



POCKETS

GEMSTONES

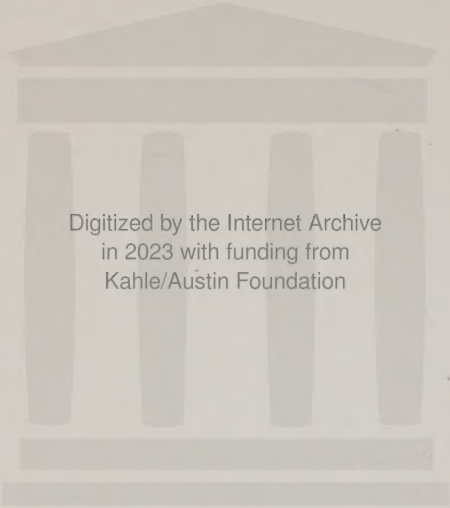


Gordon's

JEWELERS®

Since 1905

POCKETS FULL OF KNOWLEDGE



Digitized by the Internet Archive
in 2023 with funding from
Kahle/Austin Foundation

P O C K E T S
GEMSTONES





TURQUOISE
SNAKE



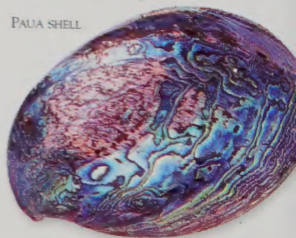
CORAL
CARVING



AMETHYST
CRYSTAL



RUBY FLY



PAUA SHELL

P O C K E T S

GEMSTONES

Written by
EMMA FOA



CHRYSOBERYL



DEMANTOID
GARNET
LIZARD



ART DECO
CLIP



DK PUBLISHING



LONDON, NEW YORK,
MELBOURNE, MUNICH, and DELHI

Project editor Joanna Buck
Designer Clair Watson
Senior editor Alastair Dougall
Senior art editors Carole Oliver, Sarah Crouch
Picture research Maureen Sheerin
Production Kate Oliver
US editor Irene Pavitt
Editorial consultants Sue Rigby, Stephen Bradshaw

REVISED EDITION

Project editor Steve Serford
Designer Sarah Crouch
Managing editor Linda Esposito
Managing art editor Jane Thomas
DTP designer Siu Yin Ho
Consultant Kim Bryan
Production Erica Rosen
US editors Margaret Parrish, Christine Heilman

Second American Edition, 2003
Published in the United States by
DK Publishing, Inc., 375 Hudson Street,
New York, New York 10014

05 06 07 08 10 9 8 7 6 5

Copyright © 2003 Dorling Kindersley Limited

All rights reserved under International and Pan-American Copyright Conventions. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the copyright owner. Published in Great Britain by Dorling Kindersley Limited.

A Cataloging-in-Publication record for the First American Edition of this book
is available from the Library of Congress.

ISBN 0-7566-1801-0

Color reproduction by Colourscan, Singapore
Printed and bound in Italy by L.E.G.O.

See our complete product line at
www.dk.com

CONTENTS



How to use this book 8

INTRODUCTION TO GEMSTONES 10

The history of gemstones 12

Myth and medicine 14

What are gemstones? 16

Mining 30

Organics 32

Artificial gems 34

COLOR KEY 36

Introduction; colorless 38

Red or pink; white or silver 40

Yellow to brown 42

Green 44

Blue or violet;

black; iridescent 46

MINERAL GEMSTONES 48

Diamond	50
Ruby	54
Sapphire	56
Chrysoberyl	58
Spinel	60
Topaz	62
Emerald	64
Aquamarine	66
Zircon	68
Tourmaline	70
Garnet	72
Quartz	74
Amethyst	76
Chalcedony	78
Jade	80
Peridot	82
Moonstone	84
Opal	86
Turquoise	88
Lapis lazuli	90
Azurite and malachite	92

ORGANIC GEMSTONES 94

Pearl 96

Coral 98

Jet 100

Ivory 102

Amber 104

Shell 106

REFERENCE SECTION 108

Legendary gems 110

Gem care 112

Making jewelry 114

Table of properties 118

Glossary 120

Resources 123

Index 124



HOW TO USE THIS BOOK

These pages show you how to use *Pockets: Gemstones*. The book is divided into five sections. These contain information about mineral, organic, and imitation gems, and an easy-to-use color key. There is an introductory section at the front, and a reference section at the back, as well as a glossary and comprehensive index.

HEADING

The heading describes the overall subject of the page. This page is about emeralds. If a subject continues over several pages, the same heading applies.

CAPTIONS AND ANNOTATIONS

Each illustration has an explanatory caption. Some also have annotations, in *italics*, that point out the features of an illustration.

CORNER CODING

The corners of the main section pages are color coded.



Corner coding

Heading

Caption

Annotation

MINERAL GEMSTONES
EMERALD
The beautiful green shades of the emerald derive from the presence of chromium and vanadium. Only the finest quality gemstones are transparent and flawless most have tiny fractures or mineral inclusions known as a "jardin," from the French for garden. It is common practice to oil emeralds to disguise these flaws and enhance the color.

ART OVERTAKING
A square cut emphasizes the richness of the color by leading the eye into the stone rather than deflecting attention away from it.

Excellent emerald green color.

A hand of emeralds shows the delicate structure.

GRASSHOPPER BRIDGE
Lush green emeralds are symbols of the freshness of nature, and the choice of a grasshopper for the emerald-studded brooch adds to that symbolism.

SIXTIETH CENTURY
In the 19th century, American scientist Cassell Chubb greatly improved the process for producing synthetic emeralds by growing emerald crystals at constant temperatures.

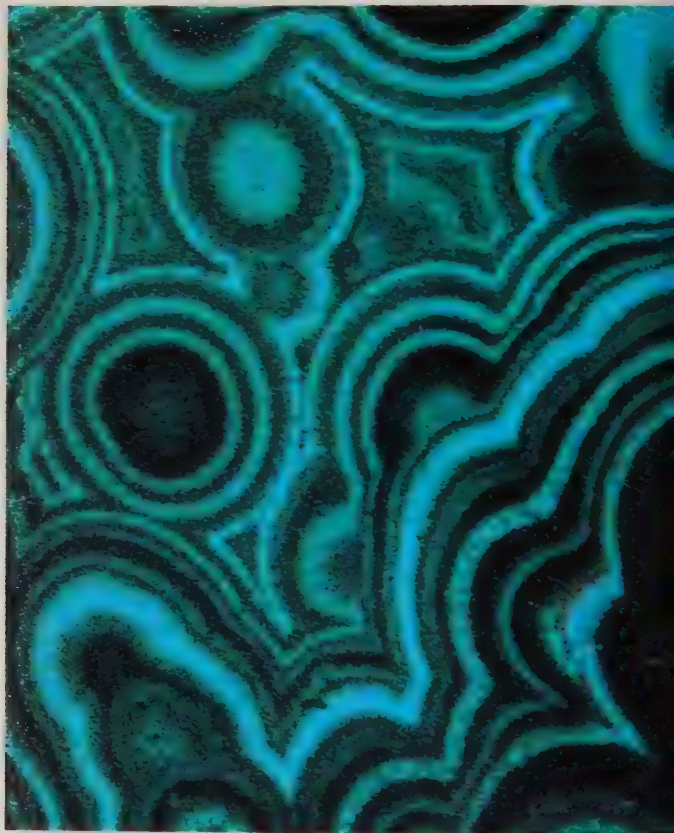
Hardness	Size	Color
7-8	Small	Blue
7-8	Medium	Blue
7-8	Large	Blue

Hardness box

Types of cut

HARDNESS SCALE

The hardness of each gem is indicated in a box on the bottom-left-hand corner of the main gemstone pages. The numbers given are taken from Mohs' scale of hardness (see pages 24-5).



INTRODUCTION TO GEMSTONES



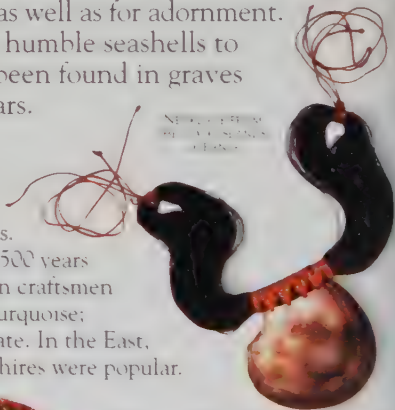
THE HISTORY OF GEMSTONES 12
MYTH AND MEDICINE 14
WHAT ARE GEMSTONES? 16
MINING 30
ORGANICS 32
ARTIFICIAL GEMS 34

THE HISTORY OF GEMSTONES

THE STORY OF GEMSTONES is as old as the hills in which they formed, millions of years ago. Gleaning our knowledge from ancient burial sites, we know that gems were used for weapons as well as for adornment. "Jewels," ranging from humble seashells to rough emeralds, have been found in graves dating back 20,000 years.

Local stones

In the past, people worked mainly with local gemstones. Jade was carved in China 4,500 years ago; Egyptian and Sumerian craftsmen used lapis, carnelian, and turquoise; and the Romans carved agate. In the East, diamonds, rubies, and sapphires were popular.



NECKLACE WITH
SHELLS AND
AGATE



Beetle,
symbol
of rebirth

NECKLACE

Shells have always been used for adornment. This necklace dates from about CE 990 and was worn by an island chief.

WINGED SCARAB

Egyptian craftsmen combined amber, lapis lazuli, carnelian, and turquoise in this scarab beetle good-luck charm. It was found in Tutankhamun's tomb and dates to 1360 BCE.



LAPIS AND
CARNELIAN
NECKLACE

Etched
carnelian

BEADS FOR THE NEXT LIFE
In ancient times, it was common practice for the wealthy to be buried with symbols of their status. This lapis and carnelian necklace was found in a Sumerian grave of the 1st century BCE.

Carved bands
of black and
white agate

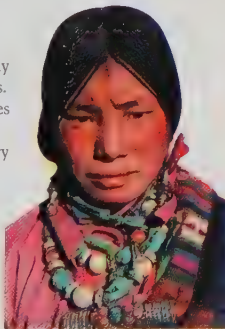
Cameo
of owner



Amethyst bead

ROMAN BROOCH
The original owner of this beautiful brooch must have been a wealthy man. Few people could have afforded to have their portrait carved in agate and then set in gold filigree.

TIBETAN NOMAD
Today, jewelry is an important part of many peoples' national dress. Large turquoise pebbles form the basis of this dramatic contemporary necklace from Tibet. Turquoise is a popular feature of Tibetan jewelry. It is obtained locally and is believed to have talismanic properties.



MYTH AND MEDICINE

THE BEAUTY OF GEMS, their shimmering colors and perfect forms, led people to believe that they came from the heavens. Superstitions grew up around them, and different stones were deemed able to do everything from curing drunkenness to calming the roughest seas.

Healing powers

The alleged power of gemstones extended beyond the supernatural – gems were thought to have medicinal properties. Chinese and Ayurvedic medicine still involves gemstones, and healing with crystals is a growing art.

PEARL FACE CREAM

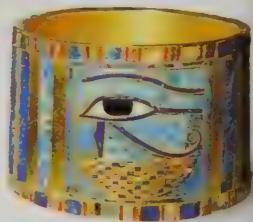
In China, powdered pearl is prescribed for skin complaints.

Pearl cream is used for the face.



CRYSTAL BALL

For centuries, balls made out of polished rock crystal have been used to "see into the future."



MAGIC LAPIS BRACELET

This Egyptian bracelet was buried with its owner. The eye was protective.

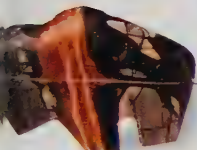
GROUND LAPIS LAZULI

Powdered lapis, taken in pill form, is a regular constituent of traditional Chinese medicine. In the past, gemstones were sometimes placed on an injured part of the body.

Powdered lapis lazuli



LEOPARD-CLAW NECKLACE
 Warriors used to believe that they took on the powers of the animals they killed. This Nigerian necklace would thus have been talismanic as well as decorative – the hunter who wore it would have thought he was invincible.



Onyx banding

Leopard's claw

BUFFALO FETISH
 North American Indians once used stone fetishes (magical objects), such as this onyx buffalo, to attempt to influence the forces of nature.

BIRTHSTONES
 Gems have been associated with different months of the year since the 1st century CE. The wearing of birthstones has and still is, deemed lucky. It first became a popular custom in the 18th century, in Poland.



December – turquoise



January – garnet



February – amethyst



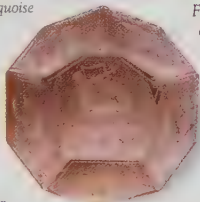
November – topaz



March – aquamarine



October – opal



Rock crystal engraved with signs of the zodiac



April diamond



September – sapphire



May – emerald



August – peridot

July – ruby



June – pearl



WHAT ARE GEMSTONES?

TO BE CONSIDERED A GEM, a substance has to be beautiful, usually in terms of its color and the way it reflects light. It also has to be rare and durable. Gems are either minerals, which have a regular internal structure and fixed chemical composition, or organics, which are produced by plants and animals.



Ruby
crystal

NATURAL CRYSTAL

Ruby crystals form in igneous and metamorphic rocks. They are sometimes washed out of these rocks into river gravels.

CUT STONES

Rubies are second only to diamonds in terms of hardness. They are prized for the richness of their color and their rarity. Rubies are one of the most expensive gems.



MINERAL GEMS

The majority of gems, like the ruby shown here, are minerals that crystallize within the Earth's crust. Ruby forms at high temperatures and pressures and is brought to the Earth's surface by rising magma or by prolonged erosion.



CABOCHON CUT

Before deciding on a cut, the gemstone cutter will inspect the crystal. Cutting as a cabochon reveals a star effect when certain markings are present.



Star-effect
ruby



Synthetic
ruby

SYNTHETIC GEMS

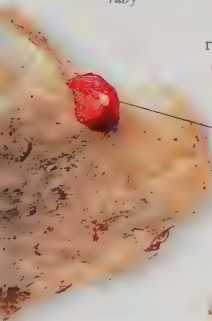
Synthetic gems are created in laboratories and have chemical properties similar to those of real gemstones. This synthetic ruby was manufactured by the Verneuil method (see page 34).

Crystals
growing



FLUX-MELT TECHNIQUE

French chemist Edmond Frémy discovered a method for growing ruby crystals by melting aluminum oxide and chromium in a crucible.

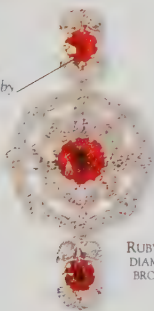


Ruby
crystals in
matrix

ORGANICS

Organic gems are produced by living organisms. This group includes jet, pearl, coral, amber, ivory, and shell. Organics are softer than mineral gems and usually opaque. They tend to be carved and polished rather than faceted (cut).

Round,
faceted ruby



RUBY AND
DIAMOND
BROOCH

Oyster
shell

Pearl bead



PEARL IN OYSTER SHELL

JEWELRY
Gemstones are
generally faceted
and mounted so
that light can shine
through. This ruby
and diamond cluster
brooch dates from
about 1915.

World map

Deposits of gemstones have been found in virtually every part of the world. They are dependent on particular geological conditions, which is why some stones are much rarer than others.



DIAMONDS
Wind, water, and erosion can transport gems to new locations. Here, an Indonesian man pans for diamonds.



KEY TO SYMBOLS



DIAMOND



RUBY



SAPPHIRE



EMERALD



AQUAMARINE



CHRYSOBERYL



TOPAZ



TOURMALINE



PERIDOT



GARNET



PEARL

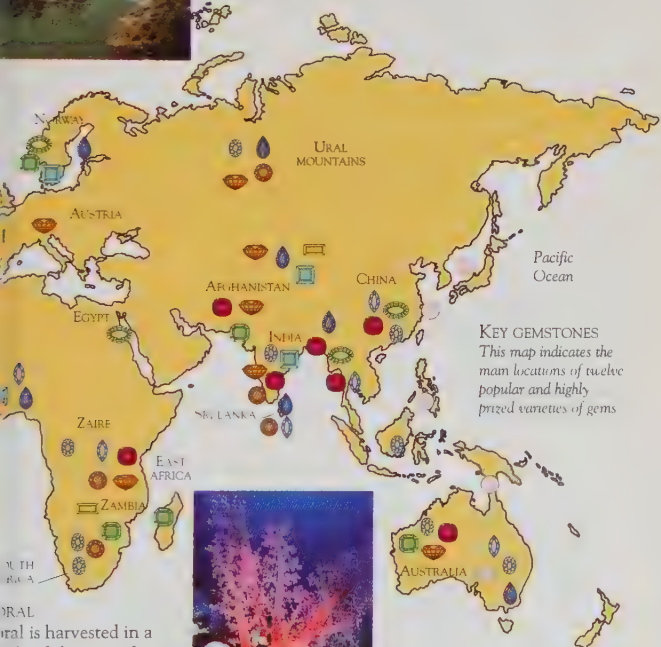


OPAL



DIVING FOR PEARLS

A diver inspects cages of South Sea pearl oysters in an Indonesian pearl farm. Although cultivating pearls is much faster than waiting for natural pearls to form, it can still take up to four years. South Sea pearls are produced by very large oysters, the *Pinctada maxima*.



KEY GEMSTONES
 This map indicates the main locations of twelve popular and highly prized varieties of gems

OPAL
 Opal is harvested in a lighted, large-mesh net dragged across the seabed. Opals are found in warm waters.



How gemstones are formed

Mineral gemstones are formed within the Earth as a result of certain physical and chemical conditions. Heat and pressure are the main external factors involved in gemstone formation. Some are brought to the surface by volcanic eruptions; others are found in rocks or in gem gravels – the deposits left by rivers and streams as they gradually erode rocks.

1 Diamond and pyrope garnet crystallize at high pressures in the Earth's mantle.

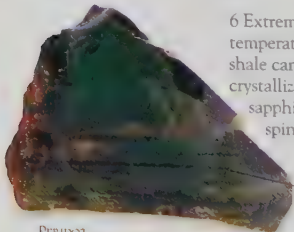
2 High pressures in the Earth's crust can lead to the formation of jadeite.

3 Peridot occurs in basaltic and ultrabasic rocks.

4 Chrysoberyl, topaz, aquamarine, tourmaline, quartz, spessartine, and moonstone crystallize when coarse-grained igneous granites (pegmatites) cool down.

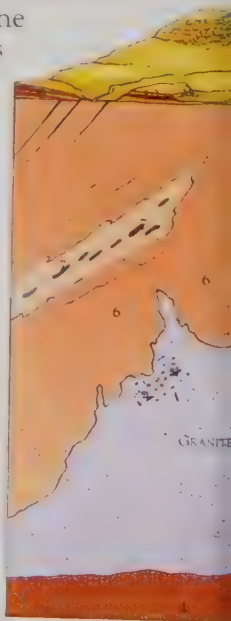
5 Emeralds occur when granitic fluids come into contact with rocks containing chromium.

6 Extreme pressure and temperature changes in shale can give rise to the crystallization of ruby, sapphire, chrysoberyl, spinel, and garnet.



PERIDOT

Peridot forms deep beneath the Earth's surface



MALACHITE



Malachite often occurs in rounded masses

7 Ruby, sapphire, spinel, zircon, lapis lazuli, spessartine, and grossular garnet form when hot granitic fluids react with impure shales and limestones.

8 Rising magma carries gem minerals to the Earth's surface, where they are trapped in basalt lavas.

9 Turquoise, malachite, and azurite tend to form close to the Earth's surface, where ore bodies come into contact with water.

