mentioned, as they occasionally attain the size of a small foot-ball, while specimens as large as billiard balls are common When these specimens are skilfully broken by qualified artisans, fine crystals of Garnet are obtained As crystals exhibiting combinations of dodecahedral and trapezohedral forms they are good collectors' examples Excellent cinnamon brown crystals of Grossularite, which in addition to the forms mentioned also exhibit hexoctahedral faces, come from pegmatite at Dolatgarh, in Mewar

तिलियर
Tiliar

'Tiliar' derives its name from 'Til' the Hindi name for sesame The stone is opaque with black spots, and grey in colour like sesame It is used for the manufacture of toys and figurines

तुर्मली (वैक्रांत)

TOURMALI (VAIKRANT)

TOURMALINE

अष्टास्रश्चाष्टफलक , षट्कोणो मसृणो गुरु ।
श्वेतो रक्तश्च पीतश्च, नीलः पारावतेच्छविः ।।
श्यामलः कृष्णवर्णश्च, कर्बुर सप्तधा स्मृतः ।
शुद्ध, मिश्रित-वर्णश्च, युक्तो वैक्रान्त उच्यते ।।

A gem which is octagonal, that is, has eight facets, or is hexagonal (with six facets), perfectly transparent has rich and lovely hue with fire and water, is of high specific gravity and of white, red, yellow, blue or of blue pigeon's colour, or of a white colour with dark sheen, or pitch black, in short, of any one of the seven colours but with a white base, or two or more colours either sharply distinct or blended in the same crystal, such a gem is known as the Tourmaline

Tourmaline derives its name from the Singhalese word 'turmalli'

The Sanskrit name for Tourmaline is Vaikrant In this gem we find a variety of colours with a dark lustre It is of high specific gravity and tough in texture

In Tourmaline we look for brilliance, deep clear colours, green African stones

Scientific Analysis

Specific Gravity	2 9 to 3 2
Hardness	7 to 7 5
Refractive Index	1 636-1 698
	1 613 to 1 658

Tourmalines rich in iron have the higher indices

Tourmaline is a very complex silicate It contains a greater variety of elements than any other mineral and its chemical composition may vary from stone to stone Its chemical formula is $M_7 Al_6 (OH, F)_4 (BO_3)_3 Si_6 O_{18}$ M represents varying amounts of Lithium, Potassium, Sodium, Iron, Magnesium, Manganese and Calcium In the Western countries, like the Garnets, the varieties of Tourmalines are usually classified according to composition as Alkali (Elbaite), Iron (Schorlite), and Magnesium (Dravite) Tourmalines The Alkali Tourmalines range from rich reds through various shades of greens and blues

Colourless Tourmalines are called Achorite

Blue	Indicolite, or Brazilian Sapphire and Tourmaline
Green	Brazilian Emerald
Yellowish green	Brazilian Peridot
Black (which are found in Norway)	Sihori, Schorl or Schorlite
Pink and red	*Rubellite*

Rubellite is a Lithium Tourmaline, commonly associated with Lepidolite Rubbellite Tourmalines are the most desirable Tourmaline gems

Notwithstanding the presence of the aforesaid distinct colours there is always a darkish brown glamour The gem can be easily identified by its specific gravity and texture

Tourmaline is of great medicinal utility and is indicated in various diseases

General Remarks

Tourmaline is a very characteristic mineral of pegmatite dikes associated with intrusions of granite It is the result of pneumatolytic and hydrothermal action as is evidenced by the presence of Fluorine, Hydroxyl and Boron It is also common in metamorphic rocks, such as gneisses, schists, and in crystalline limestones, and dolomites Some of the common associates are Quartz, Feldspar, Beryl Topaz, Fluorite, Lepidolite, Apatite, Muscovite, and Cassiterite

Excellent crystals of Tourmaline occur on the Island of Elba (in the Mediterranean Sea), in the Ural Mountains, Burma, Ceylon, South West Africa, Tasmania, Bolivia, St Gotthard (Switzerland), Madagascar (Indian Ocean), Minas Gerais (Brazil), Paris, Auborn and Rumford, Maine (France), Haddam Neck, Connecticut Gouverneur and in St Lawrence county, New York, Mesa Grande, Pala, and elsewhere in San Diego County of California

"The green variety of Tourmaline, or Indicolite, occurs in Hazari Bagh (Bihar) and Padar District of Kashmir where some transparent crystals of the red variety, Rubellite are also found "

"This variety of Tourmaline possesses greater transparency, but is much, fissured" Wadia, "Minerals of India" P 118

It is the stones of good and attractive colours that are valued as gems and used for jewellery On account of its strong absorption of light, Tourmaline is used in the making of Tourmaline tongs, an instrument of marked simplicity for the production of polarized light Properly oriented sections of Tourmaline are used for frequency control in shortwave radio apparatus and in pressure gauges

Medicinal Utility

Tourmaline is highly beneficial as a medicine It serves as a substitute for diamond ash and is frequently resorted to as the latter is very difficult to prepare It is recommended for various diseases, including sterility, syphilis, Diabetes, Gonorrhoea & other Uterine diseases

तुरसावा
Tursava
Zircon

The word Zircon is derived from French 'Zircone' which in its turn has its origin in the Arabic 'Zarqun' The Urdu

word for Zircon is 'Tursavi' It is found usually in well-developed crystals, and also as rounded or angular lumps or grains in sand and gravels Commonly it is brown but brown as the harvest moon, red yellow, blue and colourless varieties are also to be found Clear transparent Zircons are used as gems In Zircon we look for purity, colour, good cut

The following are the gem varieties of Zircon

1 The clear transparent yellow, orange red and brown varieties are termed "Hyacinth and 'Jacinth

2 Most of the other colours are included in Jargon

3 Stones recovered from Matara, Ceylon are known by that name They are naturally colourless or made so by giving coloured stones a heat treatment The colourless stones are also called 'white' Zircon

4 Blue Zircons are found in Mongka district of Indo-China The blue colour is the result of heat treatment The gems of this quality have recently become very popular

The colour of the Zircon gems, however, fades when they are used

Scientific Analysis

Specific Gravity	4 60 to 4 70 (Usually 4 69)
Hardness	7 25 to 7 50
Refractive Index	1 925-1 983 to 1 933-1 992
Chemical formula	$Zr\ Si\ O_4$

Zircon occurs in South-Eastern Norway, Miask, Ural Mountains, Australia, Madagaskar, French West Africa, India, Wichita Mountains, Oklahoma, Litchfield, Maine It is most common in sands and gravels of Ceylon, also in Henderson, Iredell, and Buncombe Counties, North Carolina, and Pablo Beach, Florida

"In India Zircons occur in the alluvial soils of Ranchi and Hazaribagh districts of Bihar, Uttar Pradesh and other

parts of the country but none of them are flawless or have the degree of transparency required in a gem Hyacinth is found at Kedarnath on the upper Ganga "**

दारेचना
Dar-e-Chana (Yellowdite)
Braunite

'Dar-e-Chana' the vernacular name of the mineral Braunite is a hard and opaque stone used for the manufacture of mortar It is of a catechu colour with yellow and smoky spots resembling the gram 'dal' (Pulse) and hence its Urdu name 'Dar-e-Chana'

Braunite is a massive or occasionally crystallized cubic ore of manganese occurring in India, New South Wales and several European countries

