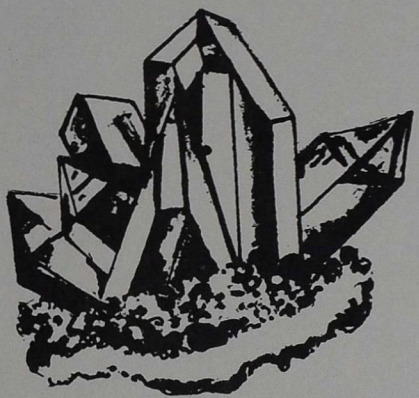
ROCKS AND MINERALS

AN INTRODUCTION



Edited by : **J. R. ASOKAN**
CURATOR
GOVERNMENT MUSEUM
SALEM.

Sponsored by : **M. K. MARAN**
MINERAL MERCHANT
ALAGUMANER COLONY
SALEM - 9.

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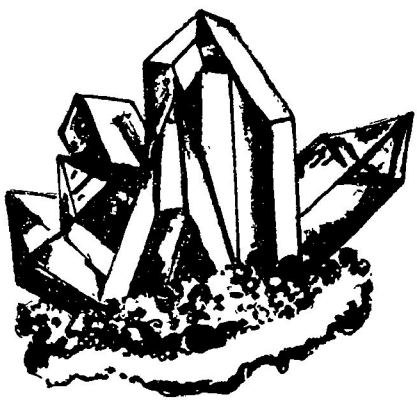

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Message

Minerals have always played a leading role in enhancing the material well being of mankind. I am glad to note that Mr. J.R. Asokan, Curator, Government Museum, Salem has taken sincere efforts in compiling and editing the important chapters of Rocks and Minerals. It covers the Economic importance and mode of origin of Rock and Minerals with special attention to the minerals found in Salem District which is more informative.

Eventhough the subject is a vast one and more complex in nature, the promoters have taken pains to present the salient features of the subject in more simple way, so as to enable the common man to know something about the basic knowledge of Minerals, and their utility and value.

It is heartening to note that Thiru. M.K. Maran, Small Mine Owners, Salem has come forward to sponser the above task voluntarily, who deserves to be congratulated.

Sd./-

(V. RAMANATHAN)
DEPUTY DIRECTOR
DEPARTMENT OF GEOLOGY AND MINING
SALEM.

Salem
4-5-94.

Message

The information provided by the editor regarding the rocks and minerals for the students, would help them to have a basic knowledge about Geology, Science of the Earth. I appreciate the efforts taken by the editor to bring forward this edition and deserves full credit as there is only very limited scope for learning Geology in the school and college level. I wish him all success.

Sd./-

(K. NEELAMEGHAN,)
Head of the Department of Geology,
Government Arts College, Salem - 7.

Salem
4-5-94.

Foreword

Rocks and Minerals form the base materials for the life supporting system. Due to this importance it becomes essential to know about these materials in a detailed way. In addition, Nature's beauty can be enjoyed in rocks and minerals, by looking at Gem stones etc. This book is an attempt to creat interest among students and general public, and as well to attract their attention towards rocks and minerals, whose study value can be considered as entertainment as well as educative. Only fundamental things (about rocks and minerals) have been touched up in this book, ofcourse in an interesting manner.

Hope this book will be of certainly useful to the students, to concenterate their minds more on rocks and minerals.

J.R. ASOKAN,
- Editor

ROCKS AND MINERALS

Almost all of the earth- the hills, the mountains, the ground itself-is made up of minerals and rocks which contain minerals. There are many different kinds, and it would take a long time just to write down all their names. Yet, most of the rocks and minerals on earth are very common.

Sand is a common mineral. Water is another common mineral. Mixed up in water are other minerals. We cannot see them by looking in to the water, but they are there just the same.

Almost all of our earth even the inside of the earth is made of rocks and minerals. We study them to learn about our world. Everyday we use something made of rocks or minerals. But often they are in a changed form. For example glass does not look like sand. Yet glass is made from sand. The ink that printed the letters on this page was made from minerals.

We study about rocks and minerals to learn about our world, to learn about the things we use, and to learn to earn a livelihood.

ROCKS

What is a rock:

Rocks are made of minerals. A few are made of just one mineral, but most of them are made of many minerals. There are many kinds of rocks.

Very small rocks are called sand. Very small sand is like sugar or salt. The individual grains are so small that they are hard to see. Rocks bigger than sand have other names, like pebbles, or stones - Big rocks are called Boulders - Some of them may be as big as a house.