CROSS SECTION OF EARTH



10 Opal is found in porous sedimentary rocks and sometimes in cavities in volcanic rocks. It forms during cooling of silica-rich groundwater.



Layer of precious opal

OPAL

11 Silica-rich liquids deposit citrine, amethyst, agate, and opal in gas cavities in lavas.

12 Various weathering processes break down gem-bearing rocks.

13 Gems are washed into river gravels.

Crystal structure

Most gemstones are composed of crystals, which grow in a regular, three-dimensional pattern. Crystals are classified into seven different systems, according to the symmetry of their faces, or flat surfaces. The overall shape formed by the surfaces is called the "habit."

Some gemstones have an irregular shape, known as "amorphous."

CHRYSOPRASE



REGULAR STRUCTURE

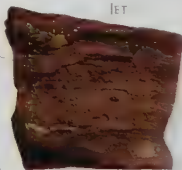
As with the other members of the chalcedony family, chrysoprase has a trigonal structure (see facing page), which is characterized by a threefold symmetry.

LINEAR CLEAVAGE



Fine-grained, rough surface

JET



CLEAVAGE

The way in which a stone breaks, or cleaves, depends on its planes of weakness. These planes relate to its crystal structure and are usually parallel, perpendicular, or diagonal to the crystal faces.

AMORPHOUS

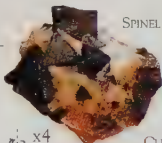
Jet, along with amber and ivory, is an organic gem that does not fall within the seven crystal systems. Instead, its structure is amorphous, which means literally "without form."

TOPAZ

CRYSTAL STRUCTURE

AXES OF SYMMETRY

Each crystal system has different axes of symmetry – imaginary lines around which the crystal rotates and still shows the same aspect. The diagrams indicate the minimum number of times a crystal shows the same aspect in each rotation.



SPINEL



CUBIC

Spinel is a typical cubic crystal. The cubic system has the highest symmetry – three fourfold axes.

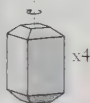


TRIGONAL

This crystal system has one threefold axis. It has the same axis of symmetry as the hexagonal.



MILKY QUARTZ



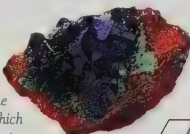
TETRAAGONAL

This system is defined by one fourfold axis. The zircon (right) displays double pyramidal ends.



ZIRCON

MONOCLINIC
Gems such as azurite, moonstone, and jade belong to the monoclinic system, which has one two-fold axis.



AZURITE



x2



AQUAMARINE



x6

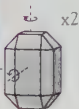
HEXAGONAL
Emerald and aquamarine belong to this system. They have one sixfold axis of symmetry.



TOPAZ

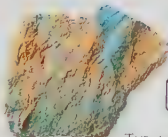
ORTHORHOMBIC

There are a minimum of three twofold axes in this system.



x2

TRICLINIC
Triclinic gems are unusual in that they have no axes of symmetry and are therefore the least symmetrical.



TURQUOISE



Physical properties

Mineral gemstones can be identified and classified according to certain properties, ranging from their relative hardness to their relative weights.

Hardness is measured on a scale of 1 to 10, with diamond being 10.

Specific gravity reflects the density of a gem, and carats are used to measure its weight.

MOHS' HARDNESS SCALE

The German mineralogist Friedrich Mohs devised a scale as a means of classifying the relative hardness of minerals. Hardness was defined as the ability to scratch another mineral, so that each mineral on his scale can scratch those below it and be scratched by those above it.



1
TALC



2
GYPSUM



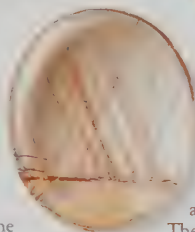
3
CALCITE



4
FLUORITE



5
APATITE



ROCK CRYSTAL

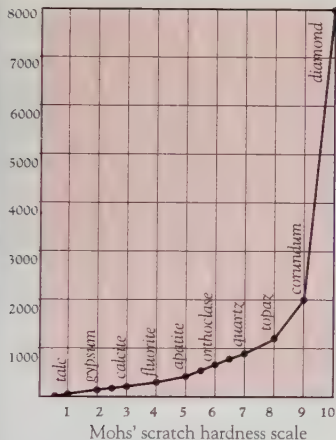


Tree-like inclusion

INCLUSIONS

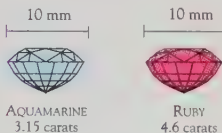
Internal features of gems such as trapped solids, liquids, or gases are called inclusions.

These can be invaluable in identifying certain gems. Needle-like inclusions are often present in rock crystal, and "landscape" features tend to form in agates, due to iron oxides and hydroxides.



SPECIFIC GRAVITY

The density of a gem is called its specific gravity (SG). It is calculated by comparing a stone's weight with the weight of an equal amount of water. The SG of aquamarine, for example, is 2.69, which means it is 2.69 times heavier than an equal amount of water.



Ruby has a much higher SG, at 4.00. Consequently, a 0.4-in (10-mm) brilliant-cut ruby will weigh 4.6 carats, compared to an aquamarine's 3.15 carats. One carat equals one-fifth of a gram. The word "carat" derives from the carob seed – a standard for weighing gems for centuries.

THE KNOOP HARDNESS SCALE

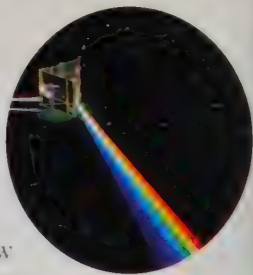
The intervals between the numbers on Mohs' scale do not represent equal increases in hardness – for example, diamond is four times harder than corundum, but is next to it on the scale. Knoop's scale, instead, reveals the varying degrees of hardness of Mohs' ten minerals.



MOHS' MINERALS

Color and luster

A gemstone's value depends largely on its color and the way in which it reflects light. The term "luster" describes the amount of light reflected from the surface of a mineral; gems range from highly lustrous (adamantine) to waxy (low luster). Their color depends on how they absorb light, as well as the type and amount of impurities they contain. Some gems occur in only one color – for example, malachite, which is always green.



SPLITTING LIGHT
White light is made up of all the colors of the rainbow. If a gem appears red, it is because red is reflected back, while the other colors are absorbed.

IDENTIFYING GEMSTONES
Many gems are so similar in color that it is impossible to tell them apart with the naked eye. Gemologists use an instrument known as a spectroscope, which separates light into its spectrum of colors. This reveals the way each stone absorbs bands of colored light. The pattern that each gemstone makes is like its individual "fingerprint."



Red with distinctive banding



RED



Red tapering to orange



AMANDINE GARNET



ABSORPTION SPECTRA

Broad band of black



GLASS

PARTICOLORED GEMS

Some gemstones are of two or more colors. Tourmalines are excellent examples of this, since a single crystal may display as many as 15 different colors or shades. This watermelon tourmaline has three bands of color.



WATERMELON
TOURMALINE

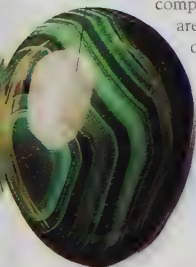


Lapis with
white flecks
of calcite

IDIOCHROMATIC GEMS

Although the shade may vary, lapis lazuli is always blue. This is due to its sulfur content, which is an essential part of its composition. Gems of this type are known as "idiochromatic," or self-colored.

VITREOUS LUSTER



VITREOUS LUSTER

Malachite has a glasslike quality, known as a vitreous luster. It is also opaque – lets no light through. The characteristic green color of malachite is caused by its copper content.

Resinous luster

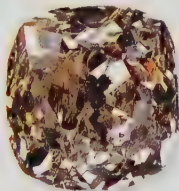


RESINOUS LUSTER

This polished amber bead has a resinous sheen. Amber with less shine than this is often called "waxy."

ADAMANTINE LUSTER

Diamonds typically have an "adamantine" luster, which is the highest and most desirable degree of sheen. The brilliant cut is popular for diamonds since it maximizes this effect.



Adamantine
luster

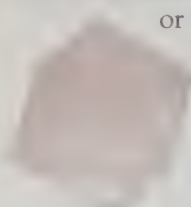
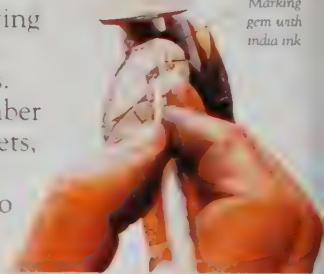
Cut and polish

Uncut gems often look like ordinary stones. It is the cutting and polishing processes that transform “rocks” into jewels.

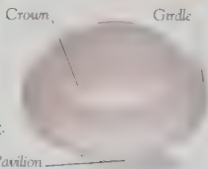
Gems may be cut into a number of flat surfaces, known as facets,

or rounded and polished into cabochons.

Marking gem with india ink



1 ROUGH
Model of the rough crystal ready for faceting.



FACETING A GEMSTONE

Decisions on the best style of cut are reached by careful examination of a gem's form and structure. The final gem may be as little as 40 percent of the original.



2 GRIND
The top of the crystal is sawn off, and the stone is rounded using a diamond grinder.



3 CUT
The main facets are added to the crown.

5 FINAL CUT
The standard round brilliant cut has 58 facets, precisely angled and in perfect proportion to one another.



Crown facet

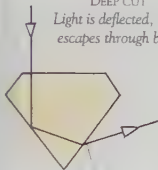
4 TOP AND BOTTOM
The eight main crown facets are completed, and facets are added below the girdle.

REFLECTING LIGHT

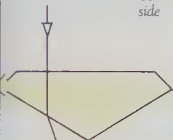
The ideal cut maximizes the amount of light that is reflected back from the stone. If a gem cut is too deep or too shallow, the stone will not sparkle.

DEEP CUT

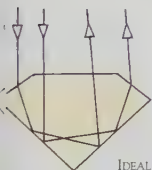
Light is deflected, then escapes through base



Light escapes on opposite side



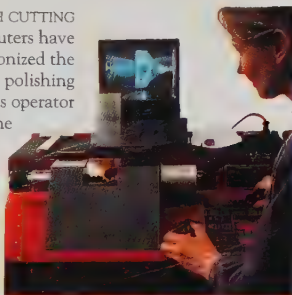
SHALLOW CUT
Light escapes on same side of base



IDEAL CUT
Light is reflected back and out of the top of the stone

HI-TECH CUTTING

Computers have revolutionized the cutting and polishing processes. This operator oversees the faceting operation on screen.



PRECISION CUTTING

TYPES OF CUT

This table shows the most popular cuts, which are shown for each of the main gemstones featured in this book. Faceted cuts are grouped as brilliant, mixed, step, and fancy. Nonfaceted gems are also listed.

BRILLIANT CUTS					
	Round	Oval			
MIXED CUTS					
	Mixed	Cushion			
STEP CUTS					
	Octagonal	Oval	Baguette	Table	Square
FANCY CUTS					
	Pendeloque	Marquise			
POLISHED/ CAMEO CUTS					
	Cabochon	Bead	Cameo	Polished	

MINING

THE COLLECTING OF GEMS can be as simple as panning for stones in a riverbed, or involve vastly expensive, technologically advanced mining equipment. In some parts of the world, traditional methods are the most cost-effective, but for stones such as diamonds, which are often embedded deep in volcanic rocks, the most



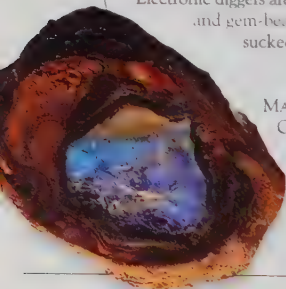
PANNING FOR RUBIES IN THAILAND

modern mining processes have to be used.

PANNING FOR RUBIES

Thai workers pan for rubies using an age-old method. The hardness and weight of rubies allow them to be sifted from river gravel and then picked out by hand.

*Hardened
sandy clay*

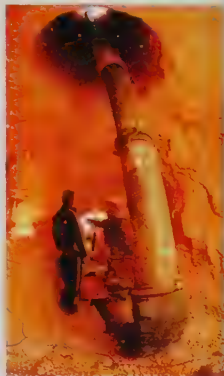


OPAL MINING IN AUSTRALIA

Opal is often found in sandstone and so can be dislodged relatively easily. Electronic diggers are used underground, and gem-bearing rubble is then sucked up to the surface, where it is sorted.

MATRIX OPAL

Opal is a silica gel containing a high proportion of water. It forms by filling cavities in a rock and hardening.



GEM TREASURE TROVE

panning operates on the principle that lighter materials are washed away by the swirling action of water, leaving behind precious minerals. This technique is often used in areas such as Myanmar (Burma).



THE SOUTH AFRICAN DIAMOND MINE is on the scale of a diamond-mining operation is astounding, in terms of both the size of the pit and the amount of equipment needed. Over 250 tons of rock have to be blasted for every finished diamond carat – for each 0.2 oz (0.2 g)!

TRAWLING FOR DIAMONDS

The seabed off the Namibian coast is an important source of diamonds. The latest recovery technique involves large, offshore ships that pump gravel containing diamonds up to the surface.



Precious stones mixed in with other minerals



ORGANICS

GEMS THAT ARE THE PRODUCTS of plants and animals, rather than having a mineral origin, are known as organics. Pearls, coral, and amber come into this category, as do ivory, jet, and different types of shell. These materials have been prized and used as ornaments for thousands of years.



JAPANESE PEARL DIVER



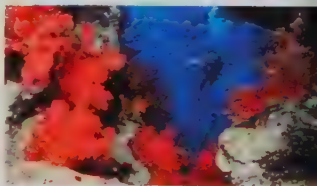
FISHING FOR PEARLS *1 Pearl in oyster*
Japan pioneered the development of cultured pearls at the turn of the 20th century, and it now dominates the world pearl market. Here a diver swims with a large bucket to gather specially farmed akoya oysters, with their valuable pearls.

CORAL

Coral grows in warm waters at depths of 10–1,000 ft (3–300 m). Its tree-like branches tend to be dull and grainy when harvested, but can be polished to a high luster.



CORAL BEAD



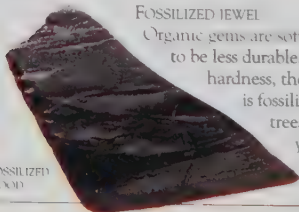
CORAL REEF

FOSSILIZED JEWEL

Organic gems are softer than mineral gemstones and tend to be less durable. Jet is 2.5 on Mohs' scale of hardness, the same as a fingernail. It is fossilized wood, a product of trees that lived millions of years ago, and has been used decoratively since the Bronze Age.



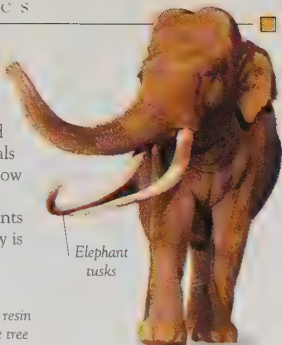
JET BEAD



FOSSILIZED WOOD

IVORY

Elephants' tusks have long been the main source of ivory, but are by no means the only one. The teeth and tusks of many other mammals also contain ivory and are now often used in preference to elephant ivory, since elephants are a protected species. Ivory is prized for its color, ease of carving, and durability.



Elephant tusks



CAVEETUSKY

AMBER

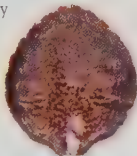
Like jet, amber is a fossil derived from trees, but in this case from the resin rather than the compacted remains of the wood. It is characteristically a golden orange color, and this, coupled with its translucence and resinous luster, have made it popular for jewelry.



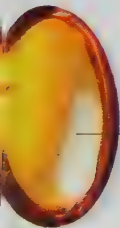
Fossilized resin from pine tree

TORTOISESHELL

The term "tortoiseshell" is confusing, since it refers to the carapace (upper shell) of a hawksbill turtle rather than that of a tortoise. It was extremely popular for hair ornaments and small boxes in the early part of the 20th century, but it is now a protected substance.



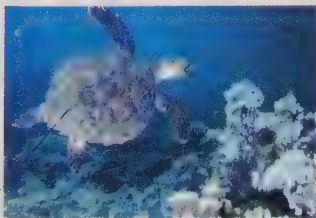
TORTOISESHELL



Resinous luster

AMBER BEAD

HAWKSBILL TURTLE



Turtle with tortoiseshell carapace

ARTIFICIAL GEMS

THE DEMAND FOR RARE GEMSTONES has led to the production of countless imitations, some more successful than others. These copies fall into three categories: gems that look like the real thing, but have a different composition; synthetic gems, which are made in laboratories and are almost exact copies of natural gems; and composite stones, which consist of several parts cemented together.



FLAME-FUSION



FLAME-FUSION TECHNIQUE

In 1891, the French scientist August Verneuil perfected a technique for producing synthetic gems. He sited powdered crystals into a flame (left), and melted them onto a holder. The melted crystal was then removed from the heat, and it formed a solid crystal (right, top section).

GROWING CRYSTALS

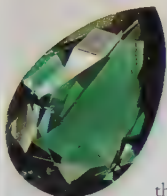
Many crystals grow in hot fluids as they cool down. Although this process can be replicated in a laboratory, it takes many years to produce gem-quality crystals in this way, and so is not commercially viable.



SLUGGISH CRYSTALS START TO FORM



CRYSTALS BEGIN TO TAKE SHAPE



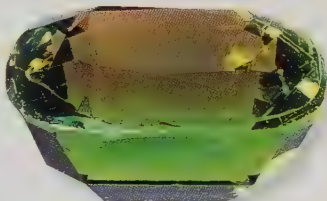
SYNTHETIC EMERALD

This pendeloque-cut emerald has been made by the flux-melt technique (see page 17).

Its composition and structure are the same as that of a natural emerald.

COMPOSITE STONE

Red garnet
on top of
green glass



synthetic /
emerald

IDENTIFYING GEMS

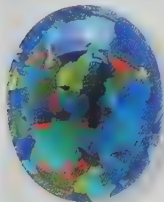
It is usually possible to distinguish between real and artificial gems with a small hand lens, called a loupe. This one has tenfold magnification.



HAND-HELD LENS

GARNET-TOPPED EMERALD DOUBLET

This composite stone is made of a red garnet top and a green glass base. It appears green despite the garnet and is intended to pass for an emerald. The garnet-topped doublet is a common composite stone.



GILSON OPAL

AL
The French manufacturer Terre Gilson has imitated the opal's iridescence. However, these opals have patches of color and are not perfect replicas.

FABULOUS FAKE

This pendant is made of simulated rubies and diamonds, probably glass. The gems are imitation rather than synthetic, as they do not have the same chemical composition as real stones.

Simulated rubies,
probably glass

IMITATION
RUBY AND
DIAMOND
PENDANT



Fake
diamonds



COLOR KEY



INTRODUCTION; COLORLESS 38
RED OR PINK; WHITE OR SILVER 40
YELLOW TO BROWN 42
GREEN 44
BLUE OR VIOLET;
BLACK; IRIDESCENT 46

INTRODUCTION

THE MAJORITY OF GEMS are colored by metallic elements, notably chromium, iron, manganese, titanium, and copper. Depending on the type and amount of metal contained in a gemstone, its color can vary greatly. In this section, gemstones are categorized according to seven basic color bands.

Intense red in ruby is caused by chromium

Yellow sapphires contain iron



Green sapphires are often composed of microscopic needles of sodium chlorite in sapphires

MULTICOLORED
These rubies and sapphires are really the same mineral, corundum. The range of colors is caused by varying amounts of chromium, iron, and titanium.