दानेफिरंग
Dane Fireng (Malachite)
Kidney-stone

Kidney-stone is non-transparent and of cloudy deep green colour It has got a dark circular body in its interior resembling the form of a kidney The Kidney-stone is a variety of hematite of which the chemical formula is $Fe_2 O_3$ It is found in reniform masses, usually with smooth shiny surfaces The blade of a knife or flat piece of steel soaked in lime juice rubbed on Kidney-stone, if the stone takes the colour of copper, it is of the essence of copper, if it turns white it is of the essence of silver, and if it turns yellow it is of the essence of gold The last variety is most rare

When worn it relieves the kidney pain Quicker result is obtained by forming a paste of the stone by rubbing it in rose water and taking it internally, or applying the paste made by rubbing it in water, on the kidney

**Wadia "Minerals of India", P 118

Refractive Index	—	1 60—1 63 to 1 62-1 65
Specific Gravity	—	3 00 to 3 32
Hardness	—	4

दूरे नजफ
Door-e-Najaf (A kind of Marble)

"Door-e-Najaf" is an opaque stone of light green and pink colour, with white and black spots in its matrix It is used for pavement of floor

दूधिया
Milk Quartz

"Dudhiya" is an opaque stone of milky colour It is used for making beads It is known as Milk Quartz

दातला
Dantala
Achroite

"Dantala" is a transparent colourless smooth and brilliant variety of Tourmaline, but its mineral is softer It is used as a gemstone In medicine it is useful in dental troubles

Its scientific properties are the same as that of Tourmaline

धुनैला
Dhunaila
Cairngorm or Smoky Topaz

"Dhunaila' is Cairngorm or Smoky Quartz It is a stone of a misty yellow or soft brown colour and belongs to the same family as the Amethyst, Citrine, Rock Crystal Rose and Gold Quartz etc It is crystalline transparent, of fine lustre and used for the manufacture of sunglasses and cheap jewellery

Cairngorm stones are produced in Cairngorm Mountains in Scotland They are also found in Arran (an Island

of Scotland) as well as the United States of America and Switzerland "From unknown localities in Kashmir come excellent crystals of Smoky Quartz which are often pierced by fine circular crystals of rutile" ** The chemical formula of Cairngorm is SiO_2 the same as that for quartz and it has also the same specific gravity, hardness and refractive index

The value of Cairngorm stones depends on fineness of their colour

नरम
Naram
Spinel

It is believed that every gemstone has its softer counterpart of accessory stone which is called its Spinel, and in Hindi as its 'Naram' which means soft, mild, delicate, gentle For example Sapphire has its Sapphirine (Blue Spinel), golden Sapphire, Rubicelle (yellow or orange Spinel), Tourmaline, Almandine (Purple & violet Spinel), Emerald, Chlorospinel (grass-green Spinel), and so on But when the term Spinel or the Hindi 'Naram' is used without any adjunct, it denotes the Ruby Spinel, sometimes called "Balas Ruby" which is a misnomer for the paler types of Red Spinel

The etymology of the word Spinel is rather obscure It is derived from Old French Spinelle which in its turn comes from the Greek, 'Spine' meaning 'thorn'

The beautiful transparent, fine crimson red is the Ruby Spinel, while the rose and pink Spinel is the Balas Ruby

Long ago Spinel of the finest quality was obtained from Badakshan in Persia, and it was considered to be the best Spinel of the world Occasionally pieces of that origin are available They are invariably of a fine lustre

In Spinel we look for transparency and colour Greyed,

**J Coggin Brown and A K Dey 'India s Mineral Wealth', P 626

very dark or flabby colours and specimens with flaws are always to be discarded

Gem Spinels are found in Ceylon, Burma, Thailand and Madagascar

The largest Spinel weighing 352 carats is in British Ragalia, and is known as 'Timur Ruby Khiraj-i-Alam' It is in the form of a bead When Timur the Lame invaded Delhi in 1398, he took it away as booty It then remained in the possession of the Tartar Kings until King Abbas I presented it to his friend the Mughal Emperor of India Jahangir In 1739, when Nadir Shah invaded India, he took it away again from Delhi Then along with the Koh-i-Nur Diamond it came into the possession of Maharaja Ranjeet Singh of Punjab In 1850 when the Punjab was taken over by the East India Company the gem was taken over by the Company and presented to Queen Victoria in the year 1851 Since then it is in the hands of the British

लालडी
Lalri
Spinel Ruby

There is lot of water in Spinel stone When there is dark tinge in the gem it is known as Spinel When it is devoid of the dark shade, it is known as ' Lalri" in Hindi, or Spinel Ruby 'Lalri' also called 'Suryamani', gem of the Sun, is blood red, perfectly transparent It is soft but full of brilliance Its scientific analysis is as follows

Specific Gravity	3 60
Hardness	8
Refractive Index	1 726

'Lalri' is found in Ceylon and Mogok (Burma) In ancient times the town of Badakshan in Persia was famous for this Gem and it was of the finest quality When it weighs less than 24 Rattis it is 'Lalri', when above 24 Rattis it becomes 'Lal'

It is studded in silver and worn in the phase of the sun at noon or mid-day

'Lalri' is also very efficacious as medicine It is reduced to a superfine paste and then taken by mouth

Sometimes Spinel with dark shade is taken for real Ruby but it can easily be identified by its specific gravity and hardness When examined under Dichroscope Spinel displays only one colour while the Ruby gems exhibit two colours, one light, the other deep

Synthetic specimens of Spinel also display double reflection that is they are dichroic It can be easily identified by examination under an ultra-violet lamp

पनघन
Panghan
Enhydros, Hydrolite Geode of Water Agate

Of the many varieties of agate 'Panghan' is one It is what is known in mineralogy Hydrolite Geode (Geodes are crystal-lined cavities found in rocks) A Hydrolite possesses a shell of chalcedony, the interior of which is partly filled with a watery solution that contains considerable dissolved silica in it Where the water has been removed by evaporation the silica remains behind on the inner wall of the Geode as minutely small, clear quartz crystals, when water is there it is clearly visible Occasionally some of the crystals are loose and rattle about when the Geode is shaken, hence they have received the name of "rattle-stones" among the dwellers of the region where they are found In India these stones are found in Banda (U P)

पितोनिया
Pitonia
Blood Stone (Heliotrope)

Blood Stone or Heliotrope is bright or dark-green chalcedony with small spots of red Jasper resembling

drops of blood, and hence the name The green colour is due to chlorite and ferrous iron salts, the red to Hematite Blood stones are translucent and very hard They are used for the manufacture of mortar

'Pitonia' is also used as medicine in the form of a superfine powder and is indicated in the disorders of bile, the Hindi name for which is "Pitt" and hence the stone is called 'Pitonia

Blood Stone is a mixture of true quartz with Hydrous or Opal-quartz, not crystallised It is found in India and is used also for seals and signet rings bearing crests or monograms and also occurs in the Hebridean Islands of Rum and in Iceland

The chemical formula for Blood Stone is SiO_2 Si 46 7, O 53 3%) It is not affected by the common acids and is infusible before the blowpipe

पारस
Paras
Philosophers' Stone

'Paras' finds mention in ancient books It is believed to be a substance which changes iron into gold It is said to be of a jet black colour and is most rare

I am, however, of the view that black rock which contains gold is Paras The gold idols of the Achalgarh temple near Delwara in Abu are made of the gold extracted from the rocks near Kumbharia The weight of the idols is several tons

फात जहर
Faat Zahar

Faat Zahar 'Hawani' that is of sea animal origin also called Pai Zahar is the Urdu name for Arabic 'Badi Zahar' It is of light green and whitish colour like that of a bamboo