Rocks are of many colours. We can find red rocks, blue rocks and yellow rocks. Often rocks are made of mixed colours. When we look, we can find them of almost of every colour.

Are rocks found every where:

Rocks are found almost everywhere. The most common place is outdoors on the ground. Most of the ground is made up of big and little rocks. Rocks are found at the sea shore. Even the tiny pieces of sand are countless little rocks that make up the beach.

Outdoors we can find many rocks. We can find rocks in the hills, in the valleys and in rivers and streams. The place where rocks and stones are dug out are called rock quarries.

MINERALS

What is a Mineral:

A mineral is a chemical element or a combination of chemical elements. Minerals are all around us and they are easily found almost everywhere. In fact, it may be said that anything that is not an animal or a plant is a mineral.

Can you see a dish? or any other pots and pans in your kitchen - all are made out of minerals. A good part of the wooden pencil is made of minerals. The lead consists of graphite which is a mineral in its natural form.

Almost all minerals are solids, but water is a liquid mineral. It is made up of two chemical elements - oxygen and hydrogen. Ice is the colourless mineral that floats in water. Ice is really a water crystal. Asbestos is a mineral that does not burn. Some other minerals are clay, chalk and oil. Metals, such as iron, silver and gold are minerals, too. Scientists have found about 2,000 different specimens.

Where can we find minerals:

Some minerals are found on top of the ground. Others are dug up from under the ground. Many people go around looking for minerals. Prospectors are men who look for valuable minerals. In many places they have found large deposits. Then a mine may be started, if enough is found in one place. The mineral is then taken out of the mine and sold.

A mine where iron is found is called an iron mine and the mineral taken out is named irone ore. The word "Ore" usually refers to any natural material which contains a valuable metal. A gold mine has gold ore and a lead mine has lead ore. In many cases, more than one kind of ore is found together. Often, for example, silver and lead ores are close together.

All minerals do not come from mines. some of our important minerals come from the sea. Salt is an important mineral. Salt is found both in the sea and on the land.

ROCK TYPES

Rocks are classified in to three major groups.

They are Igneous rocks, Sedimentary rocks and Metamorphic rocks.

IGNEOUS ROCKS

What Is an Igneous Rock

Igneous rocks were formed in a special way. The word igneous means made from fire or heat. Therefore, all igneous rocks have been formed by heat. Deep down in the earth it is very hot. The rocks and minerals found there are also very hot. The heat has helped to change these rocks and minerals into molten rocks, called Magma.

When the magma comes up to the surface of the earth, it cools off and becomes hard. The cold magma, hardened into rock, is called igneous rock. There are many different kinds of igneous rocks, but all of the them have come from the magma found deep in the earth.

Sometimes the magma does not get all the way up to the earth's surface. It cools underneath the ground, turning into rock before it gets to the surface. Granite is one kind of igneous rock. Huge rocks are formed under the ground in this manner.

Where to find Igneous rocks:

A good place to find igneous rocks is near old volcanoes. The rocks were made when the volcanoes were still active. Today you can still find the rocks they made. Many different kinds of rocks are found near the old volcanoes. Lava is one. It is a common igneous rock. Lava in the form of molten rock pours out of a crack in the side of a volcano. It runs steaming down the side of the volcano and over everthing in its path. After cooling down it becomes an igneous rock. The name, Lava, can mean the molten rock or even the cold hard rock.

Some Igneous rock types:

GRANITE is one of our most common igneous rocks, made deep under the ground. Granite is made up of quartz, feldspar, and several types of mica. These are all minerals. Quartz and feldspar are light - coloured. They make granite a light coloured rock. The little bits of mica in granite make the dark spots.

Granite may be coloured red, pink, yellow or brown. Often it is a mixture of colours in between.

DIORITE is an igneous rock. It is made like granite but is much darker in colour. It is darker than granite because it has no white Quartz in it. Diorite is made up of feldspar and hornblende. Together they give the rock a speckled appearence.

FELSITE rocks are made from fast cooling lava. The lava cools too slowly to turn into granite. The lava cools too fast to make obsidian, another kind of igneous rock. It cools just right and turns in to felsite. Felsite rocks are usually made rom light - coloured lavas. These rocks are often coloured light grey, green, yellow or even red.

BASALT is a rock that comes from volcanees. Some times the lava from volcano is a very dark colour. As this dark lava slowly cools, it turns in to a black rock called basalt. Basalt is a very useful igneous rock. It is crushed and sold to make many useful things. Basalt is used in pavements, buildings and roads, just like granite.