Prized blue sapphires contain titanium with iron

PAINT PIGMENTS

Azurite is a copper compound that produces a sky-blue color when ground down. Malachite produces a brilliant green, and lapis lazuli generates the beautiful and highly prized blue known as ultramarine.



AZURITE

MALACHITE

LAPIS LAZULI

COLORLESS

ALWAYS COLORLESS



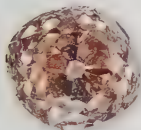
ROCK CRYSTAL
(Quartz pp. 74-5)



ACHROITE
(Tourmaline pp. 70-1)

IMITATION
DIAMONDS
Cubic zirconia
Strontium titanate
Glass

USUALLY COLORLESS



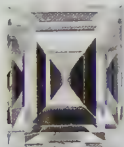
DIAMOND
(pp. 50-3)

OTHER GEMS
Scheelite
Celestine
Danburite
Cerussite



ORTHOCLASE
(Moonstone family pp. 84-5)

SOMETIMES COLORLESS



ZIRCON
(pp. 68-9)



MOONSTONE
(pp. 84-5)



SAPPHIRE
(pp. 56-7)

RED OR PINK

ALWAYS RED OR PINK



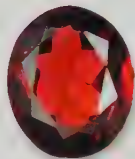
PINK GROSSULAR
(Garnet pp. 72-3)



RUBY
(pp. 54-5)



ALMANDINE
(Garnet pp. 72-3)

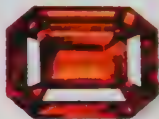


PYROPE
(Garnet pp. 72-3)



RUBELLITE
(Tourmaline pp. 70-1)

USUALLY RED OR PINK



SPESSARTINE
(Garnet pp. 72-3)

SOMETIMES RED OR PINK



TOPAZ
(pp. 62-3)



WATERMELON TOURMALINE
(pp. 73-4)



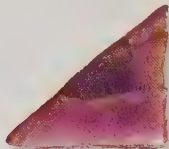
SAPPHIRE
(pp. 56-7)



CORAL
(pp. 98-9)



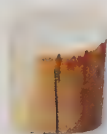
SPINEL
(pp. 60-1)



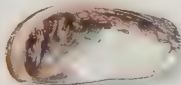
JADEITE
(Jade pp. 80-1)

WHITE OR SILVER

ALWAYS WHITE OR SILVER



IVORY
(pp. 102-3)



DONKEY'S-EAR ABALONE
(Shell pp. 106-7)



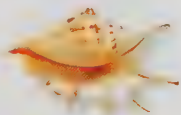
MILKY QUARTZ
(pp. 74-5)

USUALLY WHITE OR SILVER

SOMETIMES WHITE OR SILVER



PEARL
(pp. 96-7)



SHELL
(pp. 106-7)



NEPHRITE
(Jade pp. 80-1)

YELLOW-BROWN

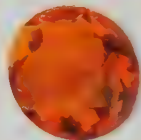
ALWAYS YELLOW-BROWN



PADPARADSCHA
(Sapphire pp. 56-7)



CARNELIAN
(Chalcedony pp. 78-9)



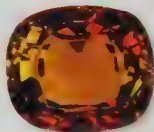
FIRE OPAL
(pp. 86-7)



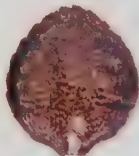
SARDONYX
(Chalcedony pp. 75-6)



HESSONITE
(Garnet pp. 72-3)



DRAVITE
(Tourmaline pp. 70-1)



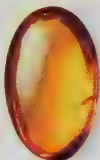
TORTOISESHELL
(Shell pp. 106-7)



CITRINE
(Quartz pp. 74-5)

OTHER GEMS
Heliodor
Sunstone
Cassiterite
Smoky quartz

USUALLY YELLOW-BROWN



OTHER GEMS
Vesuvianite
Titanite
Axinite
Staurolite

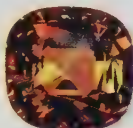
ORTHOCLASE

(Moonstone family pp. 84-5)

AMBER

(pp. 104-5)

SOMETIMES YELLOW-BROWN



SPESSARTINE

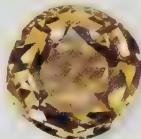
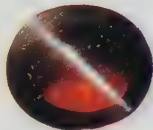
(Garnet pp. 72-3)

CHRYSOBERYL

(pp. 58-9)

CHATOYANT QUARTZ

(Chalcedony pp. 78-9)



MOSS AGATE

(Chalcedony pp. 78-9)

CAT'S EYE

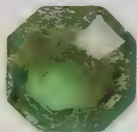
(Chalcedony pp. 78-9)

SAPPHIRE

(pp. 56-7)

GREEN

ALWAYS GREEN



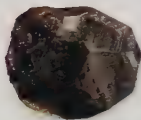
EMERALD
(pp. 64-5)



PERIDOT
(pp. 82-5)



BLOODSTONE
(Chalcedony pp. 78-9)



UVAROVITE
(Garnet pp. 72-3)

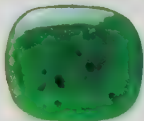


CHRYSOPRASE
(Chalcedony pp. 78-9)

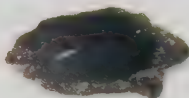


MALACHITE
(pp. 92-3)

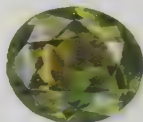
USUALLY GREEN



JADEITE
(Jade pp. 80-1)

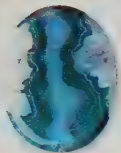


NEPHRITE
(Jade pp. 80-1)

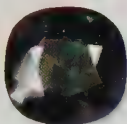


DEMANTOID
(Garnet pp. 72-3)

SOMETIMES GREEN



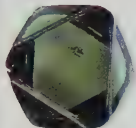
AGATE
(*Chalcedony pp. 78-9*)



SAPPHIRE
(*pp. 56-7*)

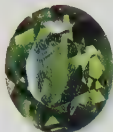


WATERMELON TOURMALINE
(*pp. 70-1*)

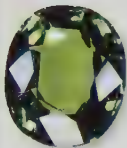


DIAMOND
(*pp. 50-1*)

OTHER GEMS
Paua Shell
Fluorite
Smithsonite
Euclase
Kyanite



ZIRCON
(*pp. 68-9*)



GROSSULAR GARNET
(*Garnet pp. 72-3*)



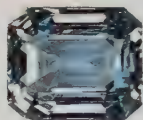
GARNET-TOPPED DOUBLET
(*pp. 72-3*)



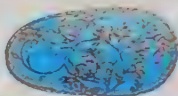
TOURMALINE
(*pp. 70-1*)

BLUE OR VIOLET

ALWAYS BLUE OR VIOLET



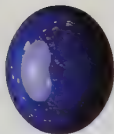
AQUAMARINE
(pp. 66-7)



TURQUOISE
(pp. 88-9)



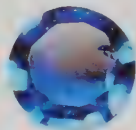
AZURITE
(pp. 92-3)



LAPIS LAZULI
(pp. 90-1)

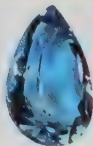


AMETHYST
(pp. 76-7)

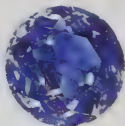


HAÜYNE
(Lapis lazuli pp. 90-1)

SOMETIMES BLUE OR VIOLET



TOPAZ
(pp. 62-3)



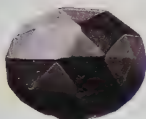
SAPPHIRE
(pp. 56-7)



SPINEL
(pp. 60-1)

BLACK

ALWAYS BLACK



JET
(pp. 100-1)



SCHORL
(Tourmaline pp. 70-1)

ARTIFICIAL JET
Cannel coal
Vulcanized
rubber
Glass

SOMETIMES BLACK



CORAL
(pp. 98-9)



DIAMOND
(pp. 50-1)

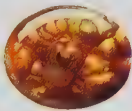


PEARL
(pp. 96-7)

IRIDESCENT



OPAL
(pp. 86-7)



FIRE AGATE
(Chalcedony pp. 78-9)



MOTHER-OF-PEARL
(Shell pp. 106-7)



MINERAL GEMSTONES



DIAMOND 50	QUARTZ 74
RUBY 54	AMETHYST 76
SAPPHIRE 56	CHALCEDONY 78
CHRYSOBERYL 58	JADE 80
SPINEL 60	PERIDOT 82
TOPAZ 62	MOONSTONE 84
EMERALD 64	OPAL 86
AQUAMARINE 66	TURQUOISE 88
ZIRCON 68	LAPIS LAZULI 90
TOURMALINE 70	AZURITE AND
GARNET 72	MALACHITE 92

DIAMOND

KNOWN AS THE “king of gems,” the diamond is the most precious of gemstones, famed both for its fiery brilliance and for being the hardest mineral on Earth.

Its name derives from the Greek word *adamas*, which means “invincible.”

Diamonds are a form of carbon. They occur in a range of colors, the most popular being colorless.



DIAMOND IN MATRIX

Diamonds are sometimes found in conglomerate rock, as shown here. It is a solidified mixture of pebbles and grains.

MYTH AND MAGIC

- Hindus believed that a flawed diamond would bring misfortune.
- The Greeks thought that diamonds could protect against poisons.
- In medieval times, those who could afford to wore a diamond jewel to safeguard against the plague.



PEARL AND DIAMOND PENDANT

In the Victorian era, sporting diamond jewelry was one of the favorite ways of displaying wealth. This piece dates from the 1850s.



Diamond weighs
2.48 carats

ENGAGEMENT RING

Diamonds, symbols of love and fidelity, have been used in engagement rings since the 15th century.



Brilliant



Cushion



Pendeloque

DIAMOND

DIAMOND NECKLACE

This necklace containing diamond loops and festoons dates from about 1870. The diamonds are brilliants of varying sizes.

NECKLACE

Brilliant cut is typical for diamonds

COLORED DIAMONDS

These gem-quality, colored stones are called fancies and fetch a very high price. Traces of nitrogen give brown, yellow, green, and black stones their color; boron is present in blue diamonds.



BUTTERFLY BROOCH



BUTTERFLY

Dating from about 1850, this delicate openwork brooch consists of over 125 brilliant-cut diamonds. The ruby eyes form a striking contrast to the shimmering white wings.

DIAMOND BRACELET



BRACELET

Designed with flexible-band links, this diamond-studded bracelet dates from the late 19th century.

Famous diamonds

The history of diamonds is one of untold greed, intrigue, and deceit. Countries have been plundered for them, wars fought, and beautiful women lost and won. However, not all diamonds have brought about such destruction. The Taylor–Burton diamond, for example, was used to save lives: in 1978, it was sold to finance a hospital in Botswana.



Gem cut from a rough stone of 241 carats

TAYLOR–BURTON

The actor Richard Burton bought this pear-shaped diamond for his wife Elizabeth Taylor in 1969. Nine years later they divorced, and she put it up for auction.

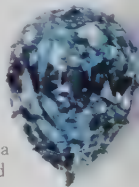


DRESDEN GREEN

Known as the Dresden Green, this is the largest green diamond in existence, measuring roughly 30 x 20 x 10 mm and weighing 41 carats.

CULLINAM I

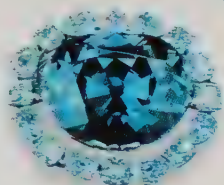
Also known as the Great Star of Africa, this stone was found in South Africa's Premier Mine in 1905. It took three polishers, working 14 hours a day, eight months to cut and polish it! Presented to King Edward VII in 1908, it is now set in the British Imperial Scepter.





THE TIFFANY

This diamond was bought by Tiffany's, the New York jeweler, in 1879 for \$18,000. Just over 100 years later, it was valued at \$12 million.



THE HOPE

Despite its name, owners of the Hope Diamond are said to be cursed. One was eaten by wild beasts; Louis XVI of France was guillotined; a Dutch jeweler committed suicide; an actress was shot on stage while wearing it; and her lover, whose gift it was, was stabbed to death!

Largest known yellow diamond

THE SANCY

In the 16th century, the Sancy was used to finance a war in Europe. The servant bearing it swallowed the stone when attacked. The stone was later retrieved from his stomach!



KOH-I-NOOR

The Koh-i-noor passed rapidly from owner to owner – Indian, Moghul, and Persian. It was presented to Queen Victoria in 1850 and was set in the crown worn by the Queen Mother in 1937.



Koh-i-noor Diamond set in Maltese cross

RUBY

THE CLASSIC RUBY is a deep, rich red, although the stone can appear in shades from pink to purple to brown, depending on the chemical content.

Rubies are second only to diamonds in terms of hardness, which, along with the vibrancy of their color, makes them highly prized for jewelry. Like sapphires, they are a form of corundum, and the finest stones come from Myanmar (Burma).



GEORGIAN DROPS
Diamonds are often used to set off the color of the ruby, as in these earrings from around 1800.



Five rubies hang within a diamond border



A typical cut for rubies

CUSHION MIXED CUT
Mixed-cut stones usually have a rounded outline, with the upper section cut as brilliants and the lower section step cut. Rubies are usually cut this way.



Brilliant



Step



Cabochon



Mixed

EDWARDIAN PENDANT

The pale tones of this ruby suggest that it was mined in Sri Lanka. Hindus considered light-colored rubies "female" gems, and the darker ones, "male."

Pale ruby cut as a cabochon



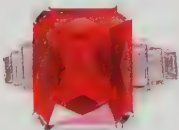
RUBY
PENDANT

FLORAL SPRAY

This brooch is set with circular rubies, step-cut diamonds, and a large brilliant-cut diamond in the center.



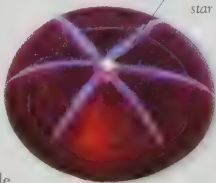
Deep red mixed-cut rubies



CLASSIC RING

Traditionally given as a 40th-wedding-anniversary present, the ruby is also the gemstone of those born in July.

Six-rayed star



STAR RUBY

The color of this cabochon is known as "pigeon's-blood red" – pure red with a hint of blue – and is the most sought after shade.

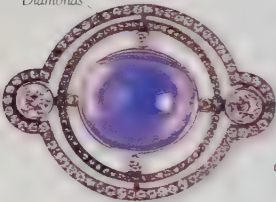
MYTH AND MAGIC

- At the time of the Borgias (15th–16th centuries), rubies were thought to counteract poison – and so were much in demand!
- Rubbed on the skin, these gemstones were once thought to restore youth and vitality.
- In the Middle Ages, the ruby was viewed as a stone of prophecy. People believed it would darken when its wearer was in danger.

SAPPHIRE

THESE STONES come in a range of yellows, pinks, and greens, as well as the better-known blue variety. The deep blue “heavenly” sapphires were, and to some extent still are, deemed holy: popes, cardinals, and bishops have worn them since the Middle Ages. They are known as the jewels of chastity.

Diamonds



SHIMMERING BROOCH
In its purest form the sapphire is colorless; traces of vanadium render it violet. Here the clarity of the diamonds enhances the tones of the central sapphire.



RING

The unusual color of this sapphire ring is due to the presence of a small amount of iron.

MYTH AND MAGIC

- At one time, sapphires were thought to exude heavenly rays that had the power to kill all poisonous creatures.
- The Persians thought the Earth rested on a giant sapphire and that the blue of the heavens was its reflection.



GREEN CUSHION CUT
Sapphires that come from Australia and Montana are often of a dark green hue.



Brilliant



Cabochon



Cameo



Brilliant



Cushion

LATE VICTORIAN NECKLACE

The stones in this intricate necklace are of a pale blue variety. Blue sapphires derive their color from mixtures of iron and traces of titanium, while green varieties are due to greater quantities of iron, and pink to the presence of chromium.

Diamond quatrefoils form links



Brilliant-cut sapphire

The sapphire and diamond drop is detachable

STAR CABOCHON

Star sapphires were considered the most potent of amulets. The three intersecting lines that form the star's "rays" represented faith, hope, and destiny.



SAPPHIRE EARRINGS

These delicate sapphire and diamond drop earrings date from about 1890. The cabochons are of highly prized cornflower blue and probably come from Sri Lanka.

Diamond-set leaves

Cabochon cut



OVAL MIXED CUT

Like rubies, pink sapphires are thought to ward off ill-health and misfortune, particularly when worn on the skin.



CHRYSOBERYL

THE NAME "CHRYSOBERYL" comes from the stone's beryllium content plus the Greek *chrysos*, meaning "golden." Interesting types are alexandrite, which can change from green to red, mauve, or brown, depending on the light, and cat's-eye, which looks as it sounds and allegedly protects against the "evil eye."



characteristic
wedge-shaped
cleavages



Gold filigree
setting

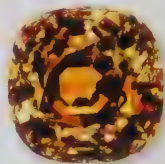
CRYSTALS

The best chrysoberyl has been found in the Ural Mountains of western Russia. Other rich sources are Sri Lanka, Zimbabwe, Tanzania, and Brazil.

BROOCH
At 8.5 on Mohs' scale, chrysoberyl is one of the hardest stones

Mixed-cut
gems

and so is particularly prized for jewelry. This Victorian piece is made of over 20 individual mixed-cut stones.



CUSHION MIXED CUT

Here hundreds of facets reflect the golden color for which chrysoberyl is renowned. Despite the stone's brilliance, it is thought to lack "fire."



Brilliant



Cushion



Cabochon



Mixed

ALEXANDRITE

Discovered in 1830 in the emerald mines of the Urals, this variety of chrysoberyl was named in honor of Czar Alexander II.

The stone changes from green to light red in artificial light.



SPANISH DESIGN

The chrysoberyl in this 18th-century ring was collected from a vein running through chalk.

The pale yellow stones are a classic cushion cut, and the large oval ring is probably of Spanish or Portuguese origin.



Pale yellow stones

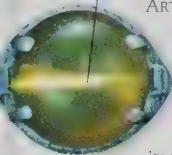
Filigree work in palmette motif

NECKLACE

This early-19th-century necklace consists of pale, honey-colored chrysoberyls in a cannetille setting – an embroidery term for gold thread with a spiral twist.



Near-white line across the center



CAT'S-EYE

ART DECO RING

Cat's-eye chrysoberyl is also known as cymophane. It is always cut as a cabochon, and its value increases

in proportion to the narrowness and intensity of its flash of light.

MYTH AND MAGIC:

- In the East, cat's-eyes are used to ward off evil spirits. In the West, they are used in crystal healing.
- Cat's eyes are also used medicinally in India, particularly as a remedy for cancer.

SPINEL

THE COLOR VARIATIONS of spinel – blue, yellow, and red – are caused by various metallic impurities. The most popular spinel is a ruby red, which contains chromium and iron. Many treasures of state throughout the world sport massive red

spinel, mistaken for rubies. The British Imperial State Crown is no exception.



Diamond surround



DROP EARRINGS

Large pendeloque-cut spinels hang from diamond frames. These earrings form part of an 18th-century jewelry set, which includes a tiara, necklace, and hair ornament.

MYTH AND MAGIC

- Spinel was recognized as a mineral only 150 years ago. Prior to this, it was classified as a ruby and so shared the ruby's reputed medicinal and prophetic powers.
- It was used as a remedy for hemorrhages.

OCTAGONAL STEP-CUT

This pink spinel comes from Myanmar (Burma), a rich source of river gravel deposits.



Cushion



Mixed



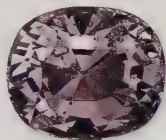
Step



Brilliant

BRITISH CROWN

The Black Prince's Ruby is the spinel in the center of the British Imperial State Crown. It was a gift from Pedro the Cruel, king of Spain, to the Black Prince, son of Edward III of England, in 1367 for his help in battle.