It is crushed in water to a fine paste and applied to a septic wound

Faat Zahar is also derived as a mineral from the mines and is known as Faat Zahar Madari 'Go-rochan' obtained from the skull of cow serves the same purpose as the "Faat Zahar"

फिरोजा; पेरोज
Firoza-Peroz
Turquoise

Turquoise comes from the 13th century French 'Pierre turquois' meaning 'Turkish stone'

The Persian name for Turquoise is 'Peroz' or 'Firoza' which is indicative of the sky blue colour of the stone for which it is prized It is a hydrated Aluminium-Phosphate containing a little Copper It is found in the rocks of Afghanistan, Persia, Egypt, Arabia and the United States of America The best stones come from Persia In colour the Turquoise has various shades of blue and green, the best being blue It is valued because it takes a bright polish Turquoise is a name variant of Turkey, because the early stones went to Europe by way of Turkey Its colour fades in time and is destroyed by heat

Scientific Analysis

Specific Gravity	2 6 to 2 85
Hardness	6
Refractive Index	1 61 to 1 65

Chemical formula $Cu\ Al_6\ (OH)_8\ (PO_4)_4\ 4H_2O$

CuO 9 78, Al_2O_3 37 60, P_2O_5 34 90, H_2O 17 72 percent

It is infusible, soluble in acids after ignition Turquoise is not a stone but pebble, and its material is very soft and opaque It is cut into rounded gems or cabochons

One noteworthy feature of Turquoise is that a piece of pure blue Turquoise looks attractive and beautiful when placed on the paper of any or every colour

Big Turquoises are rare, only small ones are available

Four Turquoise-gold-bracelets have for 7500 years adorned the arm of the mummy of Queen Zer of Egypt

The King of Persia had, however, a Turquoise 2 5 inches long The Empress Josephine of France (1763-1814) had a splendid set of ornaments studded with Turquoises and Diamonds And the pretty Russian crown contained deep blue, velvety and oval Persian Turquoises along with big Diamonds

Turquoise has also its medicinal utility It is indicated in cases of poisoning It purifies the blood

Nowadays, a new type of Turquoise has been introduced into the market known as BAR, it is completely immitation

फिटक, बिलौर–स्फटिक
'Phitak' Billor Sphatik
Rock Crystal

'Phitak' and 'Billor' or 'Sphatik' are both varieties of rock crystal of crystalline quartz of which the chemical formula is SiO_2

'Phitak' is the soft variety of crystal just as the Spinel is the soft variety of Ruby

The purest natural varieties of quartz, or rock crystals have important industrial applications dependent on their piezoelectric properties, others are valuable as Semi-precious stones

"The use of rock crystal as an ornament in India dates from the pre-historic Copper Age times, for beads fashioned from the mineral have been found in tombs of this period in Bihar From the time of the Maurya dynasty (323-185 B C) onwards, rock crystal urns and caskets, vases and pitchers have formed part of the royal treasures of Indian Emperors Today, however, rock crystal has assumed a new importance transcending all its earlier applications and dependent on its unusual piezoelectric properties When quartz crystals are subjected to mechanical pressure in the direction of any one of their three axes of binary symmetry, electrical

charges are developed at the ends of these axes Conversely, electrical charges applied in such directions cause the crystals to expand and contract, and with alternating currents the crystal is set into mechanical vibration The power of maintaining a constant rate of vibration has led to the use of quartz oscillator plates to stabilize and control frequencies in radio and television, transmission, and in telephone and cable equipment, where they permit of simultaneous transmission of many independent messages over the same wire In addition to their uses as telephone filters and resonators they are indispensible in radar work, depth sounding apparatus and acoustic anti-submarine devices They also find a place in various types of quartz clocks which keep correct time to a few hundredths of second per minute, in range finders and in instruments for measuring pressures, as for example, in gun barrels and aircraft engines "** Quartz crystals are also used in making lenses and prisms for certain optical instruments

Only the finest rock crystals are suitable for these purposes and they must be free from cracks, flaws, irregular growth and inclusions, as well as from both optical and electrical twinning

Rock crystal is cut for cheap jewellery in Madras and Kashmir The small, doubly terminated, limpid rock crystals from the gypsum of the Salt Marl, near Kalabagh on the Indus, in Mianwali district of Pakistan, are collected and sold to be made into necklaces Disused rock crystal quarries exist in Newai in Jaipur District and at Hathuna in Tonk District of Rajasthan Rose quartz is, nowadays, available in Southern India, and in Orissa It is a translucent stone Its colour is pink Toys and beads are made from this stone

Scientific Analysis

Specific Gravity	2 66
Hardness	7

**J Coggin Brown and A K Dey 'India s Mineral Wealth P 625

Refractive Index 1 544 to 1 553

Fine quartz crystals come largely from Brazil

'Phitak' is softer than 'Sphatik' (Rock Crystal) It is also brighter and more luminiscent than the latter, but even a slight puff of breath from the mouth covers it with a cloudy film and the luster vanishes, which is, however, restored when the gem is wiped with a piece of cloth

Just like the Spinel of Ruby, Rock Crystal has also its softer counterpart which is known in local dialect by the name of 'Phitak' It is more shining than Rock Crystal

Rock Crystal is cut into jewellery, and toys are also made of it Its beads are strung into necklaces and plain and rose-cut gems studded in ornaments of pure gold

बेरूज

Beruj

Aquamarine

Aquamarine comes from Latin and means "Sea Water' Aquamarine is the transparent blue, bluish, bluish green or sea green variety of beryl, a silicate of beryllium and aluminum, $Be_3 Al_2 Si_6 O_{18}$, the same mineral, which, when of an intense, grass green colour, becomes the Emerald

"Beryls were produced in India about 400 B C according to S Ball (British Astronomer) The Greek Geographer, Strabo mentions their use in the ornamentation of Indian drinking cups (45 B C to A D 21) and Pliny, (the Roman writer, A D 23 to A D 79), regarded India as the chief source of the stone in his time Of more substantial evidence and the beryl ornaments found in the Bhattiprolu Stupa, dating from the Andhra dynasty (220 B C to A D 236) ' **

Stones of the blue and sea green shades were mined in the early decades of the nineteenth century at Padyur, in Ciombatore district of Tamilnadu Slender, pale blue

**J Coggin Brown and A.K Dey ' India s Mineral Wealth P 597-8

crystals over two inches in length occur in the great pegmatite vein at Sakangyi, Katha district, Burma A yellowish green variety occurs with more usual bluish green kind in pegmatite veins near Melkot, Mysore Some beautiful Aquamarines have come from the mica mines 1½ miles west of Saidapuram, Nellore Aquamarines were discovered in 1915 near Daso in the Shigar valley of Ladakh, Kashmir Daso is situated on the right bank of the Braldu river, a few miles above its junction with the Shigar, and Aquamarines have also been found at other localities further up to the Braldu and Basha valleys and also in the Rondu neighbourhood

Beryl stones attain huge dimensions A nineteen inch long stone weighing 243 lbs was found in Brazil in the year 1910

Aquamarines suitable for use as gems are obtained from pegmatite veins crossing the Archaen gneiss at some places in Bihar and Nellore Good Aquamarines also occur in Karur (South India) The Indian Aquamarines are mainly of greenish blue or yellowish blue The new stones recently found in South India, some of them are yellow, but there is difference in its colour in comparison to that of "Sunehala", Yellow Topaz Some of them are very beautiful skyblue colour

