GEMSTONES - THEIR NATURE AND ORIGIN

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Gems are, a group of minerals which shows the following characteristics.

a) rarity

b) beauty

c) durability

d) value

Organic materials used as gems include pearls, corals, amber, and jet. Gems can be classified as diamonds and coloured stones.

In its broadest sense, the term 'coloured stone' is used in the jewellery trade to refer to all gem minerals and organic gem materials, excepting diamonds. In a narrower sense, pearls are also eliminated from this classification and treated separately.

Classification of gemstones

Of approximately two thousand five hundred minerals that have been identified, only about ninety have varieties that produce specimens possessing the requisite beauty, durability, rarity and values to be considered as gemstones. Of this ninety, only about twenty are particularly important to the Jeweller.

Since most gemstones are minerals the classification used in gemmology is not very different from that applied by mineralogists

with minor adjustments. Each mineral that produces a gemstone is considered a gem SPECIES. A gem species is characterized by a definite chemical composition and usually a characteristic crystal structure; therefore, each species possesses characteristic properties.

Almost every variety of the transparent gem species may occur in gem quality and be properly called a precious stone from a relative price standpoint, whereas another specimen of the same variety may be almost worthless. Not every ruby is precious and not every piece of jade is semi-precious.. This is one reason for calling all stones GEMSTONES rather than classifying them as 'precious' and 'semi-precious'.

Nature of gemstones

The things we see around us may be divided into two very broad classes. (1) Organic and (2) Inorganic.

The organic materials, of course, are included in the plant and animal kingdoms, and the inorganic materials are confined to the mineral kingdom. Among gemstones, we distinguish between those resulting from the activities of plants or animals (those of organic origin) and those of inorganic origin (rocks and minerals). Those of organic origin include pearls, corals, amber and jet. All other gem substances are either minerals or other materials of inorganic origin.

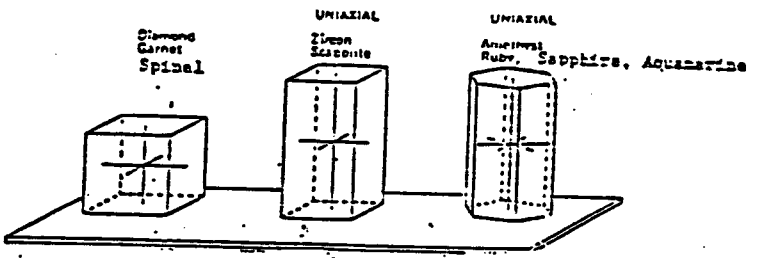
Nature of minerals

Minerals are natural inorganic products that possess a characteristic chemical composition and usually a definite crystal structure. All matter is composed of one chemical element or a combination of elements; for example, diamond is composed of carbon, a single element, whereas all other gemstones are composed of combinations of elements.

Crystal system

For convenience of study and reference, crystals are divided into six great systems, described by the comparative length and angular relation of their crystallographic axes. There must be at least three axes to describe a crystal, and in one case four are necessary.

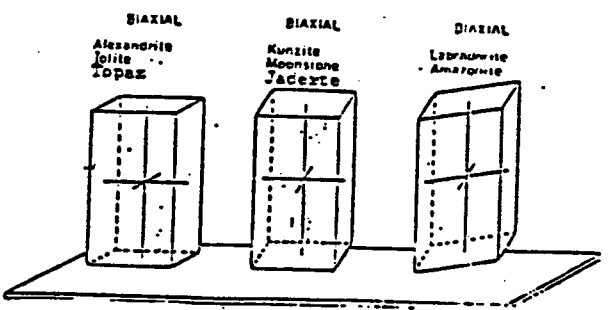
MODELS OF THE SIX CRYSTAL SYSTEMS



CUBIC SYSTEM (Singly Refractive)

TETRAGONAL SYSTEM (Doubly Refractive)

HEXAGONAL SYSTEM (Doubly Refractive)



ORTHORHOMBIC SYSTEM (Doubly Refractive)

MONOCLINIC SYSTEM (Doubly Refractive)

TRICLINIC SYSTEM (Doubly Refractive)

Hardness

Hardness is the resistance a gemstone or other material offers to scratching or abrasion. The basic idea of hardness is that a harder stone will scratch a softer one, if a sharp point or an edge of the harder material is drawn across the softer one.