This kind of rock was formed in giant sheets. When the ancient volcanoes poured out huge flows of lava that cooled faster than the granite forming magmas.

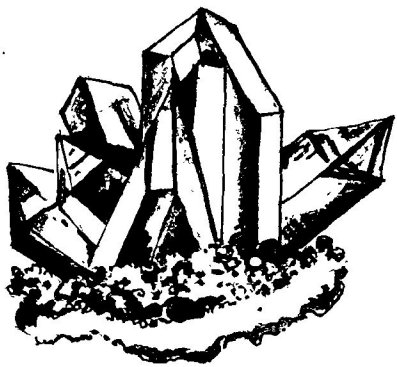
OBSIDIAN is another igneous rock made by volcanoes. When lava flows out of the volcano, it often cools very fast and forms a rock called obsidian. This rock is nearly natural glass. In thin pieces it is found in shades of green and brown. Red indians make arrow and spear heads out of it.

How they differ: Granite and diorite were formed when the magma did not reach the surface of the earth. This magma cooled very slowly deep under the earth's surface.

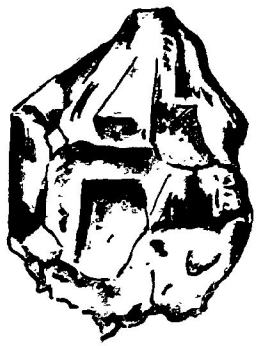
Basalt was made when the magma reached the surface. This magma came out of the earth and we call it lava. The lava cooled in to basalt. The fastest cooling lava of all turned into glass. This natural glass we call obsidian.

PUMICE is an igneous rock. It is also made by volcanoes. Sometimes the volcano throw out gobs of molten rock. Little holes grow in the rock before it cools.

QUARTZ TYPES

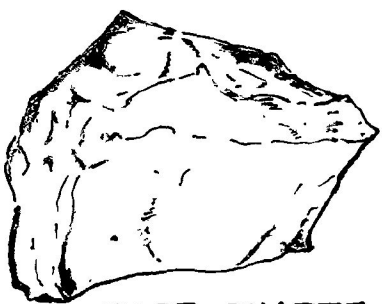


ROCK CRYSTAL IN QUARTZ

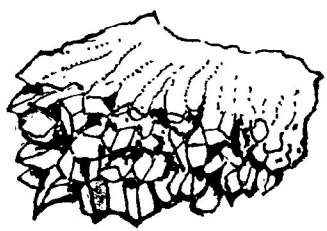


TYPICAL QUARTZ

SMOKY QUARTZ



ROSE QUARTZ.



AMETHYST QUARTZ

These holes are caused by steam or gas trapped in the molten rock. Pumice is a stone that can float on water. It floats on water because it is so very light.

SEDIMENTARY ROCKS

Stir up a handful of dirt in a glass of water. At first the water will be cloudy. But if the water is left alone, the dirt will settle to the bottom, of the glass. In time the water will be clear again. The dirt that has settled to the bottom of the glass is called sediment.

Sedimentary rocks form this way.

Rivers and streams bring more mud, rock and sand to the seas. These settle to the bottom and are called sediment. The big rocks settle first. Next the sand and then the mud sinks to the bottom of the sea. In this way different layers are build up. The weight of the layers of sand and water above press down on the bottom layer of sand. This bottom layer begins to change.

Each tiny grain of sand begins to stick to another one. The sand grains change in to stone. Because the stone is made from sand we call it sand stone. Sand stone is a sedimentary rock. Most sedimentary rock is made under water but sometimes sedimentary rock is made on dry land.

For instance, long ago, many volcanoes blew out ashes and volcanic dust which settled around them. Year after year the layers build up, and finally becomes stone. Not all sedimentary rocks were made from dirt and sand. Some were made from the shells of sea animals and plants.

LIMESTONE - Millions of animals live in the sea. Some of them build a hard shell which is made of lime, and this protects the animal living inside. Molluscs come under this group. Some plants have shells, too. A diatom is a tiny plant that lives in a shell. Millions and Millions of tiny shelled diatoms live in the sea.

When a plant or animal dies, its shell sinks to the bottom of the sea. After many years, millions of dead shells pile up on the bottom of the sea. The top layer pushes down the bottom layers and the bottom layers are pushed close together. The shell layer at the bottom closely turns into stone. The name of this stone is limestone, which is another kind of sedimentary rock.