Scientific Analysis

Specific Gravity	2 69 to 2 79
Hardness	7 5 to 8
Refractive Index	1 560 to 1 599

बासी

Bansi (Green Quartz)
Bamboo Stone

This is soft stone of moss colour or the colour of the bamboo from which it derives its name It takes a very fine polish It is an opaque and translucent stone and is

used for the manufacture of toys and for the pavement of floor

मरगज़
Aventurine or Green Zade

"Margaz" is an opaque stone of green colour It is used for making beads, toys, etc Nowadays, it is found in Southern part of India The colour is just like Emerald Some stones are opaque and transluscent Recently, another stone of blue colour has been found out, which is called 'Blue Margaz, and it is known as 'Sodalite' in English

Scientific Analysis

Specific Gravity	3 3 to 3 5
Hardness	$6\frac{1}{2}$ to 7
Refractive Index	1 66 to 1 68

यशव–सगेसम
('Yashav'—'Sange-Sam')
Chinese Jade—White Jade

Jade is a very hard stone, almost as hard as the Ruby This is evidenced by the fact that when Ruby is crushed to powder in a mortar made of the Jade stone, the latter is not at all scratched

Jade stones of pink and light green colour are considered to be the finest though Jades of white and black colours are also found

The Chinese Jade is softer than the Afghanistan and Indian Jade

In ancient Indian books of Gemmology Jade finds mention as 'Pasava' which is sometimes confused with 'Yasava' Both are, however, quite distinct stones

Jade is used for the preparation of plates, cups and figurines, which are very costly Jade was greatly prized

by the Moghal Emperors Even at the present day articles made of Jade fetch very high prices

Reduced to superfine powder in rose-water, Jade is prescribed for heart troubles and has been found to be most effective

मकड़ी
Makri
Spider-stone

'Makri' is a stone of light-black colour and is covered with a white film resembling a cobweb, hence it is called by that name which is a Hindi word for spider

It is utilized for the manufacture of toys and figurines, and for ornamental building purposes

मरियम, मारवर, मूसा, लास, अमलिया
Mariyam Marvar, Moosa, Laas, Amaliya
Marble

'Mariyam', 'Marvar', 'Moosa', 'Laas', 'Amaliya', 'Makrana' are all varieties of Marble and have been given different names due to the variety of colours and the localities where they are found

As a matter of fact the term 'Marble' has been loosely applied to any rock capable of taking a high polish Strictly it means a hard limestone used for ornamental purposes, and more especially those of a crystalline and granular character The colour varies from white to black

'Mariyam' is statuary white marble, of the type available from the Makrana quarries, whence it takes the name of Makrana stone

'Marvar' is marble of various colours, white, reddish, yellow, green brown etc

'Moosa' is marble stone of jet black colour

'Laas' and 'Amaliya' too are other varieties of marble 'Siya' is also a variety of marble of black colour and is called 'black marble

The Makrana quarries of Rajasthan are believed to have supplied stone for the Taj Mahal, erected by Shah Jahan (1628-58) at Agra as mausoleum to the memory of his consort Mumtaj Mahal The Victoria Memorial in Calcutta is built of the same stone,

"In many parts of Rajasthan there are marble occurrences of varying degrees of colour and grain in both the Delhi and Aravalli systems In the words of A M Heron "Almost everywhere in the extensive area occupied by its outcrops in North-Eastern Rajputana the Raialo Limestone — which passes up comfortably into the lowest bed of the Alwar series—affords good marble, quarried chiefly in the vicinities of Raialo in Jaipur, and of Jhiri in Alwar" The stone is an excellent pure white, saccharoidal marble though pink, pale, grey and black kinds also occur White marble from another band in the same rock sequence is quarried at Dadikar in Alwar, while a handsome modification of the Kushalgarh limestone forms a narrow-banded, black and white variety near Badgaon, close to the Alwar-Jaipur boundary The Rajnagar Marble, again a pure white stone, free from grey cloudiness, is exposed over wide tracts around Nathdwara, in Udaipur, and has given vast quantities of stone for embankments, palaces, temples, though these have made little impression on the reserves, which are for all practical purposes inexhaustible "**

The North-west Frontier Province of Pakistan has inexhaustible quantities of banded marbles suitable for building purposes Marble of good quality occurs at Maneri in Swabi Tehsil of Mardan District

The Sagyin Hills in Upper Burma are composed largely of white marble from which images of Lord Buddha, some of them of huge size, found in the pagodas of Burma have been carved Marble occurs also in Kyaukase and Sagaing districts of Burma

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**Coggin Brown and A K Dey *India s Mineral Wealth' P 364*

In the Coimbatore District of Tamilnadu there exist vast quantities of greyish-white and flesh-coloured stone and the Chitaldurg and Mysore districts of Mysore possess further supplies of the greyish-white material The Archaen formations of Madhya Pradesh possess the 'Marble Rocks' in Jabalpur district and fine marbles have also been found in the Betul, Chhindvara, Nagpur and Seoni Districts The beautifully marked, serpentinous varieties of the Sansar Tehsil in the Chhindwara district deserve mention

Unusual varieties include the lovely green pink and white mottled rock from Harikua, and its brecciated relative from Sandara in Baroda, the black marbles of Rewa Kantha, Bombay, the pale green or dark green and yellowish, clouded marble of the Kurnool district, Andhra, the fine pale sea-green stones from the Narzi formation of the Guntur and Krishna districts of Andhra, used in the sculptures which depict scenes from the life of Buddha and Jataks at the Amaravati Stupa and the Nagarjuna Konda 'Chaitya' datable from the second century B C to the third century A D , the homogeneous yellow marble, and the yellow and grey, shelly kinds and lastly, the 'Abur stone', a dark red, fossiliferous marble in which the organic remains have turned into a yellow substance

Amongst the scarcer ornamental stones the following deserve mention

(1) The tinted yellow green epidorites of south Ranchi (Bihar)

(2) The unakites of Singhbhum, with their large pink orthoclase and yellowish green epidote crystals

(3) The red aplites with pistachio green epidote crystals, Beawar in Ajmer district and Bijapur of Jodhpur District, (Rajasthan)

(4) The green quartzites of the Bellary district (Mysore), Coimbatore district, Tamilnadu and the Hassan District in Mysore, and

(5) The garnetiferous rocks with there pale salmon-coloured to red, murchisonite, feldspars of the Krishna and Visakhapatnam Districts, Andhra

It is, however, from Italy that the finest type of Marble is obtained

मूवे नजफ (Quartz withinel)
Mov-e-Nazaf

'Mov-e-Nazaf' is a white stone with thin black stripes in its texture It is a soft material The stone is utilized for the manufacture of toys, figurines etc

रात रतूवा (Jasper)
Raat Ratuva
Carnelian

Carnelian is coloured variety of Jasper typically bright ochre coloured or orange-red, it varies from yellow to brown Specimens with a more reddish tint are termed carnelian while the yellowish and brownish varieties are called 'Sard' It is used as a semiprecious stone largely for signet rings

Scientific Analysis

Specific Gravity	2 63
Hardness	6 5 to 7
Refractive Index	1 55
Chemical Formula	SiO_2
Silicon dioxide	Si 46 7, O 53 3 per cent

A patient suffering from fever only during the night gets relief by Ratuva stone being rubbed on the soles, from the heels to toes It has been referred to as 'ratjari mohara' in ancient Shastras (books of medicine)