OVAL BRILLIANT CUT

Pure spinel is colorless. This stone has a pinkish mauve tinge due to small amounts of impurities. Liquid-filled inclusions are visible.

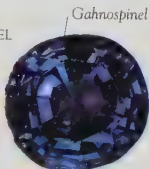


MIXED-CUT RED SPINEL

Until the 19th century, red spinels were known as Balas rubies, possibly named after their source, Balascia, now Badakhshan, in Afghanistan.

BLUE SPINEL

This blue, zinc-rich variety of spinel is called gahnospinel, after the Swedish chemist J. G. Gahn.



BRITISH
IMPERIAL
STATE
CROWN



Black Prince's Ruby

TOPAZ

THE NAME "TOPAZ" is thought to come from the Sanskrit *tapas*, meaning "fire." The stone occurs naturally in a range of different colors and is also heat-treated to produce the more popular hues. Pink topaz, for example, is usually an irradiated form of the more common yellow.



STEP CUT

OCTAGONAL STEP CUT
Although blue topaz does occur naturally, it can also be created by heat-treating a colorless variety.

NECKLACE

The gemstones in this antique necklace are foil-backed to enhance their color.



Brilliant



Cushion



Step



Mixed



Pendeloque

Foil-backed
gems

The Brazilian
Princess weighs over
21,000 carats or
8.8 lb (4 kg)



PRICELESS!
The
Brazilian

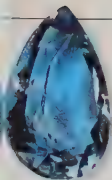
Princess was

once the largest gem ever
faceted. It is now on display at
the Smithsonian Institution,
Washington, D.C.



VICTORIAN PENDANT

Pink topaz, peridot, and diamonds sparkle from this Victorian pendant, dating from about 1880.



PENDELOQUE CUT

It is possible to see tear-shaped inclusions within this cut crystal. They are characteristic of

topaz and usually contain bubbles of gas or liquid.

Pink topaz

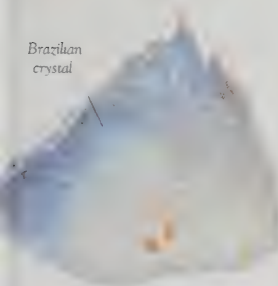
Diamonds



BROOCH

A large mixed-cut topaz forms the heart of this early-19th-century brooch, framed by 18 cushion-cut diamonds. The outer edge has four more topazes set within diamond foliage.

Brazilian crystal



CRYSTAL

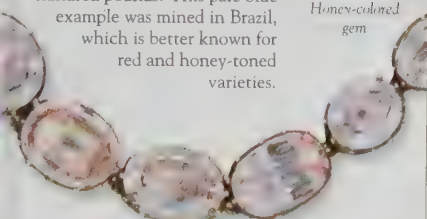
Topaz crystals can be up to 3 ft (1 m) long and weigh several hundred pounds! This pale blue example was mined in Brazil, which is better known for red and honey-toned varieties.

OVAL MIXED CUT

Color is more important than size in determining the value of topaz. Today, pink, blue, and honey-colored stones are the most sought after.



Honey-colored gem



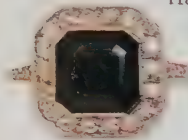
TOPAZ NECKLACE

MYTH AND MAGIC

- In 1255, St. Hildegard offered a simple remedy for failing eyesight: steep a topaz in wine for three days and then lightly rub it over the eyes.
- Worn around the neck, topaz was thought to cure madness.

EMERALD

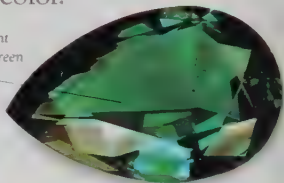
THE BEAUTIFUL GREEN SHADES of the emerald derive from the presence of chromium and vanadium. Only the finest quality gemstones are transparent and flawless; most have tiny fractures or mineral inclusions known as a "jardin," from the French for garden. It is common practice to oil emeralds to disguise these flaws and enhance the color.



ART DECO RING

A square cut emphasizes the richness of the color by leading the eye into the stone rather than deflecting attention away from it.

Excellent emerald-green color



Emerald band emphasizes structure of insect



GRASSHOPPER BROOCH

Lush green emeralds are symbolic of the freshness of nature, and the choice of a grasshopper for this emerald-studded brooch adds to that symbolism.

SYNTHETIC PENDELOQUE

In the 1930s, American scientist Carroll Chatham greatly improved the process for producing synthetic emeralds. He brewed emerald seed crystals at extreme temperatures for up to a year.

Insects were popular motifs in Victorian jewelry



Pendeloque



Step



Step

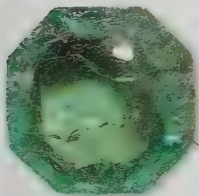


Cabochon

ANTIQUE CABOCHON EARRINGS

These Art Deco earrings boast large hanging emeralds. Inclusions – marks either on or within the surface of the stone – are clearly visible, and the carving draws the eye around the surface of the gem rather than into it.

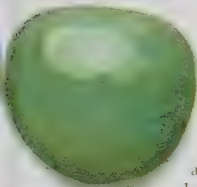
Polished oval cabochons are framed in black enamel



Inclusions provide keys to the gem's origins

OCTAGONAL CABOCHON

Emeralds almost always have fissures or inclusions. These may be embedded crystals of other materials, growth lines, or any of a whole range of microscopic occurrences. They tell the story of the gem's origin millions of years ago.



POLISHED PEBBLE

Not all emeralds have to be pried out of rocks. Some find their way into river gravels, where the action of the water tumbles and smooths them so that they resemble shiny pebbles.

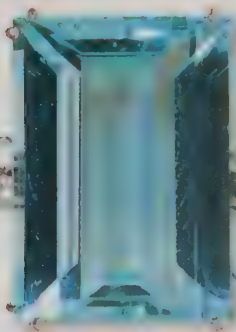


This gem is larger and lighter in color than the other one

MYTH AND MAGIC

- Hundreds of years ago, emeralds were thought to possess healing powers, particularly for restoring eyesight.
- During the Renaissance, emeralds were exchanged among the aristocracy as symbols – and tests – of friendship; the stone would stay intact only if the friendship lasted.

AQUAMARINE



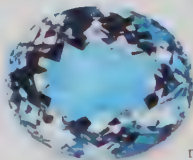
PRECIOUS RING

The stone in this early-20th-century ring is step cut to reveal its flawless internal structure. It weighs nearly 21 carats and is worth many thousands of dollars.

MYTH AND MAGIC

- In medieval times, this stone was thought to reawaken the love of married couples. It was also believed to render soldiers invincible.
- Aquamarine is known as the sailor's gem, ensuring safe passage across stormy seas.

THE SEAWATER COLOR of aquamarine has given this gemstone its name. In the 19th century, sea-green varieties were the most popular, but blues are more valued today. There are deposits on most continents, although the best quality aquamarines come from Brazil.

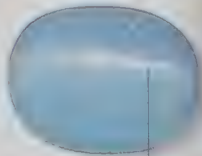


BRILLIANT CUT

Depending on the angle at which an aquamarine is viewed, it may appear blue, green, or colorless. This so-called pleochroic effect is enhanced by many small facets.

CABOCHON

The combination of a cabochon cut and growth lines within the crystal structure creates this cat's-eye effect. Six-rayed stars are also sometimes visible.



Fibrous habit contributes to cat's-eye effect



Brilliant



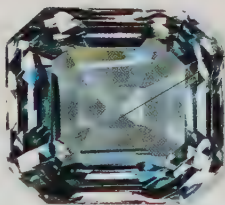
Step



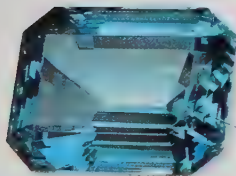
Cabochon

OCTAGONAL STEP CUT

Heat-treatment may enhance or alter the color of a gemstone and is considered perfectly acceptable. With aquamarine, it tends to change the hue from green to blue. This untreated stone has a distinctive greenish tinge.



Untreated stone has greenish hue



The layers of facets are clearly visible

UNTREATED, SKY-BLUE STONE

Large crystals of aquamarine are relatively common. In 1910, one was found in Brazil weighing 243 lb (110.5 kg), twice the weight of an average woman!



Brilliant-cut outer stones

CARTIER BROOCH

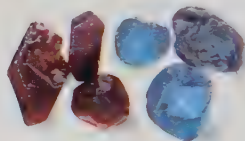
Designed by the renowned French jeweler Cartier, this Art Deco aquamarine and diamond brooch dates from about 1930. The two central stones are step cut.

Diamonds set off the pale blue aquamarines

Unusual, pendeloque-cut drop earrings

ZIRCON

IN THEIR PUREST FORM, zircons are colorless, but more commonly they are golden brown. The name "zircon" is thought to come from the Persian *zargun*, meaning "golden." Although they occur in a range of colors, many zircons are heat-treated to produce the popular blue or colorless varieties.



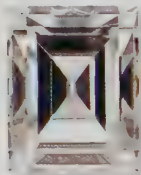
Bright cut enhances color

Brown zircon can turn blue when heated

ZIRCON PEBBLES

Gem-quality crystals are usually found as brown pebbles in alluvial deposits in places such as Sri Lanka and Myanmar (Burma). Those on the right have been heat-treated.

HEAT-TREATED ZIRCON



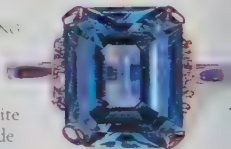
BAGUETTE CUT
This colorless stone started its life as a reddish brown zircon crystal.



GOLDEN BROWN
These earrings display the distinctive golden tones of zircons. The brilliant cut adds to their natural fire.

BLUE ZIRCON RING

This step-cut zircon is set in a four-claw mount with white gold. It was made in the late 1930s.



Brilliant



Cushion



Baguette



Mixed



COLORLESS ZIRCON RING
Clear zircons are frequently

old, intentionally or mistakenly, as diamonds. Zircons display a fire similar to that of diamonds, but are brittle and susceptible to damage, particularly around the edges of the stone.

Zircons cut as loose diamonds

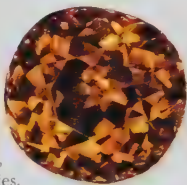


diamond-style facet setting

BROOCH
The zircons in this floral brooch are naturally colorless. The danger of using heat-treated stones is that under certain conditions they can revert to their original hue.

CUSHION BRILLIANT CUT

In Roman times, golden stones were the most popular and prized. The impurities in zircons can also produce green, blue, red, and yellow varieties.



GREEN ZIRCON NECKLACE
In this early-20th-century necklace, 36 step-cut stones are set in silver-gilt mounts to protect them and heighten their color and shine.

Step-cut zircons

Silver-gilt mounts

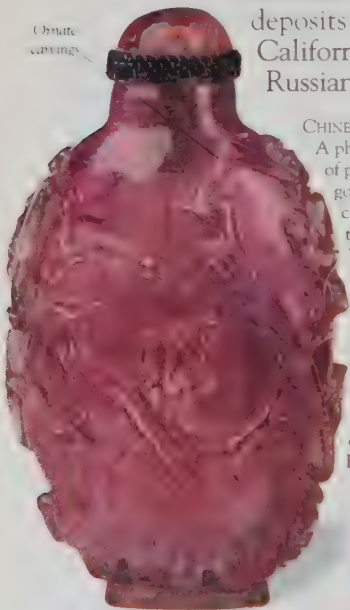
MYTH AND MAGIC

- Zircons that lost their luster were once thought to be a sign of danger.
- All zircons were deemed magical. In the 14th century, they were popularly worn to safeguard against the Black Death.

TOURMALINE

USUALLY OCCURRING as long, three-sided prisms, tourmalines come in a wide array of colors and an equally large range of varieties. For example, rubellite is red-toned, indicolite is dark blue, and achroite is colorless. Important tourmaline deposits are found in Brazil, California, and the Russian Federation.

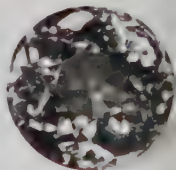
Ornate
carvings



CHINESE BOTTLE

A pheasant, symbol of prosperity and good fortune, is carved into the tourmaline.

This ornate bottle was designed to hold snuff.



ACHROITE

These rare tourmalines are named after the Greek word *achroos*, meaning "without color."

STEP-CUT RUBELLITE

In 1777, King Gustavus III of Sweden presented a deep red tourmaline to the Russian empress Catherine the Great, believing it to be a priceless ruby.



Cushion



Cameo



Brilliant



Step

MUSEUM PIECES

These earrings are copies of an early-19th-century design. The originals would probably have been made with emeralds. Green tourmaline is fairly common and is known as verdelite.

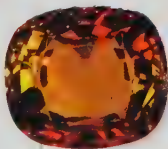


WATERMELON TOURMALINE

Many tourmaline crystals are multicolored. The watermelon variety is rarely used in jewelry.

DRAVITE

Dark brown tourmalines are rich in magnesium. They can be lightened by heat-treatment.



Cushion mixed-cut dravite

SCHORL

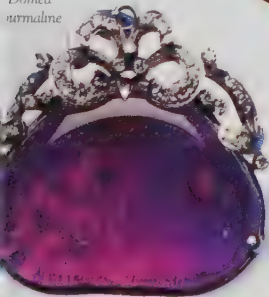
Black tourmalines are very common. They used to be popular for mourning jewelry during Victorian times.



Schorl is rich in iron.

SCHORL CRYSTAL

Domed tourmaline



PURPLE PENDANT

Held by a diamond-studded "ribbon," this domed purple tourmaline is exceptionally large, measuring 37 mm across.

MYTH AND MAGIC

- In the 18th century, a Dutch scientist claimed that a tourmaline wrapped in silk and placed against the cheek of a feverish child would induce sleep.

GARNET

A NUMBER OF GEMSTONES sharing a similar cubic crystal structure and chemical composition make up the garnet family. The color of these varies greatly, although the name “garnet”

comes from the Latin for pomegranate, which has bright red, garnetlike seeds.

VICTORIAN EARRINGS

The gold design on these drop earrings represents the arms and neck of an amphora (a Greek or Roman storage vessel).

Unusual rounded pendants

Oval and pear-shaped stones

MYTH AND MAGIC

- In medieval times, garnets were thought to cure depression, protect against bad dreams, and relieve diseases of the liver and hemorrhages.
- According to legend, Noah used a finely cut, glowing garnet to illuminate the ark

PYROPE

Of the red garnets, pyrope and almandine are the two most popular for jewelry. The blood-red color of the pyrope is due to its iron and chromium content.



Brilliant



Step



Cabochon



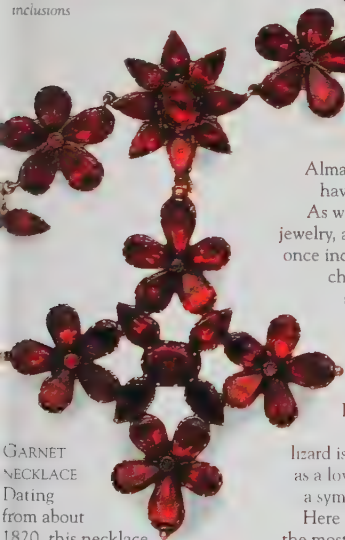
Mixed



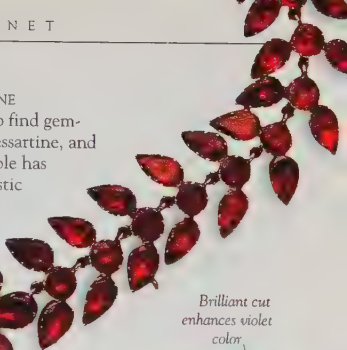
SPESSARTINE

It is rare to find gem-quality spessartine, and this example has characteristic inclusions.

Liquid inclusions



GARNET NECKLACE
 Dating from about 1820, this necklace has a flower motif with rosette clusters and decorative leaves set in gold.



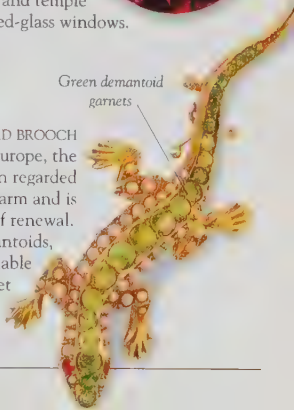
Brilliant cut enhances violet color



ALMANDINE

Almandine tends to have a violet tint. As well as its use in jewelry, almandine was once incorporated into church and temple stained-glass windows.

Green demantoid garnets



LIZARD BROOCH

In Europe, the lizard is often regarded as a love charm and is a symbol of renewal. Here demantoids, the most valuable of the garnet family, form the body.

QUARTZ

ROCK CRYSTAL, ROSE QUARTZ, and citrine all belong to the quartz family. Rock crystal is the purest of these; its name derives from *krystallos*, the Greek word for ice, as the stone was originally thought to be a type of ice created by the gods. Rose quartz is rose-tinted, caused by traces of titanium; citrine is a golden version of quartz and is colored by its iron content.

Faceted rock crystal

CRYSTAL BEADS
Rock crystal beads come in a variety of shapes and finishes. They may be carved, frosted, or, as here, faceted and highly polished.

CHINESE CRYSTAL
This crystal snuff bottle dates from about 1800. The design incorporates a dragon carved in relief on each side. In China, dragons represent the highest spiritual power.

FLOWER BROOCH
The carving in this piece is typical of work produced in Germany in the 1920s and 1930s. Rock crystal has been carved into a flower head and then frosted, with a diamond in the center.

Gold leaf

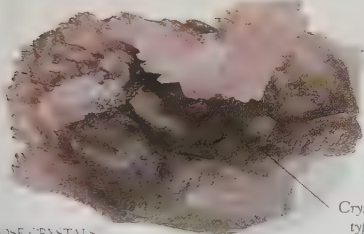
CRYSTAL BROOCH

CRYSTAL BOTTLE

Bead

Cameo

Brilliant



Crystals are typically cloudy

ROSE CRYSTALS

Pink or peach-colored quartz is known as rose quartz. It tends to be cloudy, and certain varieties produce a star effect when cut as a cabochon. In ancient Rome, the stone was popular for making seals.

MYTH AND MAGIC

- Throughout the world, crystal balls have been used to see into the future.
- Citrine is reputed to be an unlucky stone.
- Crystal healing is an ancient art. It works on the principle that certain crystals give off powerful, much-needed energy for the body.



ROSE QUARTZ

ROSE-TINTED EARRINGS

Pale pink flower heads are framed by silver leaves in these contemporary British earrings. Rose quartz tends to be brittle, so larger carvings may show cracks. It is also prone to fading over time.

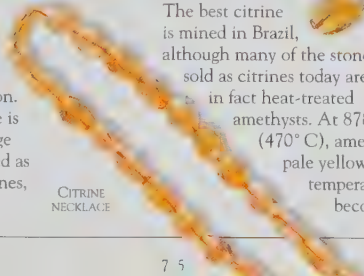
Carved crystal



Faceted beads

GOLDEN BEADS

Citrine's name derives from its color - *citron* being the French for lemon. Gem-quality citrine is extremely rare. Large pieces may be carved as pendants; smaller ones, made into beads.



CITRINE NECKLACE

CITRINE DROPS

The best citrine is mined in Brazil, although many of the stones sold as citrines today are in fact heat-treated amethysts. At 878° F

(470° C), amethysts produce pale yellow stones. At higher temperatures, the yellow becomes darker.