Where to find sedimentary rock:

Sedimentary rocks were formed under the seas and oceans. The sedimentary rocks build up higher and higher in some places. Millions of years went by. In some places the sea bottom rose slowly. If it rose high enough, it came out of the water. The land that came out of the water was made of sediment. Below the top layers of sediment were sedimentary rocks.

Wherever we find land that was once under water, we can almost be sure to find sedimentary rock. Roads are often cut, through hills. If the hill is made of sedimentary rock, it will show the layers. We can usually find sedimentary rocks in hills that are layered.

Some sedimentary rocks

SANDSTONE is a very useful sedimentary rock. It is used in walls and buildings, because it is strong and easy to quarry. After it has been taken from the quarry, it is cut in to blocks and used in the building of things. There are many different colours of sand stone. Brown is common. We can also find yellow - coloured, grey-coloured and red - coloured sand stones.

LIMESTONE is a sedimentary rock that formes only under water. It takes millions ofyears to make a lot of lime stone. Some deposits of limestone are thousands of feet thick. Pure limestone is clean and white. But often other things get mixed into the lime stone that may change its colour into yellow, brown, green, grey, black and to many other colours.

COAL is a sedimentary rock that will burn. Coal burns just as wood does. Coal was made millions of years ago. This rock is made from plants and trees that lived long ago. These trees and plants became buried in the earth and in long time are converted in to coal.

SHALE is made from fine silt and mud. Sometimes it is so soft, it is not like a stone at all. Most rocks do not have any odour, but wet shale does. It smelkls like damp earth, you can find shales of many different colours. Red, brown, and grey are common colours of shale.

CONGLOMERATE is another sedimentary rock. It is made of a mixture of smooth round stones and pebbles. The larger stones in a conglomerate rock are held

together by another kind of stone, either lime stone or sand stone.Conglomerate rock is made in old streams and river beds. The rocks that settle into the bottom are converted into conglomerate rock.

DOLOMITE is also a sedimentary rock. It is made under the sea. It is usually white or light coloured.

METAMORPHIC ROCKS

What are metamorphic rocks:

The name metamorphic means 'changed'. Metamorphic rocks began as one kind of rock and later were changed into another kind. All of them began once as igneous or sedimentary rocks. The new rocks do not look the same, for in becoming metamorphic rocks their structure and often their colour change.

Sedimentary rocks are formed deep under the seas. Heat helps to change sedimentary rocks. The weight of the rocks and water on top of the sedimentary rocks is very great. The weight and heat change the sedimentary rocks. They are converted into metamorphic rocks. When limestone is changed, it turns into marble. If shale is changed, it turns into slate. Both marble and slate are metamorphic rocks. Igneous rocks are also changed into metamorphic rocks.

Some Metamorphic rocks:

SLATE is a metamorphic rock made from the sedimentary rock shale. Although slate and shale have the same colours there are important distinctions between the two. Slate is harder and stronger than shale. The way they break also helps to tell them apart. Slate breaks into smooth flat sheets of rock. The finest black boards are made of slate that has been split into thin sheets. One side is then polished very smooth before it is used for a blackboard. Shale will not break into smooth flat sheets of rock. It breaks only into odd shapes.

MARBLE is a metamorphic rock. It comes from limestone that has been changed by heat and pressure. Marble is often in many colours. You can find white marble or black marble or just about any colour in between. Often the marble is scriped or marked with several colours. Minerals, or impurities, in the marble change its colours. Marble is used in ornamental building purposes.

SERPENTINE is a metamorphic rock often coloured green. Most serpentine rocks are dark green and many are red in colour. Serpentines are largely used as ornamental stones. Their beauty and variety are due to the mottling and veining of the serpentine by talc, magnesite and iron oxide.

QUARTZITE is a very hard metamorphic rock made from hard sandstone. Pressure and heat changed the sandstone into hard quartzite. Some quartzite is coloured like sand stone.

These colours are yellow, brown, pink and red.

SCHIST is another metamorphic rock made from mudstone or shale.

CRYSTALS

What is a crystal:

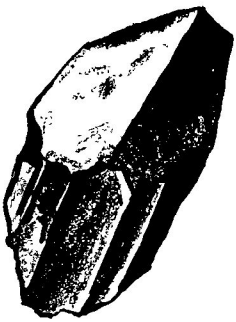
There are non-living substances which grow into bodies of various shapes. They grow by adding on more layers of the same substance, keeping the same shape at all times. These bodies of various shapes are called crystals. Most solid substances like minerals, are crystalline; that is they are made up of crystals. So a crystal is really another form of rocks and minerals, except that the word 'crystal' tells us that particular rock or mineral is of a certain shape.