The present writer has among his collection a 'Ratuva' stone containing the figure of a pair of white pigeons in its texture, like the 'Sijari' stone (Moss Agate) Stones of

such variety are very rare The body of this 'Ratuva' stone is opaque and in it the pigeons are quite transparent

Carnelian and Sard are found in many localities throughout the world The Great Arabian and Egyptian deserts were sources of the rough gem The far Western States of America including California, Oregon, Washington, Nevada and Idaho Brazil, Siberia, and India produce specimens of high-grade gem quality

लाजवर्त
Lajwart
Lapis Lazuli

Lapis Lazuli is known as 'Lajwart' in Hindi and 'Rajawart' in Sanskrit Lapis is the Latin word for 'Stone' and 'Lazulus' in Persian means heaven It is a beautiful blue mineral, its colour resembling that of the peacock's neck, and there is a golden fly in its texture which shines brightly when the stone is polished Lapis Lazuli consists of silicate of soda, lime and alumina with sulphur and chlorine It has been valued as an ornamental stone from ancient times being known to Pliny as 'Sapphirus'

In Lapis Lazuli we look for a deep voilet blue as free of pyrites as possible

Scientific Analysis

Specific Gravity	2 40
Hardness	5 50
Refractive Index	n=1 50
Chemical formula	Na 5 S $(AlSiO_4)_3$

As a medicine it is indicated in tuberculosis, jaundice and especially for urinary diseases experienced in the old age

In the family of minerals known as feldspathoids which take the place of the feldspars in certain rocks rich in alkalis and poor in silica, there are three members distinctive by reason of their vivid blue colours

(1) Lazurite—a silicate of Sodium and Aluminium with Sodium sulphide 3 (Na Al Si O_4) Na_2S

(2) Sodalite—a silicate of the same two elements with Sodium Chloride 3 (Na Al Si O_4) Na C_1 and

(3) Hauynite—a similar silcate with calcium sulphate 3 (Na Al Si O_4) Ca SO_4

Lazurite is highly valued for ornaments Stones free from golden spots alone are used for this purpose It was formerly used a pigment in oil painting Lazurite is also used for gem purposes

Lapis Lazuli is found in Afghanistan, Russia, Chili and other places

The finest Lapis Lazuli is violet-blue or blue-violet, with golden specks The Russian mineral contains the golden pyrites but contains various excellent tones of blue

'Sifari' a blue stone with spots resembles Lajward in some respects, but it is quite different stone It is a softer stone and can be easliy distinguished from it Sifari is not suitable for medical purposes

लूधिया (Plasma)
Ludhia
A Kind of Marble

'Ludhia' is an opaque stone of green colour like that of 'manjith' (madder) It is utilized for the manufacture of mortar, figurines and beads

It is found in South India Its colour is dark green

सगे सितारा
Sang-e-Sitara
Gold-stone

'Sang-e-Sitara or 'Taramandal' or 'Gold-stone is also known as Starstone, Asterias, Orpiment and Auripigment It is a material of ochre brown colour, and has got golden stains, which shine like tiny stars in its body

It is difficult these days to obtain a genuine Gold-stone Imitations are current The distinguishing feature is that the real stone has got delicate water and green shade, which is not present in the imitation one It is used for cheap jewellery

Scientific Analysis

Specific Gravity	3 5
Hardness	1 5 to 2
Refractive Index	2 4, β 2 81, γ 3 02, (—)
Chemical Formula	As_2S_3 (As 61, S 39 percent)

सगे सिमाक
Sang-e-Simak
Porphyry

Sang-e-Simak belongs to the family of the igneous rocks many of which are used as ornamental stones, such as the famous red Porphyry, with red or white crystals in a red ground mass, found in Egypt Porphyry, the English synonym for Sang-e-Simak, comes from Greek 'Porphusos' meaning purple This variety of stone is very hard It is opaque and of dull red colour with white spots in the matrix It is best suited for the manufacture of mortar Mortars made of Sang-e-Simak are considered to be the best as they alone are serviceable for crushing hard stones such as the Ruby and the Sapphire

सुलेमानी
Suleimani
Black Onyx

Suleimani or Sulemania is an agate imported from Sulemania, whence this name and is used for amulets It is a variety of agate in which there is a parallel banded structure, the milky white layers alternating with dark or black bands The bands are straight, not curved, and is a beautiful stone used for necklaces and cheap jewellery

The chemical formula for Onyx is SiO_2 (Si 46 7, O 53 3 per cent)

घीया पत्थर, सेलखडी सगे जराहत
'Gheeya Patthar', 'Selkhadi', Sang-e- Jarahat, Talc and Soapstone

'Selkhadi' is a Hindi name for talc, and 'Gheeya Patthar' Hindi and 'Sang-e-Jarahat' Persian name for soapstone or Steatite Soapstone or Steatite is often impure, structureless variety of talc a hydrated silicate of magnesium, $3MgO\ 4SiO_2\ H_2O$ It possesses the distinction of all minerals and normally has a characteristic soapy feel It is utilized in the manufacture of soap, cream, talcum powder and medicines Talc has a greasy feel and pearly lustre

सगिया
Sangiya (Pyrophyllite)

'Sangiya' is a vernacular name for Pyrophyllite which is a hydrated silicate of Aluminium It also occurs in compact masses and is slightly harder than talc and often indistinguishable from it without elaborate optical and chemical tests Its chemical formula is $Al_2O_3\ 4SiO_2\ H_2O$

सुनेला
Sunela
Citrine
Golden Topaz

Citrine is a light-golden yellow or reddish-yellow variety of crystalline quartz and is of the same composition as the amethyst (SiO_2) It owes its colour probably to a slight trace of ferric iron Citrine is a transparent stone and may be mistaken for Topaz Due to its close resemblance in appearance to Topaz it has been named 'false Topaz', 'Spanish Topas' and 'Topaz quartz' It can be easily distinguished from Topaz on account of its softness and lighter density

One area in New Mexico has yielded some very fine groups of Citrine quartz crystals Much of the commercial supply of the natural gem, comes from Brazil

सिन्दूरिया
Sinduria (Morganife)

'Sinduria' is a stone of rose pink colour and of fine water It is soft, but possesses beautiful lustre Sometimes it is mistaken for pink Ruby but the distinctive feature of Sinduria is its yellowish tinge It is found in Burma, and is different from Rubellite The latter has a slight cloudy shade, while in Sinduria there is no dirtiness

सिवार
Sivar

'Sivar' is an opaque stone of green colour with brown bands, a variety of marble

सींगली
Seengli
Mysore Star

'Seengli' is an opaque stone of dark red colour It is of the corundum family There are white streaks in its texture When the stone is cut, a star of six lines is distinctly visible The cabochon cut displaying a star of six buds is considered to be the finest It is prized highly in America as a Jewel As it is found in Mysore, it is known, as the Mysore Ruby This stone resembles a horn, the Hindi word for which is 'Seeng', and hence the stone is named 'Seengli'

सीजरी
Sijari
Moss Agate

Sijari' is a vernacular name for Moss Agate which is also known by the names of Mocha Stone, tree stone, and water stone

Moss agates are pale grey or whitish perfectly translucent stones through which the delicate tracery of dark green mineral glauconite, sometimes turning a reddish brown, stimulates moss-like growths Stated briefly it is chalcedony with dendritic inclusions The figures are formed by the reflection of trees birds and other objects, when the substance is originally being formed in the womb of nature A type of yellow-green moss agate found in Inyo County, California, is known as Amberine