Degrees of Hardness

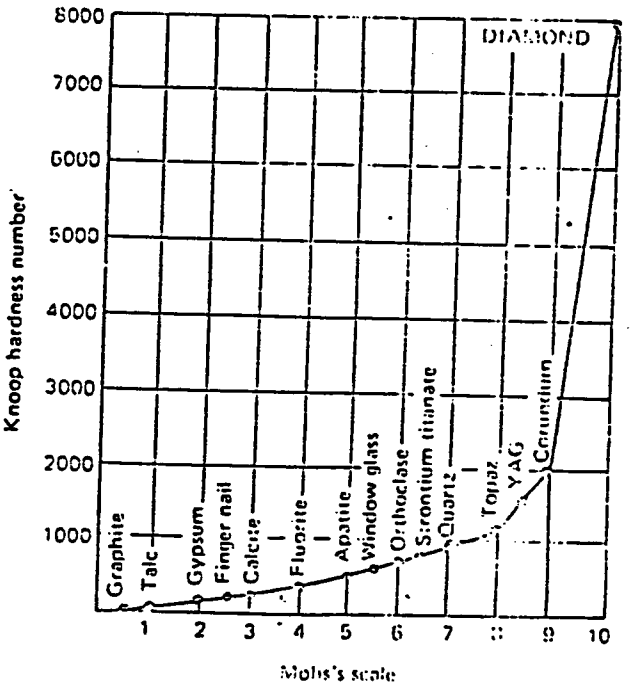


Figure 2.24. Diamond is the hardest substance known to man, natural or synthetic. The old Mohs's scale gives no idea of relative hardness, so it is here compared with an indentation hardness scale. (By courtesy of The Retail Jeweller*)*