These different crystal shapes, which help us to tell the minerals apart, are grouped into six main kinds or systems: Cubic system, Tetragonal system, Hexagonal system, orthorhombic system, Monoclinic, system and Triclinic system. Examples of six different shapes are shown in the figure.

Can we make crystals:

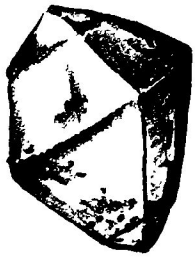
Salt crystals are easy to make at home. Stir three teblespoons full of salt into a cup of warm water. The salt crystals will disapear in a few minutes. Next pour the salt water into flat pan. Set the pan where it will be warm. Wait for a few days. Little by little the water will disappear, the salt crystals will begin to form around the edge of the pan. Sugar crystals can also be made in the same way.

CRYSTAL TYPES

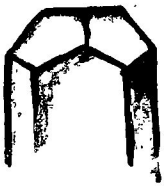


TRICLINIC

MONOCLINIC

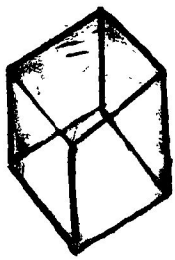


ORTHORHOMBIC



HEXAGONAL

TETRAGONAL



CUBIC

ROCK - FORMING MINERALS

What are rocks made of:

Rocks are made from one or more kinds of minerals. Granite is a rock made from three kinds of minerals - Quartz, feldspar and mica.

QUARTZ is one of the most common rock forming minerals and is found in all the big groups of rocks - igneous, sedimentary and metamorphic rocks. Some quartz is colourless, like ice. Other colours are white, pink, violet and grey. Some times the dark coloured quartz is called smoky quartz. It looks like the colour of dark smoke.

You can find quartz very easily. The small sand grains in dirt are often quartz. Beach sand is full of Quartz grains. It is found in most igneous rocks, often in the form of crystals. Infact, the names of many minerals and rocks depend upon whether or not quartz is present in the sample. You should consider quartz to be one of the most important rock - forming minerals.

FELDSPAR is a very common rock forming mineral, like Quartz. But the name feldspar is really a family name. That is, it is a name used for six or seven different feldspar minerals. All of these feldspar minerals are much alike, sometimes so much so that it is hard to tell them apart. It is easier to just call them feldspar. Feldspar minerals occur in almost all of the igneous rocks. Often the colour of the rock depends upon the colour of the feldspar mixed in it.

Feldspar may be coloured white, light pink or even green. The white and pink colours are the ones you will see most often. Granite with pink feldspar will look pink. If the feldspar is white, the granite will look white. The Quartz in the granite helps to change the colour, too.

MINERAL FOODS

We eat minerals in our day to day life. Salt is a common mineral which we take along with our food. Salts are obtained, by slowly evaporating the sea Water in salt beds. Salts are also obtained from land. The salts are in the form of rock salts. Mining is done by the usual excavation method, depending on the thickness of the deposits.

Another method of exploitation is by drilling wells in to the salt strata, pumping water down them to dissolve the salt and treating the returning brine in a manner similar to the evaporation method. The mineral name for rock salt is halite, but it is usually just called 'salt'.

Water is also a very common mineral. It is the most importnat mineral we use. Our body needs some water everyday. We only need to eat very tiny amounts of the other minerals which are found in foods. They cannot be seen because there are only tiny bits of them But they are very important.

Iron is an important mineral in our day to day life. It is also a mineral we need to eat. It is found in eggs and livers. Calcium is a mineral found in cheese, and it helps to make strong bones. Iodine is a mineral needed to keep our body healthy. Iodine is often mixed with the salt we eat. We need to eat many different kinds of food because each kind has different minerals. They help you to build a healthy body.

HARDNESS OF MINERAL

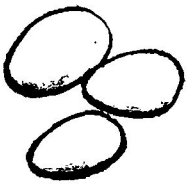
Geologists, for a long time, have used ten minerals to test for hardness. These ten minerals are called the "scale of Hardness" minerals. Each mineral on the scale has a number as well as a name. These minerals have been arranged in order. The softest mineral is number one and the hardest is number ten. Those minerals in between will vary, each higher - numbered mineral being harder than the one before.

The Scale of Hardness:

Number 1. TALC: Talc is a metamorphic mineral. It is the softest of the minerals in the scale. You can scratch talc with your fingernail. Talcum powder is made from ground up talc. The nice smell is put in after the talc is ground up.