Moss Agate is found in a tributary of the Narbada river in village Turarani in the Hoshangabad district of Madhya Pradesh The bigger stones are of the size of 8 to 10 inches It is interesting to find that there are figures resembling those of Lord Shri Krishna, Bhagwan Shri Mahavir, Lokmanya Bal Gangadhar Tilak, Dr Rajendra Prasad, the first President of the Republic of India and others, in the texture of these stones There are also pictures of animals, birds, monkeys, snakes, pigs, etc in the composition of these stones In my own collection there are Moss Agates in which figures of snake, birds, elephant, letters of English alphabet are distinctly visible In one of these stones there is a figure of a beautiful lady clad in Indian Sari We find the curious and mysterious working of nature in the specimens of 'Sijari' stone

"Of unusual interest is the 'Pagoda stone of Burma, a semi-transparent, greyish white onyx which occurs only in certain particular beds of amygdaloidal lava flows from Popa, the extinct volcano of central Burma When cut transversally the truncated bands exhibit a realistic outline of a Buddhist Pogoda in miniature and then bring prices far beyond stone obtainable for any other form of chalcedonic quartz of similar size "**

**J Coggin Brown and A K Dey "India s Mineral Wealth P 624

सिफरी
Sifri (Amazonite)

'Sifri' is a stone of blue colour with greenish tinge It is non-transparent and to some extent resembles Lapis Lazuli, but differs greatly from it in quality

It has no medicinal value

सोहन मक्खी
Sohan Makkhi
Swarana Makshika
Marcasite, Pyrites

'Sohan Makkhi' 'Sanskrit 'Swarna Makshika' is Marcasite of Jewellery or the Pyrites of mineralogy It is a stone of metallic grey yellow colour, and is found in the form of soft pebbles When of white colour it is known as 'Rupa Makkhi'

It is utilized for medicinal purposes

Scientific Analysis

Specific Gravity	4 8
Hardness	6 to 6 5
Refractive Index	
Chemical Formula	FeS_2

सुरमा
Surma
Antimony

'Surma' meaning soot, Antimony, is a stone of iron-black colour It serves in the preparation of collyrium or eye-salve If broken into small pieces and allowed to stay at the root of the neem tree (margosa, or 'melia aredirachta')' and then reduced to collyrium, the resulting medicine is of excellent quality and is very effective in preservation of eyesight

Scientific Analysis

Specific Gravity	4 65
Hardness	2
Chemical Formula	Sb_2S_3 (Sb_2 71 4, S 28 6 percent)

हकीक
Haqik
Agate

According to the Western Scientists Agate is chalcedony made up of strata or bands indicating successive stages of deposition The layers may be differently coloured or clouded giving rise to several varieties such as bands and clouded Agates

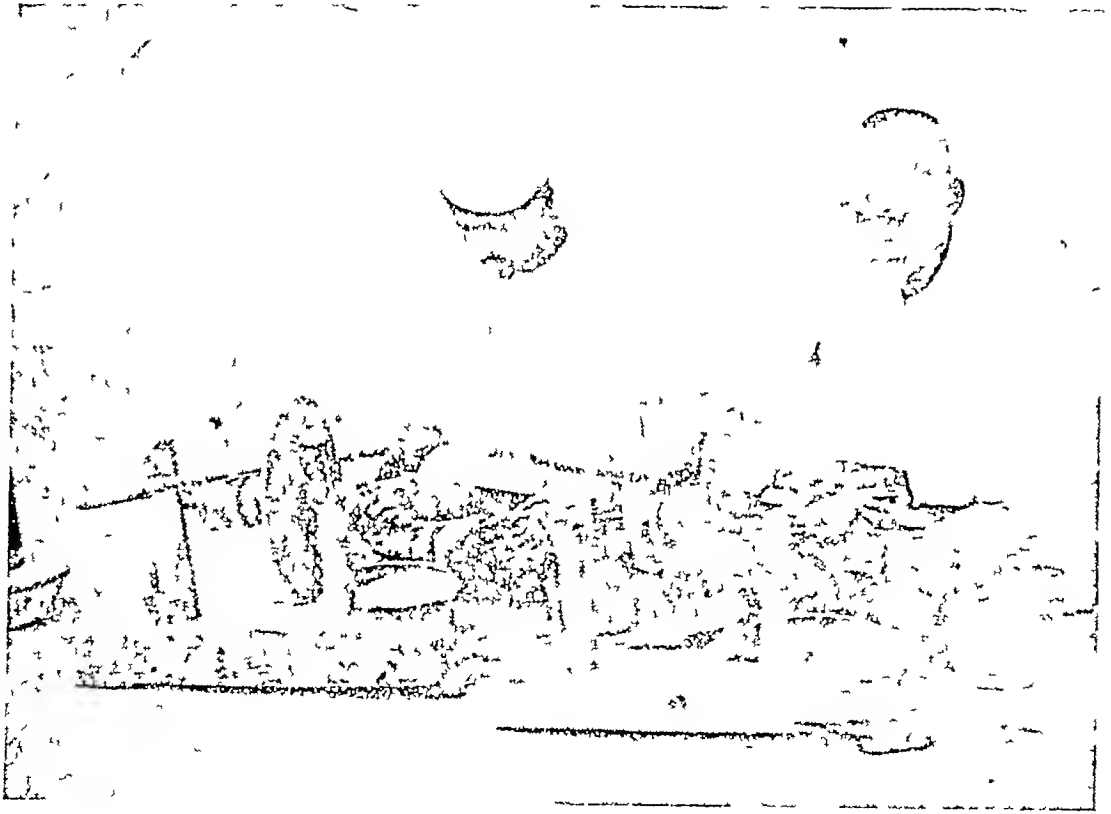
The banding is usually in parallel but more or less wavy or irregular lines Agates may be white, pale to dark brown or bluish in colour Green Agates are also sometimes found but they are very rare

Agate is a silica and as it is very hard, it is much used in the making of scientific instruments Coloured varieties are used for ornamental stones

Scientific Analysis

Specific Gravity	2 63
Hardness	6 5 to 7
Refractive Index	1 55

Agate is found in almost all countries, and in ample quantities in India It is a translucent mixture of cryptocrystalline silica and amorphous hydrated silica As a matter of fact silica accounts for 70 to 90% of its composition, the rest being alumina, oxide of iron, or oxide of manganese in varying quantities It is a tough and hard material, and becomes smooth when polished When recovered from the mine it is white and associated with foreign matter Afterwards it is given heat treatment, which separates it from



CUTTING PROCESS

impurities and brings forth its bright colour, and then alone it becomes suitable for medicinal purpose also

The properties of the varieties of Agate differ according to its colour which may be red, white, or yellow The stone is pretty cheap and yet it is very useful and is greatly used in medicine

A smooth piece of Agate is used for polishing gold ornaments It is also utilized for manufacture of beads, knife-handles, cups, mortars, etc Artisans very skilful in these handicrafts are residents of Khambhat in Gujarat

हदीद
Hadid
Eye Agate

Hadid is a variety of Agate known as the Eye Agate Concentric rings of a colour contrasting with that of the surrounding matrix present the appearance of an eye Some specimens are so perfect that they are oval in shape and display smaller coloured rings like iris and pupil of an eye Some rare specimens contain even two eyes on the same polished surface spaced at an appropriate distance