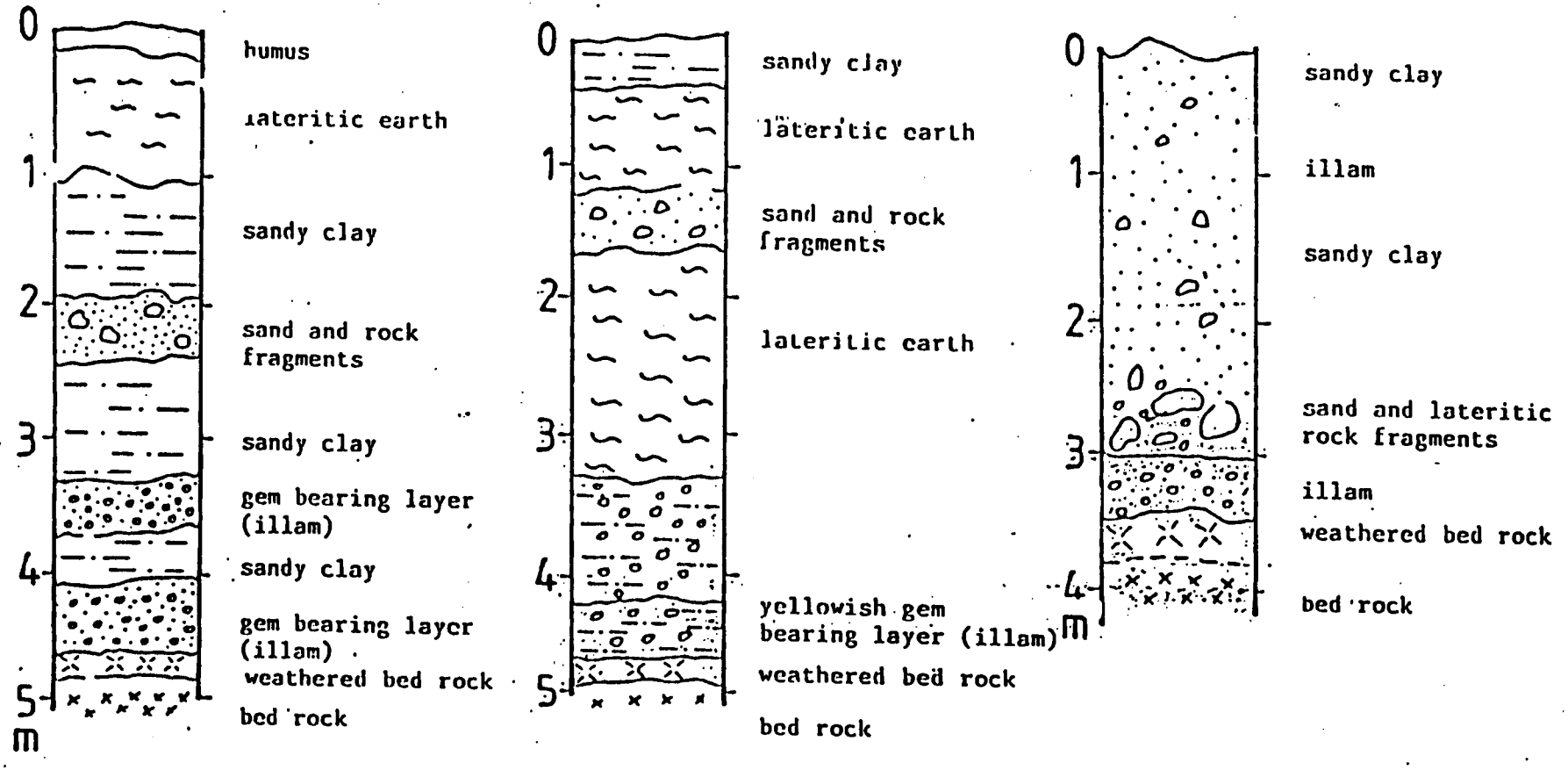
RELATIVE HARDNESS

OF THE COMMON GEM MINERALS

AND RELATED SUBSTANCES

Asterisks (*) indicate other than gem substances. Where two numerals appear, the hardness varies between those two figures.

Diamond	*10*
Corundum	*9*
Synthetic Corundum	9
Chrysoberyl	8½
Spinel	8
Synthetic Spinel	8
Topaz	*8*
Beryl	7½ - 8
Synthetic Emerald	7½ - 8
Almandite (Garnet)	7½
Zircon	7 - 7½
Rhodolite	7 - 7½
Pyrope (Garnet)	7 - 7½
Tourmaline	7 - 7½
Spessartite (Garnet)	7 - 7½
Grossularite (Garnet)	7
Quartz	*7*
Chalcedony (Quartz)	6½ - 7
Synthetic Rutile	6½ - 7
Peridot or Olivine	6½ - 7
Jadeite (Jade)	6½ - 7
Andradite (Garnet)	6½ - 7
Spodumene	6 - 7
Steel File*	6 - 7
Marcasite	6 - 6½
Pyrite	6 - 6½
Microcline (Feldspar)	6 - 6½
Orthoclase (Feldspar)	*6*
Oligoclase (Feldspar)	6 - 6½
Nephrite (Jade)	6 - 6½
Labradorite (Feldspar)	6
Iridium*	6
Hematite	5½ - 6½
Opal	5½ - 6½
Glass	5 - 6 3/4
Apatite	*5*
Lapis-Lazuli	5 - 6
Turquoise	5 - 6
Natural Glass	5½
Tooth Enamel*	5
Palladium*	4½
Iron*	4 - 5
Platinum*	4 - 4½
Brass*	4
Shell	3½
Coral	3½
Jet	3 - 4
Copper Coin*	3
Pearl	2½ - 4
Ivory	2½
Tortoise-Shell	2½ - 3
Silver*	2 - 2½
Amber	2 - 2½
Gold*	2 - 2½
Plastic Group*	1½ - 3
Lead*	1½
Talc	1
Graphite	1
Wax	1
Fingernail	*2½*
Knife blade	*< 5½*