Number 2: GYPSUM: Gypsum is a sedimentary mineral. It is harder than talc, but you can still scratch it with your finger nail. Gypsum may be colourless or white. It is found in huge beds in the ground where it is dug out. Gypsum is an important mineral. Plaster of paris is made from it. Plaster wall boards and black board chalk are also made from it.

MINERAL FOODS

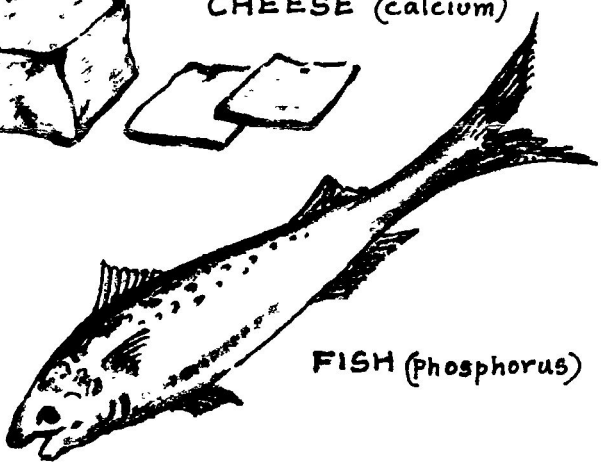


EGGS (iron)

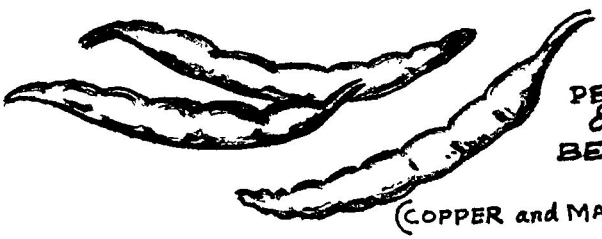
MEAT (iron)

CHEESE (calcium)

SALT (iodine)



FISH (phosphorus)



PEAS & BEANS

(COPPER and MANGANESE)

Number 3 : CALCITE: Calcite is third in the hardness scale. It scratces talc and gypsum. Calcite is a colourless or white mineral. You will find it in many places and with all groups of rocks. A special form of calcite is Iceland spar. When you look through a clear crystal of Iceland spar, everything looks double. This is called as double refraction.

Number 4: FLOURITE: This mineral is one of the most colourful of the hardness minerals. Crystals of fluorite may be white, grey, black and many other colours. They may also be colourless. Its hardness is four and you can scratch it with a pocket knife.

Number 5: APATITE: Apatite is another mineral that form beautiful crystals of many different colours. Some of these colours are white, brown, green, violet, blue and yellow. Yellow is the most common colour.

You can scratch apatite with a knife, Apatite in turn will scratch any of the hardness minerals below it. Apatite, like each of the other minerals, is able to scratch itself.

Number 6 : FELDSPAR: Feldspar is about the most common mineral on earth. When this mineral breaks up and rots, it turns in to clay. Clay is found almost every where. Your knife will not scratch feldspar, but the feldspar will scratch your knife.

Number 7 : QUARTZ: Quartz is a common mineral and it comes in many colours. A beautiful kind of quartz is named Tiger's Eye and is usually in jewellery. Quartz sand is melted and turned into clear glass. Radios, gramophones and watches very often have special quartz crystals in them. Quartz is very useful. It is the hardest mineral you apt to find easily.

Number 8 TOPAZ : Topaz is a very hard stone. It will scratch quartz or any of the other minerals below quartz. Topaz is prized as a gem stone because it is very beautiful. This stone is commonly yellow.

Number 9 CORUNDUM: Corundum is next to the hardest mineral. Some crystals of this mineral are also gem stones. Ruby is a clear red corundum crystal. Such a crystal is quite valuable. Ordinary corundum is crushed into small bits and made into sand paper.

Number: 10 DIAMOND: This is the hardest mineral known on earth. Nothing is harder than diamond. It is many times as hard as corundum. Clear crystals are made

into jewels. Dark-coloured diamonds are used to polish and cut other hard stones, as well as other diamonds too. Diamonds are valuable because they are very hard, beautiful and rare. Diamonds are also used in the testing of hardness of other minerals.

GEM STONES:

Gem stones are more difficult to find than ordinary rocks. They are harder to find because there are not so many of them. If a stone is hard to find, if it is beautiful, and if it can be cut and polished, it then becomes valuable. This kind of stone is named a gem stone.