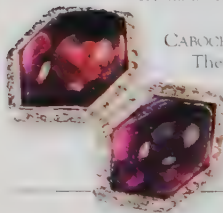
AMETHYST

OCCURRING IN shades of purple, lilac, and mauve, this is the most valuable of the quartz group. Some amethyst is heat-treated to produce the yellow variety of quartz known as citrine. Amethyst is traditionally thought to have strong talismanic properties; amethyst crystals are still used in forms of natural healing.

AMETHYST
LEAVES
BRANCH

GRAPES
In myth, Bacchus, Roman god of wine, caused Amethyst to be turned into rock crystal. In horror at what he had done, he threw down his goblet of wine, coloring the crystal a beautiful violet

AMETHYST CRYSTAL AND ROCK CRYSTAL
Here amethyst crystals grow from a bed of rock crystal. Structurally, amethyst is simply a colored – containing impurities – form of rock crystal. The color is often darker at the end of the crystal.



CABOCHON CUFF LINK

These cabochons are notable for their hexagonal cut; most cabochons are either round or oval.



Characteristic pyramid formation



Baguette



Bead



Mixed



Pale-colored
amethyst

DROP EARRINGS

These elegant earrings consist of pendeloque-cut amethysts. Usually, deep-colored stones are faceted to accentuate their color, while paler or poorer quality ones are cut into cabochons.

MIXED-CUT RING

Amethysts owe their color to the presence of iron, and deep tones tend to be the most favored. Rich sources of good-quality crystals come from Russia's Ural Mountains, Brazil, and Uruguay.



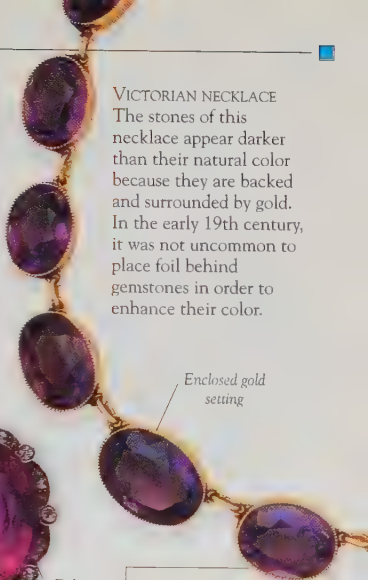
Five petals
carved from a
single stone

FLORAL SPRAY

Nine dark purple crystals have been carved into delicate petals, each flower being made of a single stone inlaid with a central diamond. The brooch is mounted in platinum and 18-carat gold and is signed by its American designer, William Ruser



Delicate
diamond
frame



VICTORIAN NECKLACE

The stones of this necklace appear darker than their natural color because they are backed and surrounded by gold. In the early 19th century, it was not uncommon to place foil behind gemstones in order to enhance their color.

Enclosed gold
setting

MYTH AND MAGIC

- Amethysts were thought to induce a sober mind; the name is derived from the Greek word *amethystos*, which means "against drunkenness."
- In traditional Chinese medicine, ground amethyst is prescribed for stomach pains and bad dreams.

CHALCEDONY

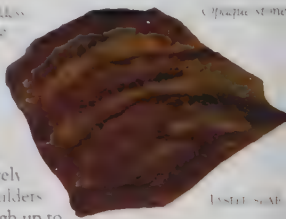
THE GROUP OF QUARTZES that includes agate, chrysoprase, carnelian, jasper, and bloodstone makes up the family of gemstones known as "chalcedony." They are linked by their microcrystalline structure and waxy or dull appearance.

Apple-green chrysoprase is the most valuable of these and has been mined since the 14th century.



Athena in sardonyx
set in 18k yellow gold

SARDONYX CAMEO RING
Layer stones such as sardonyx make ideal gems for cameos. Here the white has been carved away to reveal a helmeted Athena.



Chrysoprase stone

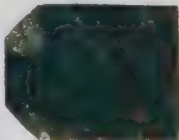
Jasper stone

JASPER

This stone is usually striped, spotted, or multi-colored – it is rarely all one color. Boulders of jasper can weigh up to several hundred pounds.

MYTH AND MAGIC

- In the Middle Ages, bloodstone was thought to hold drops of Christ's blood and to be all-powerful.
- In Renaissance times, sardonyx was worn by wives to bring about marital happiness.



Characteristic
red spots
and veins

BLOODSTONE

Polished slabs of bloodstone are often used decoratively as inlay or as cameos. The red spots in this stone are due to traces of iron oxides.

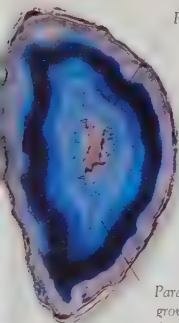


Cabochon

Bead

Cameo

Polished

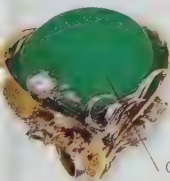


Poor absorption of blue stain

Parallel growth bands

AGATE BROOCH

Although agate comes in a range of colors, blue is not one of them. This slice has been stained and polished. The white bands and the rock crystal center have rejected the stain.



Characteristic apple green

CHRYSOPRASE RING

Here a chrysoprase cabochon is encircled by diamond "flowers." It is an appropriately lavish setting for the most valuable of the chalcedonies.



Polished cabochons appear darker

TIGER'S-EYE BEAD
The bands of color appear to move when this stone is rotated. The effect, known as chatoyancy, is most marked when tiger's eye is cut as a cabochon.

Markings resemble tiger stripes

TIGER'S-EYE BEAD

CARNELIAN NECKLACE

This stone is always a translucent, reddish brown. In antiquity, it was thought to have a calming effect on the blood and on anger.

Carved floral design

JADE

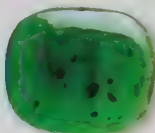
TWO DISTINCT MINERALS, jadeite and nephrite, are recognized as jade.

Nephrite is the more common and has been carved for thousands of years. Jadeite is slightly harder, often appears dimpled when polished, and comes in virtually every color.



CARVED JADEITE

This Chinese pomander once contained aromatic substances. It is suspended from a tourmaline bead and string of seed pearls.



JADEITE

Black inclusions can be seen throughout this polished jadeite pebble. It is translucent with a greasy luster.

Rich imperial green shade



Jadeite beads

MYTH AND MAGIC

- In China, children wore small jade amulets to prevent disease.
- Powdered and distilled in dew water, jade was believed to calm the mind.
- Its name comes from the Spanish *piedra de hijada*, loin stone, since jade was thought to cure hip problems.

IMPERIAL JADEITE

This unusual long string of beads is of the finest quality jadeite known as imperial jade, typified by its rich emerald-green hue.



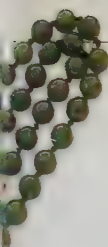
Bead



Cameo



Polished

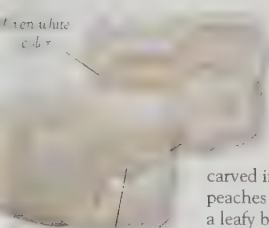


YELLOW JADE

Carved in the shape of a purse with drawstrings, this Chinese pomander is worked in fine, yellow-toned jadeite. Each side is decorated with an insect hovering over flowering sprigs.



Seven-character inscription



Even white color

Box cover depicts descending crane

WHITE JADE

The base of this intricate box is carved in the shape of two peaches joined together on a leafy branch. Its white color results from the absence of iron.

CHINESE CAMEL

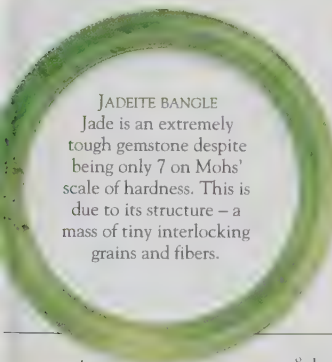
Here the artist used the shape of the stone for inspiration. With minimal carving, he transformed the nephrite into a resting camel.



WHITE NEPHRITE CAMEL

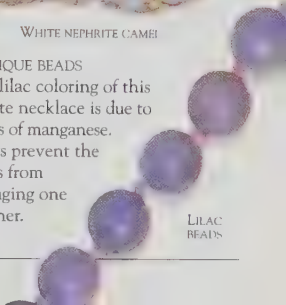
JADEITE BANGLE

Jade is an extremely tough gemstone despite being only 7 on Mohs' scale of hardness. This is due to its structure – a mass of tiny interlocking grains and fibers.



ANTIQUE BEADS

The lilac coloring of this jadeite necklace is due to traces of manganese. Knots prevent the beads from damaging one another.



LILAC BEADS

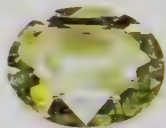
PERIDOT

THE MOST IMPORTANT deposits of peridot are on the so-called “serpent isle” – the volcanic island of Zebirget in the Red Sea. According to Greek legend vicious snakes lived on the island, guarding the precious stone and killing anyone who dared to approach it.



Step-cut drop

PERIDOTS AND DIAMONDS
Peridot's rich, oily green color depends on its iron content. The stone is often cut as a pendeloque, as on the left, to create a darker, more favored, hue.

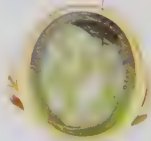


OVAL MIXED CUT
Peridot has strong double refraction, which means that you can often see a doubling of the back facets.

MYTH AND MAGIC

- The early Egyptians claimed that peridot glowed by night but was invisible by day.
- In the Middle Ages, peridot was believed to dispel the darkness and terrors of the night.
- King Edward VII of England used to wear a peridot for good luck.

Intaglio design – carved inward.



CARVED SIGNET RING
This ring is probably of Roman origin and would have been commissioned by the man who is featured. He would have used it to seal his letters.



Step



Cabochon



Table



Cameo



Pendeloque

HARDNESS 6.5

STRINGS OF BEADS

Peridot is the name given to gem-quality specimens of the mineral olivine. Olivine derives its name from its characteristic olive-green color, although it can also be bottle green or yellowish green. This peridot necklace displays a variety of shades.

Varying shades of green

4-mm round beads

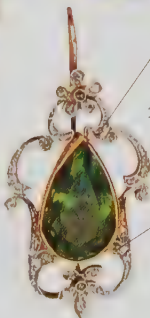
Diamonds and a central stone



TOP EARRINGS
Peridots are usually set in yellow gold to complement their color. Here a combination of white and yellow gold has been used, with white gold for the diamonds. The earrings form part of a set with the pendant opposite (top left).

White gold setting for diamonds; yellow gold for peridot

Foliate design



LINKED BRACELET
This 20th-century bracelet is made of seven oval, step-cut stones. Peridot was once known as "evening emerald," but with a hardness of 6.5, is much less durable than its more illustrious cousin.

Elongated gold beads form the links



MOONSTONE

REMINISCENT OF the silvery moon, this stone derives its name from its blue-white sheen. Indeed, it was once thought that the gem's luster waxed and waned just like the moon itself, and moonstones have always been used in jewelry by moon worshipers. In reality, the stone's distinctive sheen comes from its structure: thin albite layers create an attractive blue; thicker layers, a more milky opalescence.

The stones have a bluish sheen.

Over four dozen oval cabochons have been used

NECKLACE
Moonstones are generally set in silver, which brings out their characteristic bluish-silvery sheen.



CUSHION BRILLIANT CUT
The relative flatness of the cushion cut refracts the light in such a way as to enhance the opalescence of the stone.



Cushion



Cabochon



Cameo

HARDNESS 6-6.5

EASTERN EARRINGS

These earrings from Afghanistan show the moonstone's range of hues. The hanging drops are considerably lighter than the four upper ones.



The single drops are "moon-colored"



HORN COMB

This Art Nouveau hair ornament is a combination of enameled copper and moonstones on a carved horn base. Designs from nature were typical of the period (1890s).

Carved horn "tree trunks"

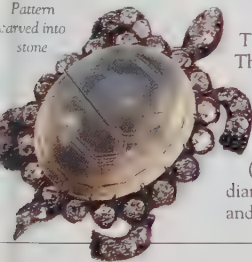
CUFF LINKS

Large cabochons form the sides of these cuff links, designed by Carl Fabergé ca. 1910. The moonstones' pink sheen is due to the setting.



Gold setting lends a golden, pinkish tinge

Pattern carved into stone



TURTLE BROOCH

The distinctive markings of the turtle's upper shell are carved into the moonstone in this unusual piece (ca. 1900). The diamonds set in the legs and head are cushion cut.

MYTH AND MAGIC

- In India, the moonstone is believed to bring good luck and is considered sacred.
- The Romans thought that the wearers of moonstones would receive wisdom, wealth, and success in battle.

OPAL

UNLIKE OTHER GEMSTONES, the opal is non-crystalline and is formed from a hardened silica gel. It is known for its rainbow iridescence. The name “opal” is thought to be derived from the Sanskrit *upala*, meaning “precious stone.” The opals used in ancient times came from the former Czechoslovakia, but today most are mined in Australia.



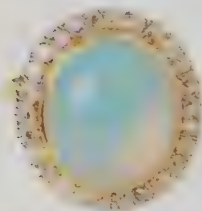
Large black opal

SAMURAI PENDANT

Precious opal with a dark background, as in this unusual Art Deco pendant, is known as black opal. Here the “face” is dark, matching the stone below, while that on the other side is lighter.

EDWARDIAN RING

Here the opal is cut as a cabochon and reveals a milky-blue iridescence. The ring dates from the early 1900s.

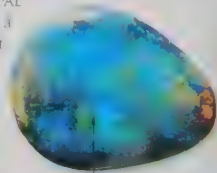


MYTH AND MAGIC

- In Europe, the opal is regarded as unlucky. Its reputation dates from the 14th century when many thought it had caused the plague known as the Black Death.
- In Asia, the stone is viewed more favorably. It is a symbol of hope.

UNMOUNTED BLACK OPAL

Despite displaying a predominance of light colors, this uncut stone is of precious black opal. It weighs more than 9 carats.



Silica structure disperses color



Cameo



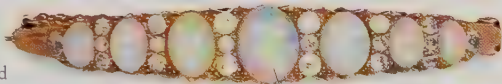
Step



Cabochon

BROOCH

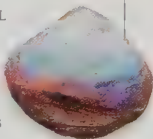
Milky opal cabochons are interspersed with diamonds in this classically elegant bar pin. The opals show flashes of pale pinks, blues, and greens.



Opal cabochons ranged in decreasing size

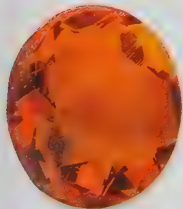
OPALIZED FOSSIL

Opal is found in fossilized shell, wood, and bone. In this shell, the play of color is caused by the diffraction of light off its closely packed silica spheres.



Fossilized shell

Diamonds frame the large opals



WINGS OF A BUTTERFLY
Victorian designs paid homage to nature. Moths, bumblebees, and dragonflies were especially popular. Here four large opals form the delicate wings of a butterfly.



Shimmering bands of color

RED OPAL
Named for their deep orange color, most fire opals are translucent or transparent. They are extremely fragile and suffer from changes in temperature, humidity, and even light intensity.

TURQUOISE

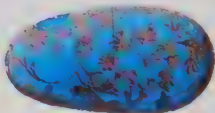
FIRST MINED OVER 6,000 years ago, turquoise has a rich and colorful history. To the Aztecs, it was the “stone of the gods,” used extensively in forms of art and worship; in medieval times, it was deemed a powerful talisman. Today most commercial turquoise comes from China and the southwestern United States.

CHILD'S NECKLACE

Turquoise forms in solid grapelike masses and as nodules, often containing dark veins, as can be seen here. White enameled links join the stones in this unusual Italian piece.



Floral motif engraved in gold



PERSIAN BLUE

Inlaid with gold leaf, this good-luck charm is of the finest sky-blue turquoise, which is mined in Iran. Its distinctive color comes from the presence of copper. Traces of iron cause a greenish tint.



Bead



Cabochon



Cameo

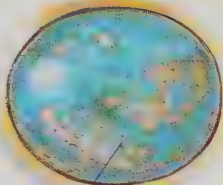
MYTH AND MAGIC

- Turquoise has always been considered lucky, capable of safeguarding and bringing happiness.
- According to a 15th-century legend, the stone loses its color when its owner is unwell or in danger and regains its brilliance when the illness or danger has passed.



RABBIT EARRINGS

In China, turquoise beads are often carved into a variety of animal shapes, as in these contemporary rabbit earrings. Here the silver "feathers" lend them a distinctly American Indian flavor.



Vast turquoise stone set in gold

MAMMOTH RING

The color of turquoise is affected by heat, as well as by oils, cosmetics, and perspiration, and is liable to go from blue to a dull green. In order to minimize the risk of damage, it is best to remove turquoise rings before washing hands.

Hundreds of cabochons form the body

SERPENT NECKLACE

The serpent was a favorite motif for necklaces in Victorian times. When coiled around the base of the throat in a complete circle, it symbolized eternal love.

LIZARD

Turquoise cabochons surround a spine of diamonds in this 19th-century brooch. The eyes are set with brilliant-cut rubies to make them stand out.



Lizard with 45 small turquoises

LAPIS LAZULI

PRIZED FOR ITS INTENSE BLUE color, lapis lazuli has been used in jewelry, carvings, and amulets for thousands of years. Its name derives from medieval Latin and means "blue stone." The Egyptians regarded lapis as a heavenly stone and often used it on the statues of their gods and in burial masks as protection for the next life.

LUCKY HAND

This pendant is doubly powerful – the lapis offers protection against evil, and the clenched fist is a good-luck charm.

ROCK

Lapis is made up of several minerals, but its main ingredient is lazurite. The best quality lapis has a high proportion of lazurite.

Dragon-head
hook

CARVED LAPIS

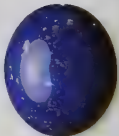
This dragon garment hook is carved in high relief. The many tiny crystals in lapis make it an ideal material for carving.



White
calcite

IMITATION LAPIS

The French manufacturer Pierre Gilson created an artificial lapis using lazurite. The imitation stone has a composition similar to that of natural lapis, but is slightly softer.



Cabochon



Cameo



Polished

HARDNESS 5–5.5

TIFFANY NECKLACE

The American jeweler Tiffany designed this fine lapis and jade necklace. The beads are carved, and every alternate bead is cupped in gold and set in emerald. The lapis is of a rich, dark blue variety.



Sulfur gives rich blue color

Thickly cut slices of lapis

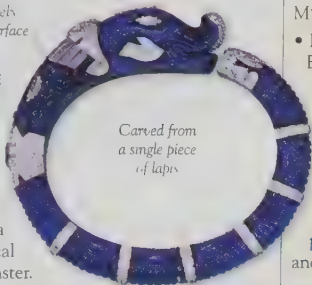
Single bead of blue jade

CONTEMPORARY EARRINGS
Lapis is hard enough to take a good polish. These stones come from the United States, which is known for its dark, high-quality lapis. Afghanistan is another important source.



Intricately carved surface

CARTIER BANGLE
Dating from the 1950s, this carved bangle is the work of the Parisian design house Cartier. The piece is in the form of a chimera – a mythical fire-breathing monster.



Carved from a single piece of lapis

MYTH AND MAGIC

- Both the ancient Egyptians and Babylonians believed that lapis lazuli could cure melancholy.
- Today, lapis is used in Chinese medicine to treat phlegm, congestion, and spasms.

AZURITE AND MALACHITE

THESE TWO STONES have a similar chemistry and history. Both are copper-based, both have been crushed and used as pigments, and both have been worked for thousands of years.

The ancient Egyptians wore malachite as jewelry and used azurite for carving ornaments.