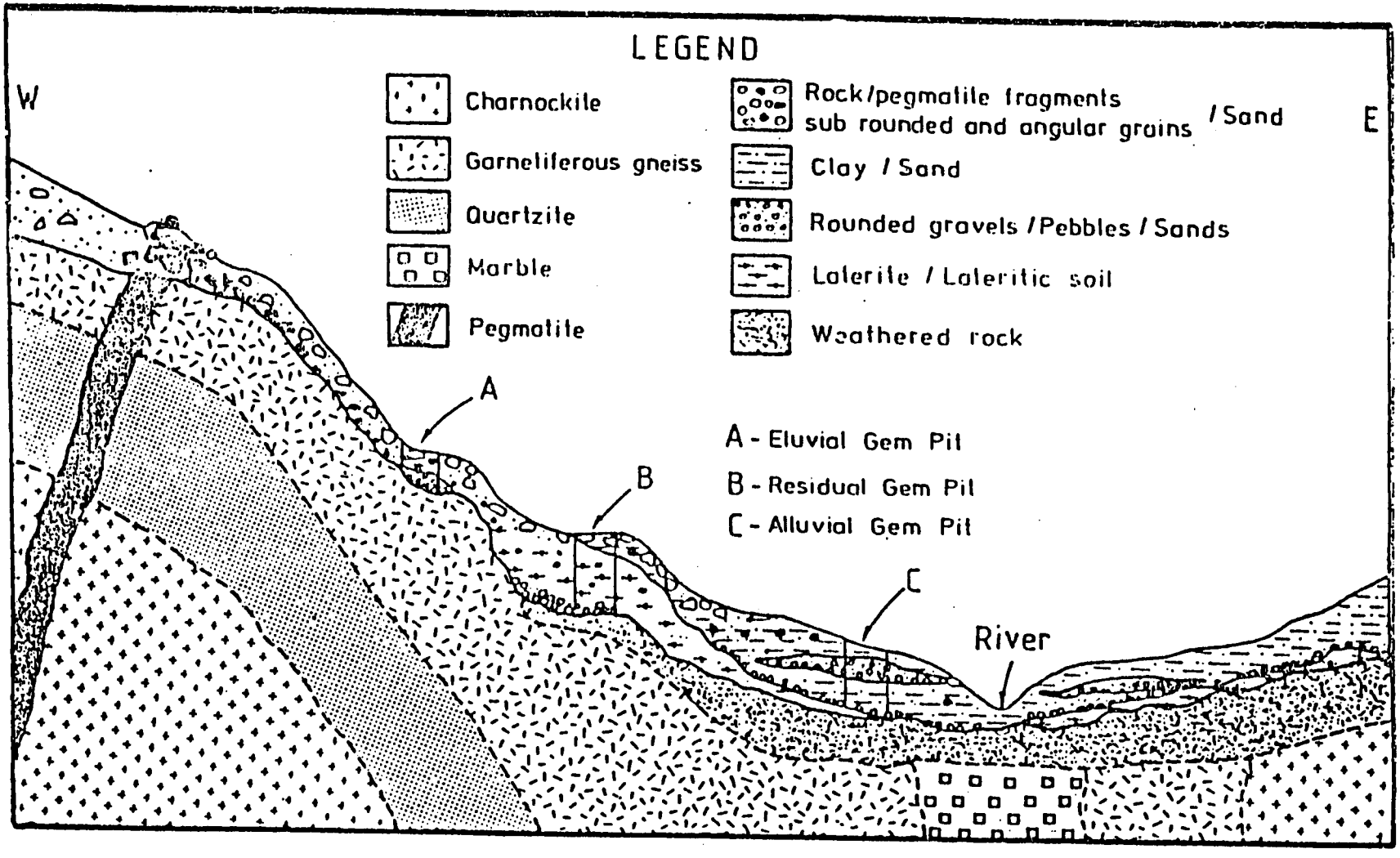
ALLUVIAL GEM PIT

RESIDUAL GEM PIT

ELUVIAL GEM PIT

Modified after DAHANAYAKE (1980)
bu RUPASINGHE (1986)

Stratigraphie und Lithologie von Alluvial-, Eluvial- und Residualen Edelsteingruben



Schematische Darstellung der Lage verschiedener Edelsteinlagerstättentypen (modifiziert nach DAHANAYAKE 1980)