A ruby is a beautiful red - coloured gem stone. When a ruby is polished, it sparkles and shines. The colour of the ruby helps to make it valuable. Other interesting gem stones are opals, emeralds and diamonds. Emeralds and diamonds are the most expensive and rarest gem stones. All gem stones are beautiful. Gem stones are used in jewellery.

If the material used for ornament occurs in abundance and could be secured cheaply, it may be called a semi - precious stone.

ECONOMIC MINERALS

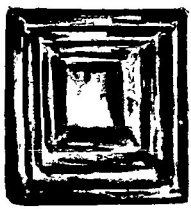
Economic minerals are of service to man, entering into nearly all aspects of modern industry and commence. They are esstneial in sustaining the growth in world population, living standards and technological advances and, in this way, the history of the development of man is interwoven with their discovery and utilization.

Excluding coal, limestone, sand and gravel, it is estimated that nearly sixty minerals are of economic value of which somewhat less than half consists of metals. In terms of the quantities produced the most important, in order, are : Iron, rock salt, phosphae rock, bauxite, gypsum, sulphur, potash, copper, chromium, lead, zinc, asbestos, fluorspar and titanium. This list does not include silver, gold, diamond, platinum, nickel, tin and tungesten - which are usually produced in much smaller amounts but represent high monetary value. Gemstones are also come under this category.

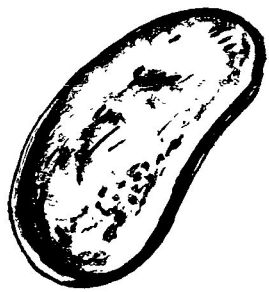
GEM STONES

STAR SAPPHIRE

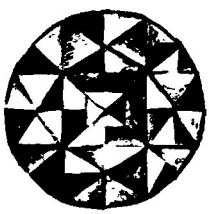
EMERALD



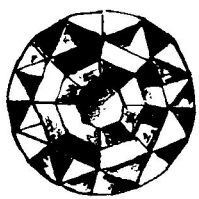
SAPPHIRE.



OPAL



DIAMOND



RUBY

SOME IMPORTANT ECONOMIC MINERALS:

ALUMINIUM: It is best known for it lightness, high thermal and electrical conductivity, high reflectivity for light and heat and also for good workability. It does not corrode easily and unaffected by many chemical reactions. It is mainly used in building and electrical work and in various aspects of railway, road and air transport. Australia and Jamaica are the major producers.

IRON: Next to Aluminium, Iron is the most abundant metal in the Eath's crust. Iron ore is consumed in very large quantities in the manufacture of iron and steel and its uses are known to everybody. A large number of iron - bearing minerals are known, but only four are important commercial sources of the metal. They are magnetite, Haematite, Goethite and siderite. Major Producers are Russia, Australia, U.S.A., Brazil, China, Canada, France and India.

COPPER: Together with gold and silver, copper is one of the metal known to early man. Copper is mainly famous for its electrical and heat conductivity, corrosion resistance, and for its alloy properties. It is mainly used in the electrical and electronic fields. Major Producers are U.S.A., Chile, Canada, Russia and Zambia.

CHROMITE: Chromite is the ore mineral of chromium and generally found as dark-brown or black in colour. Chromium is primarily an alloying metal employed in the steel industry, in the manufacture of high speed tool steels and stainless steels. Chromite is also used for refractory purposes. Found mainly in South Africa.

SULPHUR: Sulphur is mainly used in the manufacture of sulphuric acid, which in turn is utilized in the preperation of varies fertilizers. It is also used extensively in the manufacture of rayon, pulp, paper, pharmaceutical and rubber industries. U.S.A. Canada, Poland, France and Russia are Major Producers.

TIN: Tin is famous for its resistance to corrosion and this characleristic is superior to that of even copper and nickel. Tin is mainly used in the tin plate industry and it is also used in the manufacture of Bronzes. Mined in Malaysia, Thailand and Indonesia.

LEAD AND ZINC : Lead and Zinc invariably occur together in nature, and galena and sphalerite are the principal minerals accounting for the most of the world's production. Lead is among the metals to have been used by early man. In present days lead is principally used in storrage batteries, cable covering, paint pigments, building construction and in so many other purposes. Lead is mainly used for its softness and extreme workability, alloying properties and good corrosion resistence. Lead is also used as radiation sheild and it is much ligher in weight than gold, platinum

and mercury. Contrary to popular belief, lead is much lighter in weight than gold, platinum or mercury. U.S.A., Russia, Australia, Canada and peru are the important producers of lead in the world.