*Azurite
donut*

AZURITE PENDANT

Azurite derives its name from its azure-blue color. It is typically used for ornamental objects and simple jewelry, such as this circular pendant.

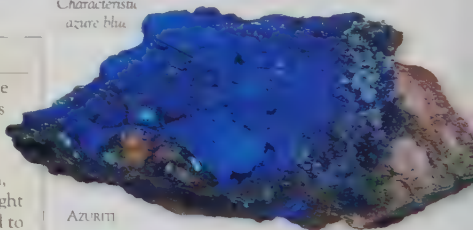


Malachite Azurite

POLISHED AZURITE

Azurite often intergrows with malachite, creating tabulous color effects. Here, bands of green malachite can be seen with the distinctive bright blue azurite crystals.

*Characteristics
azure blue*



AZURITE



Cameo



Cabochon

ROCK OF AZURITE

Azurite occurs as short crystals or in spherical lumps as here. Copper gives the stone its distinctive color.

MYTH AND MAGIC

- During the Middle Ages, malachite was used as a cure for vomiting.
- Worn by children, malachite was thought to protect them and to keep evil spirits at bay.
- The ancient Egyptians used malachite amulets to ward off evil.

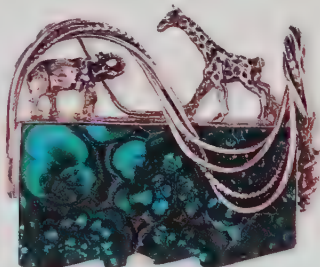
NECKLACE AND EARRINGS
 Malachite is almost always set in silver, as the two colors work well together. Here, polished cabochons are set within hexagonal silver frames. The stones are similar, but irregular.



Silver setting

CLIP EARRINGS

WILD ANIMAL BROOCH
 This piece, with its beautifully modeled elephant and giraffe, takes jewelry into the realm of wearable art. The base, a slab of polished malachite, forms a perfect ground for the animals.



MALACHITE BROOCH

Circular bands of color

Alternating light and dark greens



POLISHED SLAB

MALACHITE SLAB
 The round and kidney-shaped formations are characteristic of this stone. Large pieces of a single color are rare.

Polished "pebbles"



MALACHITE NECKLACE



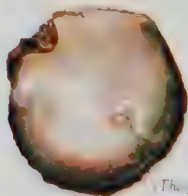
ORGANIC GEMSTONES



- PEARL 96
- CORAL 98
- JET 100
- IVORY 102
- AMBER 104
- SHELL 106

PEARL

ONCE VIEWED BY ARABS as tears of the gods, pearls are created by certain shellfish, mainly oysters and mussels. They form when an irritant such as a grain of sand enters the shell. The mollusk then secretes layer upon layer of calcium carbonate, known as nacre, around the foreign body. It is this innate defense mechanism that creates the bead of pearl.



NATURAL PEARL IN OYSTER SHELL
The term "natural pearl" refers to a pearl that has formed as an accident of nature and not by human intervention. Such pearls are rare and valuable.

The pearl is still attached to the shell lining

SEED-PEARL BRACELET

Pearls vary in size from a millimeter in diameter to as large as a pigeon's egg! Their weight is given in grains, 1 grain = 0.002 oz (0.05 g). Seed pearls weigh less than 0.25 gram.

CULTURED PEARLS

It is virtually impossible to find natural pearls that match. This string is of cultured pearls, produced artificially by inserting beads of clam shell into oysters.

Perfect size, form and color

Strings of cultured seed pearls



Bead



So-called black pearls are gun-metal colored

HAPE EARRINGS
The multicolored pearls in these early-17th-century earrings are probably produced by Tahitian Black Lip oysters. These oysters secrete a dark pigment directly into the pearly strata.

Cultured pearls take two to four years to form



Classic cream-white color

Triton, son of Poseidon, Greek god of the seas

Small baroque pearl



CANNING JEWEL
Irregularly shaped pearls are known as baroque pearls. The 16th-century Triton has four, with the

largest one forming the body. It is fitting that a sea god is made up of pearls – the “fruits” of the sea.

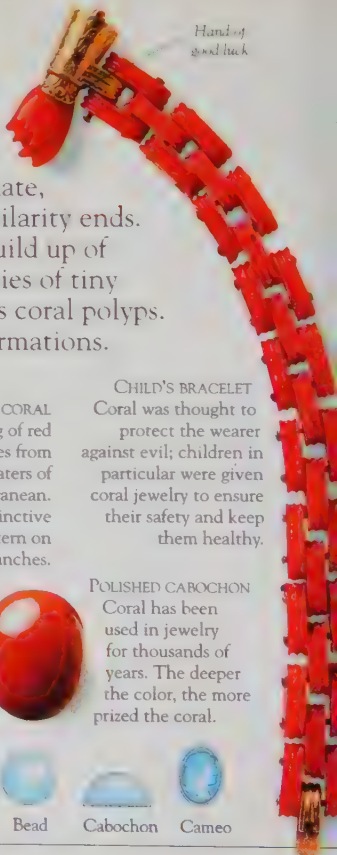
Natural pearls take up to seven years to form

MYTH AND MAGIC

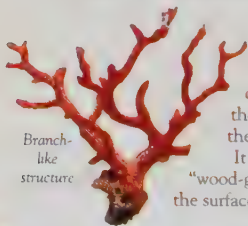
- According to the Roman writer Pliny, Cleopatra dissolved a priceless pearl earring in her wine and drank it as a testament of love for Antony.
- Pearls have long been used medicinally. They were thought to cure everything from fevers to stomach ulcers.

CORAL

MOST CORAL – red, pink, white, and blue varieties – consists of a substance similar to that of pearls, calcium carbonate, but that is where the similarity ends. Coral is formed by the build up of skeletal remains of colonies of tiny marine animals known as coral polyps. It grows in branchlike formations.



Hand of
good luck



Branch-
like
structure

RED CORAL

This sprig of red coral comes from the warm waters of the Mediterranean. It has a distinctive "wood-grain" pattern on the surface of its branches.

CHILD'S BRACELET
Coral was thought to protect the wearer against evil; children in particular were given coral jewelry to ensure their safety and keep them healthy.

CORAL FRAGMENT NECKLACE

Large pieces of coral are relatively rare and so are saved for decorative objects or cameos. Branches too small for beads may be fashioned into "sprig" strings.



POLISHED CABOCHON

Coral has been used in jewelry for thousands of years. The deeper the color, the more prized the coral.



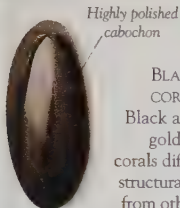
Bead



Cabochon



Cameo

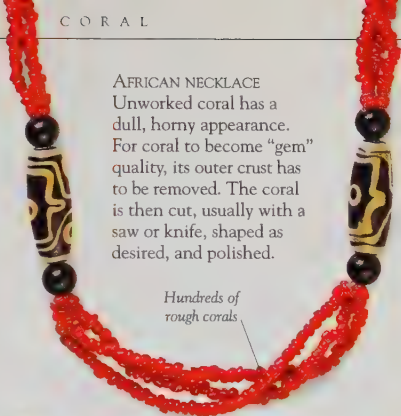


Highly polished
cabochon

BLACK CORAL
Black and golden corals differ structurally from other varieties. They are composed of an organic, hornlike substance called conchiolin.

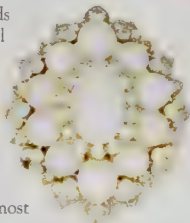
AFRICAN NECKLACE

Unworked coral has a dull, horny appearance. For coral to become "gem" quality, its outer crust has to be removed. The coral is then cut, usually with a saw or knife, shaped as desired, and polished.



Hundreds of
rough corals

WHITE CORAL BROOCH
A large oval cabochon is framed by diamonds and ten white coral beads in this gold-mounted brooch. In the early 1900s, it was fashionable to 'marry' the humble coral with the world's rarest and most precious gemstone.

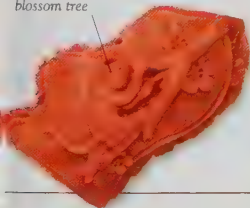


PALE PINK

Graduated cabochons of the palest pink are interspersed with diamonds in this ring, which dates from about 1900. It was probably given as a 35th-wedding-anniversary present.



Monkey on a
blossom tree



MONKEY CARVING
The relative softness of coral means that it is quite easy to carve. This piece is of Eastern origin; much pink coral is taken from the waters around Japan.

MYTH AND MAGIC

- In the 16th century, people thought that a sprig of red or white coral could calm a raging tempest.
- Coral allegedly cured madness and protected against enchantments.

JET

A PRODUCT OF FOSSILIZED WOOD, jet is similar to coal, only harder and more durable. Jet forms when the remains of wood are immersed in stagnant water for hundreds of years and then buried and compacted under intense pressure. In the 19th century, jet became popular for mourning jewelry, because of its color.

Glass, onyx, and a type of rubber known as vulcanite are used as imitation jet.

SYMBOLIC BROOCH

The dove symbolizes peace and salvation. Here it is coupled with a heart, an emblem of love, in this finely carved remembrance brooch.

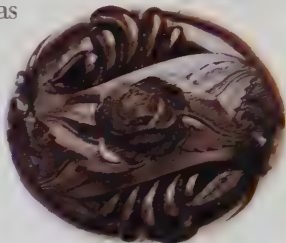


Carved jet

EMBLEM OF
PEACE

HARDNESS 2.5

Whitby jet



BLACK ROSE

Jet from Whitby, Yorkshire, is considered the best quality, because it takes such a good polish. This piece dates from the late 19th century and features a rose. It would have been worn by a woman in mourning.

JET BRACELET
Faceted, flat, oval plates of jet are strung together in this polished 19th century bangle.



Polished



Bead



Cameo



ACORNS
Queen Victoria
of England

popularized jet

by wearing it after the death of her husband, Prince Albert. Death was viewed as a passage into another life, and this acorn (which forms part of a necklace) reflects that sense of hope and renewal.



Trim of drilled jet beads

BEADED CLOTH
This delicate trim from a Victorian overskirt has beads of faceted jet sewn into the fabric, as was the fashion of the day. The beads create a gem-studded form of black lace, the scallop design edged by rows of black sequins.



Jet hair comb

HAIR COMB

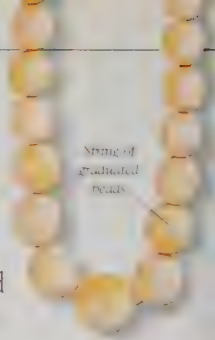
At its height of fashion, Whitby jet was exported all over Europe. Combs were popular in Spain, where they were used to hold up a lady's black mantilla – a lace veil worn in church.

MYTH AND MAGIC:

- According to the Roman writer Pliny, jet mixed with the marrow of a stag could heal a serpent's bite.
- Powdered and mixed with beeswax, jet was used to shrink tumors, and mixed with wine, to alleviate toothache.
- In China, jet is a symbol of winter.

IVORY

THE TERM "IVORY" is generally associated with elephant tusks, although it also includes the teeth or tusks of such mammals as the hippopotamus, boar, sea lion, and sperm whale. People have collected ivory for thousands of years, prizing it for its rich creamy color and fine texture. It has always been a popular material for jewelry, ornaments, and amulets.

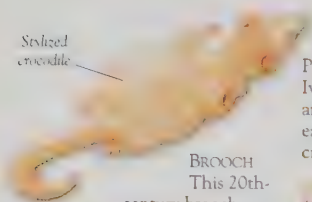


String of graduated beads

AFRICAN NECKLACE

Polished elephant ivory, such as the beads on this necklace, is characterized by a distinct cross-hatch pattern in the grain called engine turning.

Stylized crocodile



BROOCH

This 20th-century brooch was carved on the shores of Lake Malawi, an area known for crocodiles. As in many other parts of the world, Malawi has strict restrictions on the sale of ivory.

PATCHWORK BOX

Ivory is quite a soft material to work with and, because of its porous nature, can be dyed easily. Here slices of natural and stained ivory create a decorative surface for this small box.



INLAID BOX



Bead



Cameo



Polished

POLISHED SECTION OF ELEPHANT TOOTH

This ivory slice is a horizontal cross-section of an Indian elephant's molar tooth. The white bands are enamel and the yellowish bands are dentine. The dark lines are cracks that occurred when the tooth dried out after the elephant died.

Crack

MOLAR TOOTH



MYTH AND MAGIC

- Acquiring an elephant's tusks was once thought to confer superhuman powers – to conquer such a mighty opponent was to be invincible.
- A symbol of purity, ivory was much used for making crucifixes.



*Ivory face with
ruby eyes*

DEVIL HAT PIN

Dating from around 1840, this ivory hat pin is carved in the form of Lucifer's face, complete with

gold horns and piercing ruby eyes. Like the more common carved skull, it is a memento mori – a playful reminder of human mortality.

*Uniformly
carved beads*

CARVED BEADS

These carved beads have a distinctly organic feel, resembling a rare tropical fruit. The necklace is of African origin, although India, Myanmar (Burma), and Indonesia are also significant sources of elephant ivory.



*Insect and spider
trapped in resin*

AMBER

FORMED FROM THE fossilized resin of trees that lived millions of years ago, amber has been used for jewelry and religious objects since prehistoric times.

It was believed to have talismanic properties, and many ancient peoples buried amber objects and amulets with their dead to protect them in the afterlife. It is usually a golden orange color.

PENDANT

Plants and insects may become trapped in the sticky resin before it sets. In this extraordinary pendant from London's Natural History Museum, a spider and a cricket are visible.

*Rough pebble
found washed up
on beach*



BALTIC AMBER

Most commercial amber comes from the Baltic coasts of Poland and the former USSR, although other notable deposits are in Sicily, Myanmar (Burma), and the Dominican Republic. Amber tends to be found in soft sediments or in the sea. It is occasionally washed ashore after heavy storms.

GOLDEN BEADS

These honey-toned, antique beads are of an opaque variety and have aged well. Amber has a tendency to dry out and crack if left in the sun or worn in the heat of the day.



Bead



Cabochon



Cameo



Polished

HARDNESS 2.5

DANISH AMBER

This fossilized pebble is a mixture of clear and cloudy amber and was found along the Danish coast. Amber is not as dense as synthetic and plastic resins and will float in saltwater.

Cloudy,
opaque areas

DARK RED BEADS

The rich red tones of this necklace suggest that the amber originated in China; Baltic examples tend to be pale yellow or golden. More than 50 drilled, faceted, and polished beads have been used.

Chinese
amber

ELECTRIC CHARGE

This translucent bead has a resinous luster and hints of cracks. Amber is known for producing an electrical charge when rubbed. It is from the Greek name for amber, *elektron*, that the word "electricity" is derived.

GOLDEN GRAPES

Amber's relative softness makes it easy to carve, as can be seen in the glistening grapes that dangle from the overhanging leaf. This brooch is of Baltic origin.

MYTH AND MAGIC

- Sacred to the Greek sun god Apollo, amber was once thought to be congealed sunlight.
- Amber was also viewed as tears – for the Vikings, Freya's tears for Svipdag; and for the ancient Greeks, tears over the death of Phaeton.

DROP EARRINGS

These amber and gold earrings are of Italian design. The air bubbles and inclusions give amber its characteristic mottled appearance and are not seen as flaws. However, this opaqueness can be removed by boiling the fossil resin in oil.

SHELL

THESE OFFERINGS from the sea have been used as items of adornment for thousands of years. Conch shells, with their pink and white layers, have been fashioned into cameos since Roman times, and the use of mother-of-pearl, the iridescent lining of many shells, goes back still further. Tortoiseshell, the hard shell of the hawksbill turtle, has been made into countless boxes, bangles, and hair ornaments over the years.

TIGER COWRIE CAMEO

To create a cameo, layers of shell are carved away to reveal the different colors. It takes great skill to create a realistic image.

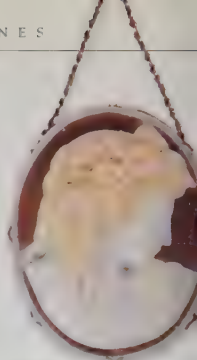


Mottled colors

HAIR COMB

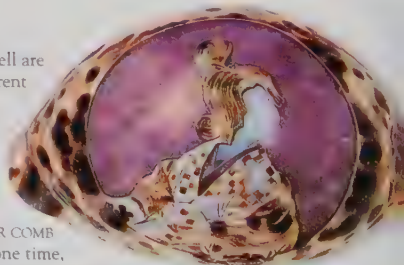
At one time, tortoiseshell was the most popular material for hair ornaments, such as this comb. Today, because of overhunting, most combs are made of plastic.

HARDNESS 2.5



CAMEO

This cameo dates from ca. 1900. It was common then for cameos to reflect classical scenes, paying homage to ancient empires.



TIGER COWRIE SHELL



Cabochon

Cameo

Polished

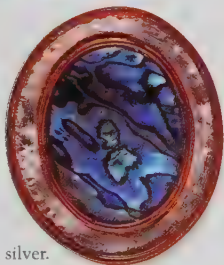


TREASURE BOX

Here, a silver lid and clasp have transformed this shell into a box. The shell is of the “turban” family and comes from the Indian Ocean; the green tones are not natural but the result of a dye.

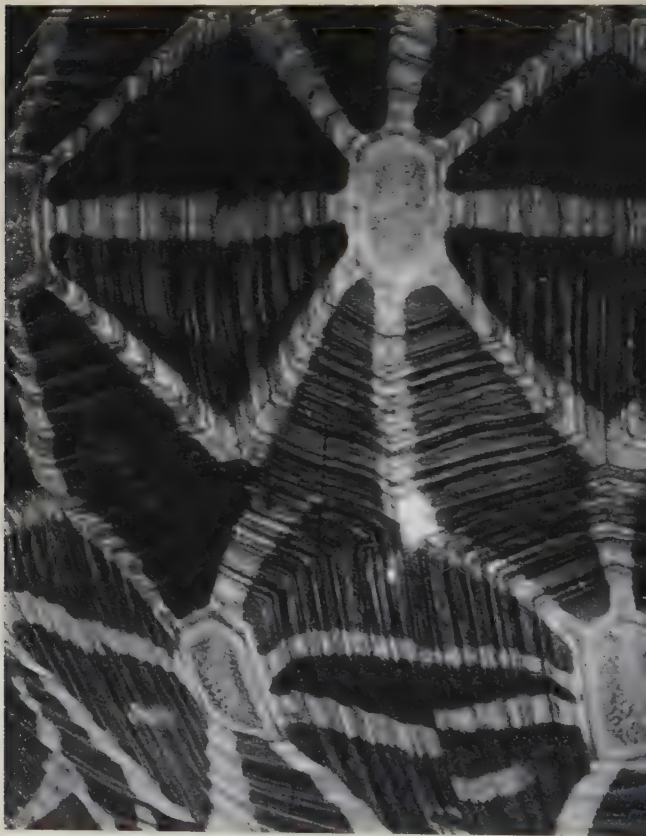


PAUA-SHELL BROOCH
Paua is a blue shell from the shores of New Zealand. It is part of the abalone family, but characteristically has far richer tones of blues, greens, and purples. Here a cabochon from the mother-of-pearl lining has been framed in copper and silver.



MYTH AND MAGIC

- In China, mother-of-pearl has been prescribed for over 1,000 years. It is used for heart palpitations, dizziness, and high blood pressure.
- Venus, goddess of love, is believed to have emerged from the sea in a giant scallop shell.