Eye agates resembling the eye or eyes of a human being or some animal may be found in a locality where Agates with circular bands are present In order to show the eye the surface of the stone is cut and polished The fine eye Agates from Brazil with bands of black and white are coloured artificially by treatment with sugar and sulphuric acid to bring out the black bands clearly and conspicuously

Agates with concentric circles not having so close a resemblance to an eye are called "Ring Agates" Those having a single eye are called "Cyclops Agate" and those with two eyes that may resemble the eyes of an ox or an owl are named accordingly

हकीकुल बहार
Hakikul Bahar (A variety of Agate)

"Hakikul Bahar" is also a beautiful variety of Agate in which pale green colours are arranged in parallel bands

हवास
Hawas

'Hawas' is yet another variety of Chalcedony of dark green colour with white or yellowish spots

हजरत बेर
Hazrat Ber

'Hazrat Ber' is a hard stone in the form of a berry like plumb with rough granular surface It is also known as 'Hazrat-e-ud'

It is of medicinal utility It is reduced to a fine paste by rubbing in water on a flat stone and is indicated in urinary troubles and for vomit or nausea

हालन लरजा
Halan-Larza
Sandstone

Sandstone is a sedimentary rock consisting of sand grains cemented together It is a rough stone of dull rosy colour, with some elasticity When shaken it emits a light sound A pure sandstone is formed of quartz grains with silic as the cementing material, when it is known as ortho-quartzite It occurs in great variety of colours Many Sandstones contain fragments of felspar, mica and other minerals with a calcareous, clayey or ferruginous cement

When considerable felspar is present, the rock spoken of is felspathic Sandstone or 'arkose' (over 25 per cent felspar)

When Sandstone contains mica it is called 'itacolumite' It then becomes flexible

Sandstone containing iron oxide shows the greatest variation in colour

Metamorphosed sandstone in which the individual quartz particles are generally not easily recognized by the naked eye is known as 'Metaquartzite'

Chemical Formula SiO_2

CUTTING AND POLISHING OF GEMS

Although gem minerals are frequently found in nature in beautiful and well-developed crystals, they are seldom adapted for use as gems without requisite cutting and polishing Although the crystals may show excellent reflections, the full optical splendour of the gem mineral is best brought out by cutting or grinding the stone into symmetrical shapes which will allow the specimen to appear as brilliant as possible, show its best colour and display the maximum amount of fire

This process of cutting involving the creation of artificial faces or facets was not prevalent in ancient times It is of comparatively recent origin

"The Indians were the first to master the art of cutting for colour, that is, of cutting a stone that was patchily or unevenly coloured By using depth, light, facets and angles, they increased the spread of the colour until to the naked eye, all the stone (ruby) looked a heavenly crimson

"The Indian view—and they have been thinking and working this way for thousands of years—is that colour is the chief beauty of a coloured stone The discovery of a form of cutting that gave more brilliance did not interest the Indian cutter Such a cut took weight from the stone He preferred the unbroken egg to the omelet As a consequence no one cuts for colour like the Indian He learned his trade well and was wise to be cautious for there was a

time when if his cutting was poor, if he reduced the stone too much, if he failed to augment the colour, he would have lost his fortune, and probably his life as well" ("Gems" by Mab Wilson)

The ancient jewellers contented themselves with simply polishing the natural crystal faces, or they ground the stone into certain rounded shapes At present, due to the improved methods various fancy cuts are used such as 'triangle', Kite, cut corner triangle, 'pentagon', trapez baguette, epaulet, half-moon, hexagon, Keystone, lozenge, marquise, half-moon, etc These cuts could not be accomplished by the old method

This is the reason why in the ancient times greater importance among the gems was given to Pearls and Corals Pearls did not require any more action than drilling, and in the case of Coral too the raw material could be cut and sliced easily and it could be given the desired shape without much difficulty On the other hand the style of cutting involving facets required a lot of skill and difficult and experienced handling

The Cabochon cuts are used for stones exhibiting sheens, play of colours, opalescence, and asterism, thus for tiger's eye, opal, moonstone and star Rubies and Sapphires They are also used for many coloured stones for example, garnet, amethyst, turquois and chryscolla The hollow cabochon cut is generally employed for transparent but deeply coloured stones through which very little light could pass if cut in the other styles, for example almandite variety of garnet

The Cabochon cuts are, hence, the oldest of the various styles of cutting still in common use The following types may be differentiated

Mathela (Double or Convex Cabochon) —This involves generally circular elliptical or oval forms with two convex surfaces, the upper side being more convex than the

lower When the convexity is the same, above and below, the cut is sometimes called **lentil shape**

Pota (Domed Cabochon) —This is somewhat similar to the preceding type, but the upper portion is very much higher and, hence more convex than the underside

Talaf (Simple or Plain Cabochon) —In this cut both the surfaces are flat This cut is especially suitable for setting gems in gold ornaments of 'Kundan' work Stones with this style of cutting are mounted with the plane surface down

Hollow or Concavo-convex Cabochon —This is also called **Shell Cut** In this style the upper side i convex but the under portion hollowed out

Though Diamond is the hardest, most durable and most valuable of all the gems, due to the lack of appropriate materials and necessary apparatus for cutting, the style of cutting facets did not then come into vogue And it was for the reason that in the ancient times the Diamond did not get that importance and recognition which it deserved, while the other gems such as the Pearl and the Coral etc retained their importance and remained popular

The raw material when it is recovered from the mines and brought into the market is known as 'Kharad' or rough stone A lot of foreign matter is then found to be adhering to the precious stone It should be carefully separated from it The gem material should then be soaked in lime juice and washing soda for cleansing Fresh ore usually requires two to three hours' soaking for the purpose But if the rough stone has been kept lying for a long time and has thus grown old, it will have to be soaked for a longer period ranging from twelve to twenty-four hours It should then be washed thoroughly in clean water and after drying, coated with sesamum oil. The greasing would smoothen the stone and would also reveal its internal structure The crystals should then be spread on a table, sorted out

according to their colour and classified into homogeneous groups with due regard to the intensity of colour and 'water' Each one of the crystals of these classified groups should then be scrutinized with a view to determine which type of gem it would be most appropriate to cut from it The crystals should now be examined to find out their flaws Formerly 'Sarota' a special type of scissors was used to separate the portions containing inclusions from the transparent crystals Nowadays, however, pliers are used as they are more convenient and serviceable in breaking and cutting fragments of minerals Care should be taken that the pliers are applied gently and tactfully to the parts that are weak and have fractures in them Indiscriminate and forcible use of pliers may result in cracks and crevices, and the specimen may consequently be spoiled

In bygone days a wire was tied to the ends of a bow-shaped bamboo and slicing was done with it by using corundum powder Nowadays a rapidly revolving metallic wheel or disc containing or covered with some abrasive, as Diamond dust, carborundum, or emery, fuller's earth and 'Murda Singi' is used for slicing The position and inclination of the various facets are determined by the eye of the cutter, who obviously must exercise great judgment in order to cut stones to the best advantage These cutters become very expert, and rarely does an experienced cutter exceed the permissible limits of variation in the angles between the different facets After the facets have been produced, they are polished in much the same manner as they were cut, except that some polishing material, such as tripolite or rouge, instead of an abrasive is used Diamonds are usually cut and polished by men who specialize on the Diamond, while a lapidary is one who cuts and polishes all other types of gems In evaluating a cut gem the 4 "C5" of gem value, namely, the (1) colour, (2) clarity (3) cutting and (4) carat weight (size) of the gem must be taken into consideration

In old times the gemstones used to be shaped more or less according as they occurred in nature In fact there was hardly any cut, but only a smoothing of rough spots, pits and uneven corners Many of the great Indian gemstones still hold their original shape and have never been what would today be called 'Cut' These days stones have to be cut and gems manufactured according to the demand in the market It has, however, to be remembered that in cutting the gemstone should lose minimum of its weight on finishing.