REFERENCE SECTION



LEGENDARY GEMS 110

GEM CARE 112

MAKING JEWELRY 114

TABLE OF PROPERTIES 118

LEGENDARY GEMS

IT IS NO WONDER that there are so many stories surrounding gemstones. They represent money and glamour, desired by all, but owned by few. Precious stones have been the cause of countless thefts, strange events, and even murders, some of which are recounted here.

THE BOLDNESS OF CAPTAIN BLOOD

During the reign of Charles II of England (1660–85), Blood, a former army officer, attempted to steal the crown jewels from the Tower of London. Disguised as a parson, he befriended the Master of the Jewel-House. Then one day he and his friends bludgeoned the 80-year-old warder with a mallet and seized the royal regalia. However, the burglary was interrupted by the arrival of the warder's son, who raised the alarm. The thieves headed for the wharf with their booty, dropping the scepter in their haste, but were overtaken, and the crown, globe, and scepter were returned to their rightful place.



MISTAKEN IDENTITY

In 1740 a gigantic diamond was found in Brazil, valued at millions of dollars. The stone became the prized property of the Braganza's, the Portuguese royal family, and then disappeared from view. It is believed to have been set in the Portuguese crown jewels. If this is the case, then the famous Braganza Diamond is in fact only a humble, albeit beautiful, aquamarine.



MODEL
OF THE
BRAGANZA

THE CAT'S-EYE CATASTROPHE

The French queen Marie Antoinette gave a massive cat's-eye ring to a devoted admirer of hers – the Swedish count Axel de Fersen. After her death during the French Revolution, Count Fersen never removed the ring from his left hand, and he was wearing it when

he was stoned to death on the steps of Stockholm Cathedral some years later. One of his attackers allegedly hacked

his finger off with an ax, and threw the ring, finger and all, into the sea. But the ring returned to haunt the man, who imagined he was being threatened by a disembodied hand.



MARIE ANTOINETTE

A JINXED JEWEL

King Alfonso XII of Spain jilted his fiancée, the countess of Castiglione, in favor of a princess of royal blood. The Countess sent her betrayer a wedding present of a superb opal, knowing it to be a stone of ill-omen. Within months, Alfonso's new bride was dead. The king then gave the ring to his grandmother, and she, too, died. His sister soon followed, and finally King Alfonso himself fell victim to the opal's curse.

MYSTERY THEFT

On October 14, 1946, the jewel box of the duchess of Windsor was stolen from her stately



DUKE AND DUCHESS OF WINDSOR

home in Ednam, England. Strangely, the duchess's dog did not bark, the jewels were under her maid's bed rather than safely under lock and key, and none of the stated contents of the case were ever recovered. Nevertheless, the insurers paid the full amount of the claim – about \$100,000 – and the delighted duchess was able to buy the first of her Cartier panther jewels, a brooch of a big cat on a magnificent 90-carat emerald cushion.



CARTIER PANTHER

SMASH AND GRAB

In August 1958, the illustrious New York jeweler Tiffany & Co. was the victim of a daring robbery. Early one Sunday morning, two men leaped out of a car and smashed the store windows. In just minutes, they grabbed thousands of dollars' worth of diamonds. The jewels were never recovered.

LIPPERT'S LUGGAGE

In September 1989, Felice Lippert, co-founder of Weight Watchers International, mysteriously lost her handbag containing \$500,000 worth of uninsured jewelry. At Miami's Palm Beach airport, she placed her bag on the X-ray machine's conveyor belt, and the bag disappeared, never to be seen again!

GEM CARE

GEMSTONES HAVE LASTED for millions of years underground. However, once mined and made into jewelry, they are exposed to conditions and chemicals that can affect their life spans. Precious stones may fracture, break, lose their shine, or even change color if they are not cared for properly.

STORAGE OF GEMSTONES

Store each piece separately, as harder gemstones, such as diamonds and rubies, will scratch softer ones.

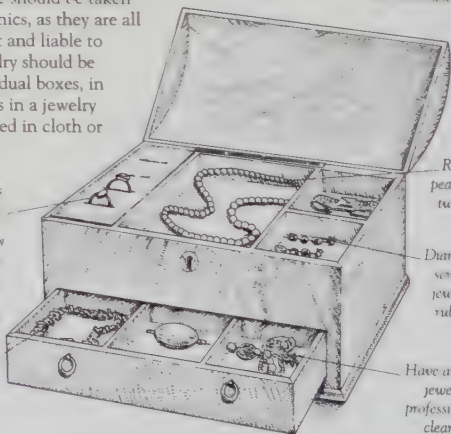
Particular care should be taken with the organics, as they are all extremely soft and liable to damage. Jewelry should be kept in individual boxes, in compartments in a jewelry box, or wrapped in cloth or tissue paper.

Check for loose stones before wearing in washing gems

Store rings separately

Opals will dry out in plastic bags. Store in humid surroundings

Keep items in individual compartments



Restring pearls every two years

Diamonds will scratch any jewelry they rub against

Have antique jewelry professionally cleaned

CARE AND CLEANING OF GEMSTONES

Remove jewelry before doing any gardening or housework. Clean gems regularly using warm water and bar soap, or a dilute vinegar solution, unless specific instructions are given below. Dishwashing liquid is too harsh to use on organic gems. It should also be avoided with emeralds and rubies, since it will strip them of any oil that may have been applied. Never wear organic gems in swimming pools.



SOAP



TOOTHBRUSH



SOFT CLOTH

DISHWASHING
LIQUID

BOWL

ORGANIC GEMSTONES

Pearl Pearls are damaged by perfume, hairspray, detergents, and perspiration. Apply perfumes or cosmetics before putting pearls on. Wipe with a damp cloth after wearing.

Coral Perspiration will affect coral, dulling the color. Avoid all chemicals. Never soak. To clean, use a damp cloth.

Amber and Ivory Avoid contact with hairspray, perfumes, and cosmetics. To clean, wash in warm water with soap and wipe dry.

MINERAL GEMSTONES

Diamond Diamonds attract grease. Clean with a toothbrush in warm water and soap or dishwashing liquid, or in alcohol.

Opal Opals may crack in freezing conditions and lose color in excessive heat. Never wash in hot water.

Turquoise Liable to crack in extremes of temperature. Avoid contact with perfumes and cosmetics, which may cause stones to turn green. To clean, wipe with a damp cloth. Never soak.

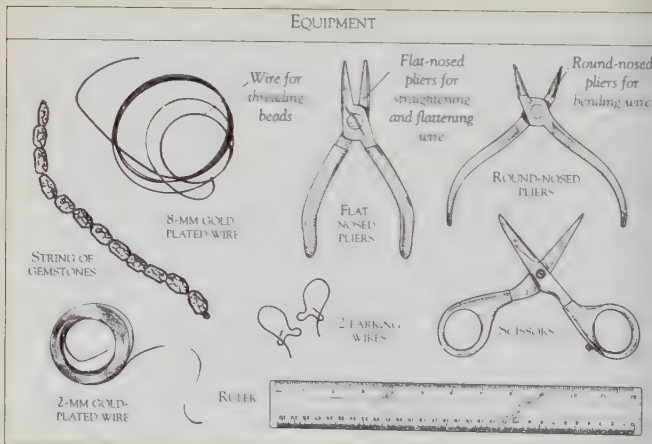
MAKING JEWELRY

USE THE FOLLOWING step-by-step guide to make a pair of earrings and matching necklace. We have used multicolored tourmalines in this example, but you can substitute any stones of a similar size. If you are using gemstones of different colors, plan your pattern before you start in order to be certain that you have enough of each color.

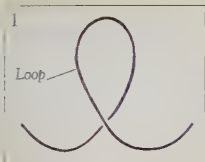


TOURMALINE EARRINGS

EQUIPMENT



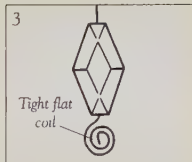
EARRINGS



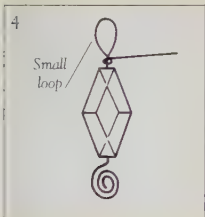
1 Cut a 2.3-in (6-cm) length of thick wire and bend it to form a loop.



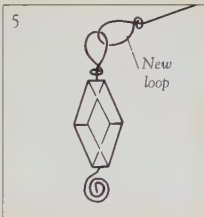
2 Make two small loops, leaving ends slightly open.



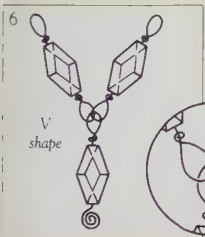
3 Cut three 2-in (5-cm) lengths of thin wire. Make tight flat coil at one end of piece of the thin wire and thread stone onto it.



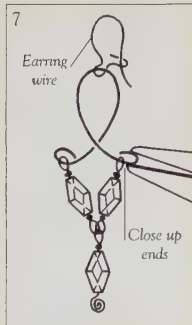
4 Make small loop at other end and twist wire over itself to secure.



5 Trim excess wire to avoid sharp edges. Thread a new piece of thin wire through existing loop, and loop and twist wire again.



6 Thread another gemstone onto this wire, make loop, and secure as before. Repeat steps 5 and 6 to make V shape.

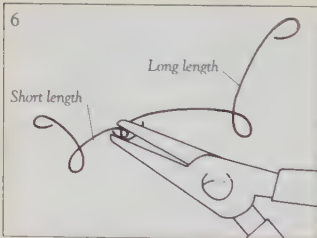
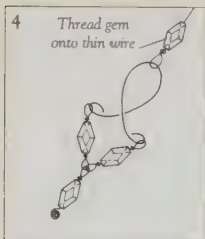


7 Secure the two stones on the thick wire and close up end loops with pliers. Place completed earring onto earring wire. Repeat whole process for second earring.

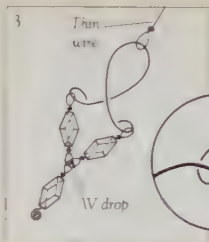
NECKLACE

1 Cut six 2.3-in (6-cm) lengths and twenty 1.2-in (3-cm) lengths of thick wire. Cut twelve 2-in (5-cm) lengths of thin wire.

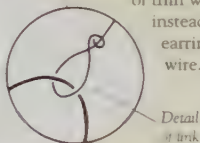
2 Bend one 2.3-in strand of thick wire, as in earring stages 1 and 2.



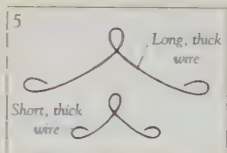
6 Link together the loops at the end of each short and long piece. Secure by closing the loops with pliers.



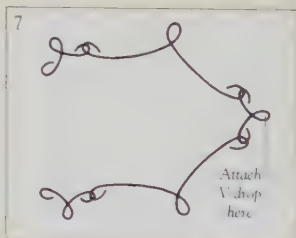
3 Repeat earring stages 3-7, but insert V drop onto length of thin wire instead of earring wire.



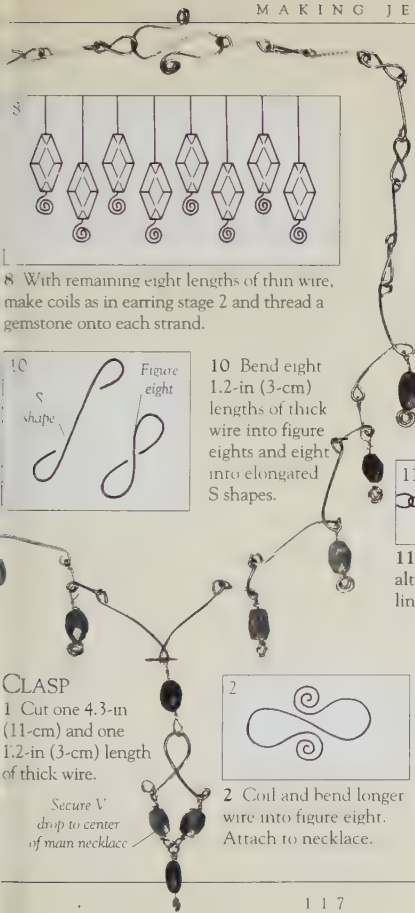
4 Loop and secure thin wire as before and thread gemstone onto it. Put to one side to use in stage 7.



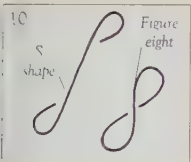
5 Bend four short, and five long, thick wires at center to form small loops and curl up ends.



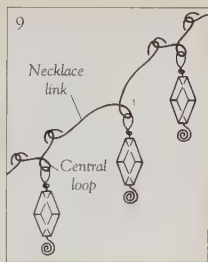
7 The long and short lengths should make an alternating pattern. Attach V drop to central link.



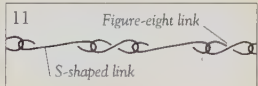
8 With remaining eight lengths of thin wire, make coils as in earring stage 2 and thread a gemstone onto each strand.



10 Bend eight 1.2-in (3-cm) lengths of thick wire into figure eights and eight into elongated S shapes.



9 Thread a coiled gemstone drop through the central loop of each necklace link. Secure as before and trim off any excess wire.



11 Join lengths together to make alternating pattern. Attach eight links to each side of necklace.

CLASP

1 Cut one 4.3-in (11-cm) and one 1.2-in (3-cm) length of thick wire.



2 Coil and bend longer wire into figure eight. Attach to necklace.



3 Thread shorter wire onto other end of necklace and form oval loop large enough to hook clasp into it.

Secure V drop to center of main necklace

TABLE OF PROPERTIES

THIS TABLE SETS OUT the main features of each type of gem, along with a rough guide to its value.

The gemstones are divided into eight categories, depending on their structures (see pages 22-23).

Hardness is measured according to Mohs' scale, which classifies minerals relative to each other on a scale of 1 to 10 (see page 24). A gemstone's

specific gravity (SG) is its weight compared with the weight of an equal volume of water (see page 25).

The "price" column indicates the comparative value of each gem, calculated on the basis of an 0.3-in (8-mm) diameter, cabochon-cut stone of average quality. Where cabochon cuts do not apply, prices for faceted gems are given. No specific figures are listed, since gem prices are constantly fluctuating.

NAME	STRUCTURE	HARDNESS	SG	PRICE
Achroite (Tourmaline)	Trigonal	7.5	3.06	\$\$\$
Agate (Chalcedony)	Amorphous	7	2.65	\$
Almandine (Garnet)	Cubic	7.5	4.1	\$
Amber	Amorphous	2.5	1.08	\$
Amethyst (Quartz)	Trigonal	7	2.65	\$
Aquamarine (Beryl)	Hexagonal	7.5	2.69	\$\$\$
Azurite	Monoclinic	3.5	3.77	\$
Bloodstone (Chalcedony)	Amorphous	7	2.65	\$
Carnelian (Chalcedony)	Amorphous	7	2.65	\$
Chalcedony	Amorphous	7	2.65	\$
Chatoyant Quartz	Trigonal	7	2.65	\$
Chrysoberyl	Orthorhombic	8.5	3.71	\$\$\$\$

TABLE OF PROPERTIES

NAME	STRUCTURE	HARDNESS	SG	PRICE
Chrysoprase (Chalcedony)	Amorphous	7	2.65	\$
Citrine (Quartz)	Trigonal	7	2.65	\$
Coral	Amorphous	3	2.68	\$
Demantoid (Garnet)	Cubic	6.5	3.85	\$\$
Diamond	Cubic	10	3.52	\$\$\$\$
Dravite (Tourmaline)	Trigonal	7.5	3.06	\$\$
Emerald (Beryl)	Hexagonal	7.5	2.71	\$\$\$\$
Fire Agate (Chalcedony)	Amorphous	7	2.65	\$\$
Grossular (Garnet)	Cubic	7	3.49	\$
Hauyne	Cubic	6	2.44	\$\$
Hessonite (Grossular Garnet)	Cubic	7.25	3.60	\$
Ivory	Amorphous	2.5	1.90	N/A
Jadeite (Jade)	Amorphous	7	3.24	\$
Jasper (Chalcedony)	Amorphous	7	2.65	\$
Jet	Amorphous	2.5	1.33	\$
Lapis Lazuli	Amorphous	5.5	2.80	\$
Malachite	Monoclinic	4	4.00	\$
Milky Quartz	Trigonal	7	2.65	\$
Moonstone (Orthoclase)	Monoclinic	6	2.57	\$
Nephrite (Jade)	Amorphous	6.5	2.96	\$
Opai	Amorphous	6	2.10	\$\$
Orthoclase	Monoclinic	6	2.56	\$
Padparadscha (Corundum)	Trigonal	9	4.00	\$\$\$\$
Pearl	Amorphous	3	2.71	\$\$\$ *
Peridot	Orthorhombic	6.5	3.34	\$\$\$
Pyrope (Garnet)	Cubic	7.25	3.80	\$
Rock Crystal (Quartz)	Trigonal	7	2.65	\$
Rose Quartz	Trigonal	7	2.65	\$
Rubellite (Tourmaline)	Trigonal	7.5	3.06	\$\$\$
Ruby (Corundum)	Trigonal	9	4.00	\$\$\$\$
Sapphire (Corundum)	Trigonal	9	4.00	\$\$\$\$
Sardonyx (Chalcedony)	Amorphous	7	2.65	\$
Schorl (Tourmaline)	Trigonal	7.5	3.06	\$\$
Shell	Amorphous	2.5	1.30	\$
Spessartine (Garnet)	Cubic	7	4.16	\$\$\$
Spinel	Cubic	8	3.60	\$\$\$
Topaz	Orthorhombic	8	3.54	\$\$
Turquoise	Amorphous	6	2.80	\$
Uvarovite (Garnet)	Cubic	7.5	3.77	\$\$\$\$
Watermelon Tourmaline	Trigonal	7.5	3.06	\$\$
Zircon	Tetragonal	7.5	4.69	\$\$

(*price given is for 0.3-in (8-mm) cultured pearls)

Glossary

ALBITE

Important variety of feldspar; occurs in many types of rock.

ALLUVIAL DEPOSITS

Concentrations of fine-grained sediments that have been carried downstream and then deposited by rivers and streams.

ALUMINOUS SHALE

Shale is a rock made out of clay that has been buried and then compacted. The form known as aluminous shale contains traces of aluminum.

AMORPHOUS

Without regular internal atomic structure or external shape.

AMULET

Protective charm worn to ward off evil or illness, or to bring about good fortune.

ART DECO

Decorative style originating in Paris in the 1920s, marked by geometric motifs and well-defined outlines.

ART NOUVEAU

Late-19th-century style of art and architecture characterized by curved outlines often derived from nature.

BAGUETTE CUT

Rectangular step cut.

BASALT

Basalt rock forms at the Earth's surface and cools rapidly. It consists of small, poorly developed crystals.

BRILLIANT CUT

Most popular cut for diamonds and many other stones, especially colorless ones. It ensures that the maximum amount of light is reflected from the stone.

CABOCHON

A type of cut in which a gemstone has a domed upper surface.

CAMEO

Design in low relief, usually on a shell or type of agate, around which the background has been cut away.

CARAT

Standard measure of

weight for precious stones. One carat equals 0.007 oz (0.2 g). The term is also used to describe the purity of gold. Pure gold is 24 carat.

CHATOYANCY

Cat's-eye effect shown by some stones when cut as a cabochon. Light is reflected along thin, iridescent bands.

CLEAVAGE

The way a mineral breaks along certain planes according to its internal structure.

CROWN

Top section of a cut stone, above the girdle.

CRYSTALLINE

Having a crystal structure.

CRYSTAL STRUCTURE

Internal atomic structure of crystals. Crystalline gems are classified according to seven basic structures.