When the crystals have been cleansed, classified and cut into fragments by removal of flaws, they are handed over to the lapidary for cutting them into the desired forms

The lapidaries fix the stone on 'got', a ball of sealing wax and 'Kandi', which is made of bamboo in some cement or mechanical wheel which is made of corundum and shellac These days some foreign abrasives are also mixed, which help in grinding, but in the process the gem loses a part of its fineness and delicacy The softer varieties of gemstones are grounded against the wheel of corundum but for grinding the harder stones such as Ruby and Sapphire the wheel is sharpened adequately by application of an abrasive made of Sapphire dust It helps in cutting hard stones with comparative ease Gems prepared by this method are beautiful in form, they retain their colour and brilliance and the loss of weight is also reduced to the minimum

Bigger stones are fixed for cutting on 'got' while the smaller ones on the 'Kandi'

The principal style of cutting involving facets is the 'brilliant cut' Thus in cutting the Diamond, the octahedron, either natural or produced by cleavage, is made the basis The upper and lower portions are removed usually by sawing in such a manner that when the stone is cut the portion above the girdle should be about 40 per cent as thick as that below the girdle The upper portion of the stone is

called the 'crown' 'top' or 'bezel', the lower part, the 'pavilion', 'back', 'or base' The uppermost facet is the 'table' and the nethermost 'culet' All the facets, including the 'table' and the 'culet' usually number, 58 Hence, the 58 facets include

1	table
8	star facets
4	bezel or top main facets
4	top corner facets
16	top half (break or girdle) facets
16	bottom half (break or girdle) facets
4	bottom corner facets
4	pavilion or bottom main facets and
1	culet
TOTAL 58	

Since the four top corner facets may be of the same shape and size as the 4 bezel facets, as is the case on the round brilliant, they also may be called bezel facets Such stones are then said to have 8 bezel facets Similar conditions may apply to the bottom corner and the pavilion facets In such cases, stones are said to have 8 pavilion facets

The girdle of the stone is formed where the top half and the bottom half facets meet in a sharp edge In order to retain as much as possible of the original weight of the uncut stone the experienced Diamond cutter may leave a very small portion of the rough original surface of the Diamond crystal at one or two points around the girdle These are known as 'naturals' and generally do not detract from the value of the stone if they are minute, because they are evidence of careful workmanship However, if they are easily recognized the stone is said to have a 'thick girdle' At time the girdle is polished, or a series of small facets

may even be placed around the entire circumference of the stone For a given weight, stones with a polished or faceted girdle obviously have a smaller spread than those with knife-edge girdles

The cutting of Diamond so as to exhibit the maximum brilliancy and fire is based upon long practical experience Accordingly, it is common practice to cut stones so that the thickness from the table to the culet is about 60% of the width of 'Spread' at the girdle The distance of the table above the diameter through the girdle may vary from about 1/3rd to slightly less than $\frac{1}{2}$ of the distance than the culet is below it The width of the table may be 40 to 60 per cent of the spread.

Under the foregoing conditions the angle that the main upper facets make with the plane through the girdle will be 35 to 37°, whereas the lower main facets will be inclined at about 41° Depending upon the character of the stones to be cut, a variation of 5 to 7° may be observed in the inclination of the upper main facets, that is, from 30 to 37° The permissible variation in the inclination of the lower main facets is much less

Depending upon the character of the rough material, the outline of the cut stone varies, being circular, quadratic, oval, elliptical, or pear-shaped While the Diamond was formerly cut almost exclusively in this style, in recent years the 'Emerald cut' has become quite popular, especially for stones of larger size Usually stones with the Emerald cut have 50 facets including the table and culet

The 'Rose cut' has 24 triangular facets with a flat base This style of cutting is one of the earliest involving facets but it is not employed much at present

The old method of preparing gems from the natural stones is quite different from the style mentioned above Care should be taken that in cutting, the stone does not lose its beauty It is also to be borne in mind whether in grinding

the stone acquires proper shape or not If the stone gets the proper form the gem is easily made In cutting the stone the foremost thing to be remembered is that the portion containing 'fire' is not cut away So far as possible 'Chambi' (tone) should also be saved from cutting, otherwise the gem is likely to lose a part of its colour, and brilliance

When a stone has been given the desired form, it is necessary to polish it This is done in the case of less hard gems such as Emerald on a tin or bronze wheel and in that of harder stones like Ruby and Sapphire on a copper wheel Agate stone with 'gava' ash is applied to the wheel for preparing plan cut such as beads & cabochons etc Gems of softer stone are given polish on wooden wheels which are made of oak, Ak (aselepias gigantea) or 'Ardu' wood Only softer gemstones require 'paniyayi' treatment with water before being polished

Jewels are drilled by steel wires pointed with Diamond

All polished Gems are then soaked in a mixture of lime juice and soda for twelve hours, then boiled in water and then washed with water

The gems of softer stones should not be washed with cold water after being boiled as there would be apprehension of cleavage or fresh fissures or crevices creeping in The gems after being washed should be dried and kept in a preservative

For Emerald the preservative is made of 'berja', 'Jangal' (Verdigris), 'roomi mastangi' (Gum mastic), and turmeric

For Ruby the preservative is prepared of 'ratan jot' (a plant the root of which contains crimson colour) Nowadays instead of 'ratanjot' the preservative is prepared from inorganic red colouring matter This gives an attractive appearance to the gem in the beginning but in the long run the brilliance fades away It is not possible to delineate them in a small book like the present They would require a whole volume in themselves

Theoretically there are different and independent methods of manufacturing different gemstones, but the process detailed here would serve ordinarily for all kinds of gems In the case of Diamond, Diamond-set abrasive wheels are used for cutting, steel wheels for polishing

These days gems are polished by machine This gives a very fine polish It is only a refined form of the old method

Birth Stones

Birth stones attributed to the signs of the Zodiac

In this country different gems are worn according to the signs of the Zodiac, and references to this effect have been given in the body of the book In Western countries it is customary to put on gems corresponding to the dates of birth and the appropriate gems are designated as birth stone Kenneth Parkinson F G has asserted in his book that the Gemstones work like magic

The following table gives a list of birth stones according to the dates of birth

From January 20 to February 19 Aquarius	Garnet, Diamond, Jade, Onyx, Ruby
February 20 to March 20 Pisces	Amethyst, Jasper
March 21 to April 19 Aries	Blood stone, Aquamarine Emerald
April 20 to May 19 Taurus	Diamond, which is preferred in Europe In America, Russia, and Italy it is the Sapphire which is in vogue The gems also are in favour of Sapphire
May 20 to June 20 Gemini	Agate, Emerald

June 21 to July 20	
Cancer	Emerald
July 21 to August 21	
Leo	Ruby, Onyx, Turguoix
August 22 to Sept 22	
Virgo	Sardonyx, Peridot
Sept 23 to Oct 22	Sapphire or Topaz
Libra	Chrisolite
Oct 23 to Nov 22	
Scorpio	Opal, Aquamarine
Nov 23 to Dec 20	
Sagittarius	Topaz
Dec 21 to Jan 19	
Capricorn	Turquoise