DICHOIC

Gem that appears to be two different colors or shades when viewed from different directions.

DIFFRACTION

The splitting of white light into its constituent colors.

DOUBLET

Composite stone made of two pieces cemented or glued together.

EROSION

The transportation of material from its original site by weathering – processes involving wind, water, and ice.

FACET

One surface of a cut gemstone.

FACETING

The cutting and polishing of the surfaces of a gemstone into facets. The style of cut is dependent on the number and shape of the facets.

FANCY

Diamond of an unusual natural color.

FANCY CUT

Name given to a stone with an unconventional shape when cut.

FIRE

Term used for dispersed light. A gem with strong fire is unusually bright.

GIRDLE

Band around the widest part of a cut stone, where the crown meets the pavilion.

GRANITE

Coarse-grained igneous rock.

HEAT-TREATMENT

Application of heat to a gem aimed at enhancing its color or clarity.

IGNEOUS ROCK

Rock that has formed from erupted volcanic lava or solidified magma.

INCLUSION

Solid, liquid, or gaseous particle contained within a mineral. Often adds interest to a stone.

INTAGLIO

Design in which the subject is cut lower than the background. Often used for signet rings.

INTERGROWN

When two or more minerals grow together and become interlocked.

IRIDESCENCE

Reflection of light caused by internal features of a gem, giving rise to a rainbowlike play of colors.

LAVA

Molten rock, erupted from volcanoes.

LUSTER

The intensity of light reflected off a gem's surface.

MAGMA

Rock in a molten state below the Earth's surface.

MANTLE

Layer of the Earth between the core and the crust. It is about 1,740 miles (2,900 km) thick.

MATRIX

The rock in which a gem is found.

METAMORPHIC ROCK

Type of rock that forms from other rocks owing to the action of heat and pressure, or heat alone.

MICROCRYSTALLINE

Mineral structure in which crystals are too small to be seen with the naked eye.

MIXED CUT

Cut in which the facets above and below the girdle are styled in different ways, usually brilliant cut above and step cut below.

MOHS' SCALE

Measure of a mineral's hardness in relation to other minerals, on a scale of 1 to 10.

OILING

Process of applying mineral oil to certain stones, mainly emeralds, to mask their inclusions; turn the stones a darker, more favorable hue; and make them more transparent.

OPALESCENCE

Milky blue form of iridescence.

OPAQUE

Exhibiting opacity, blocking the passage of light.

PAVILION

Lower part of stone, below the girdle.

PEGMATITE

Igneous rock, which forms as the liquids from magma cool. It consists of unusually large crystals.

PENDELOQUE CUT

Lozenge-shaped, fancy cut, often used for flawed gems.

POROUS

Containing pores, or holes, that allow a substance to be penetrated by water, other fluids, or air.

RESIN

Sticky substance obtained from certain plants.

RIVER GRAVEL

Deposit of minerals that have been broken down and washed downstream, occasionally containing gemstones.

ROUGH

Term used to describe a rock or crystal still in its natural state, before cutting or polishing.

SEDIMENTARY ROCK

Type of rock at the Earth's surface. It consists of layers of rock fragments or other substances that have been deposited on top of one another and have hardened.

SILICA

Hard, glossy mineral usually occurring as quartz. Silica is the main constituent of sandstone.

SPECIFIC GRAVITY

The comparison of a mineral's weight with the weight of an equal volume of water.

SPECTROSCOPE

Instrument used to identify different gemstones. It reveals the bands of light

that a gemstone absorbs.

STEP CUT

Rectangular- or square-shaped cut with several facets parallel to the edges of the stone. It is generally used for colored stones.

STRIATIONS

Parallel scratches, grooves or lines in a mineral.

SYNTHETIC GEMSTONE

Laboratory-made stone whose chemical composition and optical properties are similar to those of its natural equivalent.

TALISMAN

Good-luck charm believed to possess magical powers.

TRANSLUCENT

Permitting the passage of, but diffusing, light.

TRANSPARENT

Permitting the passage of light without diffusion.

VITREOUS

Glasslike quality (used to describe a gem's luster).

WEATHERING

The breaking down of rocks by the action of various processes, such as freezing, thawing, and dissolving in water.

Resources

MUSEUMS

American Museum of Natural History
Central Park West
at 79th Street
New York, NY 10024
The collection includes exhibits of cut, uncut, and carved examples of both precious and semiprecious gemstones, including the Star of India – the largest star sapphire in the world.

Cleveland Museum of Natural History
Wade Oval Drive
University Circle
Cleveland, OH 44106
Among the gems on exhibit are colored diamonds, opals, and mineral eggs and labochrons.

Field Museum of Natural History
400 South Lake Shore Drive
Chicago, IL 60605
This museum has both a gem room, with precious stones, and a jade room.

National Museum of Natural History
10th Street and Constitution Avenue NW
Smithsonian Institution
Washington, DC 20560
The founder of the Smithsonian was a mineralogist whose 10,000 specimens formed the basis for the National Mineral Collection and the National Gem Collection. The highlight of the collection is the Hope Diamond, a blue diamond made into a pendant.

Natural History Museum of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007
In addition to an exhibit on gemstone formation and specimens that can be touched, including a several-hundred-pound block of jadeite, the collection has uncut emeralds, aquamarines, and tourmalines; an 18-carat star ruby; and a 4,644-carat topaz.

ORGANIZATIONS

Gemological Institute of America
The Robert Mouawad Campus
5345 Armada Drive
Carlsbad, CA 92008

International Colored Gemstones Association
19 W. 21st Street
New York, NY 10010

International Gemological Institute
589 Fifth Avenue
New York, NY 10017

Index

- A
achroite, 70
 color key, 39
adamantine luster, 27
agate, 12, 13, 78, 79
 color key, 45
 fire agate, 47, 119
 formation, 21
 moss agate, 43
Albert, Prince Consort, 101
Alexander II, tsar, 59
alexandrite, 58, 59
Alfonso XII, king of Spain, 111
almandine, 73
 color key, 40
amber, 33, 104–5
 care and cleaning, 113
 color key, 43
 luster, 27
amethyst, 76–7
 color key, 46
 formation, 21
amorphous structure, 22
aquamarine, 66–7
 color key, 46
 crystal structure, 23
 distribution, 18–19
 formation, 20
Art Deco, 59, 65, 86
Art Nouveau, 85
artificial gems, 17, 34–5
Australia, 30
axes of symmetry, 23

axinite, 43
Ayurvedic medicine, 14
azurite, 92
 color key, 46
 crystal structure, 23
 formation, 21

B
Balas rubies, 61
baroque pearls, 97
birthstones, 15
black coral, 99
black gems, 47
bloodstone, 78
 color key, 44
blue gemstones, 46
Braganza Diamond, 110
Brazilian Princess, 62
British Imperial State Crown,
 60–1
Burton, Richard, 52

C
cabochons, 16, 28
cameos, 106
cannel coal, 47
carats, 24, 25
carbon, 52
care of gems, 112–13
carnelian, 12, 13, 78, 79
 color key, 42
Cartier, 67, 91, 111
cassiterite, 42

Castiglione, countess of, 111
cat's-eye, 58, 59, 110–11
 color key, 43
celestine, 39
cerussite, 39
chalcedony, 78–9
Charles II, king of England, 110
Chatham, Carroll, 64
chatoyancy, 79
chatoyant quartz, 43, 118
China, 12
Chinese medicine, 14
chrysoberyl, 58–9
 color key, 43
 distribution, 18–19
 formation, 20
chrysoprase, 78, 79
 color key, 44
 crystal structure, 22
citrine, 74, 75, 76
 color key, 42
 formation, 21
clasps, 117
cleaning gemstones, 113
cleavage, 22
Cleopatra, 97
 color, 26–7
 color key, 37–47
 colorless gems, 39
 conch shells, 106
 conchiolin, 99
Cook Islands, 12
coral, 32, 98–9

- care and cleaning, 113
 color key, 41, 47
 harvesting, 19
 opurundum, 54
 Crown Jewels, 110
 crystal balls, 14, 75
 crystals:
 growing, 34
 structure, 22–3
 cubic gems, 23
 cubic zirconia, 39
 Cullinan Diamond, 52
 cultured pearls, 96–7
 cuts, 28–9
 zoisite *see* cat's-eye
- canburite, 39
 canchroid, 44, 119
 canchrosity, 25
 canchroid, 12, 50–3
 care and cleaning, 113
 color key, 45, 47
 distribution, 18–19
 formation, 20
 imitation gems, 35, 39
 cluster, 27
 mining, 31
 planning for, 18
 monkey's-ear abalone, 41
 doublets, garnet-topped, 35,
 45
 rayite, 42, 119
 Resden Green, 52
- arrings, making, 115
 Edward, Black Prince, 61
 Edward VII, king of England,
 52, 82
 Egypt, 12, 14, 90
 Elizabeth, the Queen Mother,
 53
 emerald, 64–5
 color key, 44
 distribution, 18–19
 formation, 20
 synthetic gems, 35
 equipment, jewelry making,
 114
 euclase, 45
- F
 Fabergé, Carl, 85
 Fersen, count Axel de, 110–11
 fire agate, 47, 119
 fire opal, 42, 87
 flame-fusion technique, 34
 fluorite, 45
 flux-melt technique, 17, 35
 Frémy, Edmond, 17
- G
 Gahn, J. G., 61
 gahnospinel, 61
 garnet, 72–3
 color key, 40, 45
 distribution, 18–19
 formation, 20, 21
 garnet-topped doublets, 35, 45
 Gilson, Pierre, 35, 90
 glass, 39, 100
 color key, 47
 Great Star of Africa, 52
 green gemstones, 44–5
 grossular garnet:
 color key, 40, 45
 physical properties, 119
 growing crystals, 34
 Gustavus III, king of Sweden, 70
- H
 hardness, 24–5
 hauyne, 46, 119
 healing, 14–15, 75
 heliodor, 42
 hessonite, 42, 119
 hexagonal gems, 23
 Hildegard, St, 63
 history of gemstones, 12–13
 Hope Diamond, 53
- I
 identifying gems, 26, 35
 idiochromatic gems, 27
 imperial jade, 80
 inclusions, 24
 indicolite, 70
 iridescent gemstones, 47
 ivory, 33, 102–3
 care and cleaning, 113
 color key, 41
- J
 jade, 12, 80–1
 jadeite, 80–1
 color key, 41, 44
 formation, 20
 Japan, 32
 jasper, 78, 119
 jet, 32, 100–1
 color key, 47
 crystal structure, 22
 jewelry, making, 114–17

- K**
 Knoop hardness scale, 25
 Koh-i-noor Diamond, 53
 kyanite, 45
- L**
 lapis lazuli, 12, 90-1
 color key, 46
 colors, 27
 formation, 21
 medicinal uses, 14
 lazurite, 90
 legendary gems, 110-11
 leopard claws, 15
 Lippert, Felice, 111
 Louis XVI, king of France, 53
 loupe, 35
 luster, 26-7
- M**
 making jewelry, 114-17
 malachite, 92-3
 color key, 44
 formation, 21
 luster, 27
 Marie Antoinette, queen of France, 110-11
 medicine, 14-15
 milky quartz, 41, 119
 mineral gemstones, 16, 49-93
 mining, 30-1
 Mohs, Friedrich, 24
 Mohs' hardness scale, 24-5
 monoclinic gems, 23
 moonstone, 84-5
 color key, 39
 formation, 20
 moss agate, 43
 mother-of-pearl, 47, 106, 107
 mourning jewelry, 100
 Myanmar (Burma), 31
 myths, 14-15
- N**
 nacre, 96
 Namibia, 31
 natural pearls, 96
 necklaces, making, 116-17
 nephrite, 80-1
 color key, 41, 44
 Nigeria, 15
 Noah, 72
 North American Indians, 15
- O**
 olivine, 83
 onyx, 100
 opal, 86-7
 care and cleaning, 113
 color key, 47
 distribution, 18-19
 fire opal, 42, 87
 formation, 21
 mining, 30
 synthetic gems, 35
 organic gemstones, 17, 32-3, 95-107
 orthoclase:
 color key, 39, 43
 orthorhombic gems, 23
- P**
 padparadscha, 42, 119
 paint pigments, 38
 panning, 30-1
 particolored gems, 27
 paua shell, 45, 107
 pearls, 17, 32, 96-7
 care and cleaning, 113
 color key, 41, 47
 distribution, 18-19
 diving for, 19
 medicinal uses, 14
 Pedro the Cruel, king of Spain, 61
 peridot, 82-3
 color key, 44
 distribution, 18-19
 formation, 20
 physical properties, 24-5, 18-19
 Pliny, 97, 101
 Poland, 15
 polishing, 28-9
 pyrope, 72
 color key, 40
- Q**
 quartz, 74-5
 chalcedony, 78-9
 chatoyant quartz, 43, 118
 crystal structure, 23
 formation, 20
 milky quartz, 41, 119
 rose quartz, 74, 75, 119
 smoky quartz, 42
- R**
 red gemstones, 40-1
 resinous lustre, 27
 rock crystal, 74, 76
 color key, 39
 crystal balls, 14, 75

- Romans, 13
- rose quartz, 74, 75
- rubber, vulcanized, 47, 100
- rubellite, 70
- color key, 40
- ruby, 12, 54-5
- color key, 40
- cuts, 16
- distribution, 18-19
- formation, 16, 20, 21
- imitation gems, 35
- mining, 30
- synthetic, 17
- ruby spinel, 61
- Ruser, William, 77
- S
- Sancy Diamond, 53
- sapphire, 12, 56-7
- color key, 39, 40, 43,
- 45, 46
- distribution, 18-19
- formation, 20, 21
- sardonyx, 78
- color key, 42
- scarab charms, 12
- scheelite, 39
- schorl, 71
- color key, 47
- seed pearls, 96
- shell, 12, 106-7
- color key, 41
- silver-colored gems, 41
- smithsonite, 45
- smoky quartz, 42
- South Africa, 31, 52
- specific gravity, 24, 25
- spectroscope, 26
- spessartine, 73
- color key, 40, 43
- formation, 20, 21
- spinel, 60-1
- color key, 41, 46
- crystal structure, 23
- formation, 20, 21
- staurolite, 43
- stone fetishes, 15
- storage, 112
- strontium titanate, 39
- sunstone, 42
- symmetry, axes of, 23
- synthetic gems, 17, 34-5
- T
- Taylor, Elizabeth, 52
- tetragonal gems, 23
- Tibet, 13
- Tiffany & Co., 53, 91, 111
- Tiffany Diamond, 53
- tiger's-eye, 79
- titanite, 43
- topaz, 62-3
- color key, 40, 46
- crystal structure, 23
- distribution, 18-19
- formation, 20
- tortoiseshell, 33, 106
- color key, 42
- tourmaline, 70-1
- color key, 40, 45
- colors, 27
- distribution, 18-19
- formation, 20
- triclinic gems, 23
- trigonal gems, 23
- turquoise, 12, 88-9
- care and cleaning, 113
- color key, 46
- crystal structure, 23
- formation, 21
- Tibetan jewellery, 13
- U
- uvarovite, 44, 119
- V
- verdelite, 71
- Verneuil, August, 34
- Verneuil method, 17, 34
- vesuvianite, 43
- Victoria, queen of England, 53, 101
- violet gemstones, 46
- vitreous lustre, 27
- vulcanite, 47, 100
- W
- watermelon tourmaline, 71
- color key, 40, 45
- Whitby jet, 100, 101
- white coral, 99
- white gemstones, 41
- Windsor, Duchess of, 111
- Y
- yellow-brown gems 42-3
- Z
- zircon, 68-9
- color key, 39, 45
- crystal structure, 23
- formation, 21

Acknowledgments

Dorling Kindersley would like to thank:

Stephen Bradshaw of the jeweler Pearl Cross Ltd. for the generous loan of his jewelry; Emma Foa for her handmade jewelry; Carole Oliver for the loan of her personal jewelry; Dennis Durham, gem cutter, for his expert knowledge and patience; Fiona Gamble of the jeweler Bentley & Co. for her unstinting enthusiasm; David Mayor for his research into traditional medicine; Hilary Bird for the index; Tanya Tween, Robin Hunter, Earl Neish, and Jacqui Burton, for design assistance; Caroline Potts for picture library services.

Photographs by:

Steve Gorton. Additional photography by Ken Findlay, Colin Keates, Harry Taylor, Mathew Ward.

Illustrations by:

Sarah Ponder, Aziz Khan, Janet Allis, John Hutchinson, Peter Visscher, Caroline Church, Janos Marffy, Alistair Wardle.

Picture Credits:

c = center; b = bottom; l = left; r = right; t = top
The publisher would like to thank the following for their kind permission to reproduce their photographs:

The Ancient Art and Architecture Collection Ltd: 14tr; **Amber Centre:** 105bl; **Courtesy of Argos:** 69tr; **Bentley and Co:** 4c, 4cr, 5cl, 5cr, 7tc, 17bl, 50bc, 50br, 51crb, 54cl, 55cl, 57cla, 59cr, 62tr, 63tr, 64cla, 64bc, 65tr, 66tl, 67crb, 67cbl, 72cla, 73cl, 73br, 85bc, 86clb, 87br, 88–89, 89bc, 98cr;

Bridgeman Art Library: Cheltenham Art Gallery and Museums, Gloucester: Hair comb by Fred Partridge 85tr; Christie's Images 60cl; Giraudon 12bl; Private Collection 101bl; **Bruce Coleman Ltd:** Gerald Cubitt 18cl; Charles and Sandra Hood 19cb; John Murray 32crb; **Christie's Images:** 3c, 35br, 51t, 51br, 59bl, 62bc, 70bl, 71bl, 74clb, 76tl, 77tr, 77bl, 78cla, 80tl, 80cr, 81cl, 81tr, 81bl, 81br, 82tl, 83bl, 87tc, 91tr, 91bc, 94–95, 98cl; **Crown Copyright. Historic Royal Palaces:** 52br, 61cl; **De Beers:** 28tr, 29tr, 31br, 31cla, 52tr, 53cl, 53tl, 53tr, 110br; **Eye Ubiquitous:** 32tl; **Michael Freeman:** 19tl, 30cla, 48–49; **Robert Harding Picture Library:** 13br; **Michael Holford:** 101tl; **Hulton Getty:** 53br, 111bl; **The Natural History Museum, London:** 16–17, 16cl, 21crb, 24–25, 26br, 28bc, 30bl, 34tr, 34br, 34bc, 35c, 35cbl, 38cl, 51cr, 104tl; **Rex Features:** 52bl; **Science Photo Library:** Peter Menzel 30br; David Parker 26tr; **Sotheby's Picture Library:** 55tr, 76bl, 85bl; **Smithsonian Institute:** 62br, 66cla; **By Courtesy of the Board of Trustees of the Victoria and Albert Museum:** 97tr; **The Worshipful Company of Goldsmiths:** 79bl.

Every effort has been made to trace the copyright holders and we apologize in advance for any unintentional omissions. We would be pleased to insert appropriate acknowledgment in any subsequent edition of this publication.

All other images © Dorling Kindersley
For further information see:
www.dkimages.com



POCKETS

GEMSTONES

A new generation of
illustrated pocket books



Systematically organized for
easy access to information



Contains diagrams, charts,
maps, glossary, and index



Jacket images from: Natural History Museum (R). Back: Natural History Museum (L).



Discover more at
www.dk.com

ISBN 0-7566-1801-0

Printed in Italy

90000



9 780756 618018

POCKETS FULL OF KNOWLEDGE