For many years the only important use of zinc was for alloying with coper to make brass. The metal came into industrial prominence with the discovery that a thin coating of zinc protected iron sheets from rusting for longer periods (galvanizing). This technique has widespread application. Other important uses are zinc-base alloy die castings, the manufacture of brass and zinc oxide in rubber and paints. zinc is employed in the chemical industry as a reducing agent and in dye making. U.S.A. Russia, Australia, Canada and Peru are Major Producers.

MANGANESE: Manganese is essential in steel making, and this is mainly used for this purpose. Manganese is also used in the manufacture of drycells, varnishes, paints and inks. Manganese does not occur alone in nature in the metallic form, but chiefly as two black minerals, pyrolusite and psilomelane. Russia, India, South Africa and Ghana are the major manganese producing countries in the world.

NICKEL : Nickel like manganese and molybdenum finds its greatest single use in the steel industry to provide steel and cast iron with added strength and hardness, and resistance to corrosion and heat. Pure nickel is used principally in electroplating and also in the chemical, electrical and petroleum industries.

GOLD : Gold and silver were both known to man in prehistoric times, gold being long considered as the 'king of metals'. The principal uses of gold are as coinage and bullion. The next most important use is for ornamentation, especially in jewellary, for which purpose gold, as the most ductile and malleable metal, is hardened by alloying it with copper, silver, palladium, or nickal, the process giving the various 'carat' quantities in everyday use. The term carat indicates a twenty-fourth part; thus, twenty-two carat gold has twenty-two parts by weight of pure gold and two parts of alloying elements. Major mining of gold is done in south Africa which is followed by Russia, Canada U.S.A and Australia.

PHOSPHATE ROCK: Phosphate rock forms the basis of large mining industry of worldwide importance which ranks second to iron ore among economic mineral commodities in terms of gross production and international trade. More than four-fifths of the world production is consumed each year in making phosphoric acid and a wide variety of phosphate fertilizers, notably superphosphates and ammonium phosphates, most of the reminder is used in the growing production of detergents and animal feed supplements. Major mining of phosphate rock is done in U.S.A., Morocco and Russia.

IMPORTANT ROCKS AND MINERALS OF SALEM DISTRICT

Material	Availability	Uses
Magnesite	Chalk hills, Sirapalli, Chettipatti, Jalahandapuram and Vimanayakanur	Used in refractory purposes. Also used in the chemical, pesticide and ceramic Industries.
Bauxite	On hill caps in shervaroy hills and Kollimalai	Production of Aluminium and as abrasives
Chromite	Chalk hills between sittampundi and Karungal-patti, Konohampalayam, Karundanpalayam	Used in the manufacture of stainless steel, chemicals, and refractory purposes.
Lime stone	various places in Sankari, Thiruchengode and Namakkal Taluks	Used in Sugar, Tannery, Textile, Paper Rayon pulp industries and for blending in cement Industry. Used as Industrial lime and other lime based chemicals.
Ironore	Kanjamalai, Godamalai, Chitteri, Rasipuram, Namakkal, Valiyapatti	Ores to be utilized in Salem Steel Plant
Talc	Periya soragai, Tholo-sampatti, Aahampatti, Chinna-ppampatti, Tharamangalam, Araganur, Kavelli, Comaliyur, Marakottai and Machai	Used in making utensils, idols, toys, powders and Pesticides.
Quartz	Tharamangalam, Idappati, Tammampatti, Valaiyappatti, Paramathi, near Kabilar Malai and Mallikkarai	Used in Glass manufacturing, Ceramics and Electionic Industriesand as abrasives

Material	Availability	Uses
Feldspar	Tharamangalam, Mettur, Idappati, Mecheri	Used in the manufacture of Glass and ceramic Industries.
Corundum	Near sittampundi, Kancham-palayam, Pamanthapalayam, Sevittur angampatti	Used as drilling material, abrasives and as gem stones
Nickel	near vimanayakanur in namakkal Taluk	Plating work
Gold	Placer gold is reported in the Streams from the hill near Singiliyankombai and Eswaramurthipalayam in Rasipuram Taluk	Jewellery
Asbestos	Karuppur, Vellalapatti	in the preparation of asbestos sheet and fire fighting equipments
Barite	between Idappati and Taramangalam	in the manufacture of pesticides, paints and paper Industries
Beryl	Pollachipatti, Manickam-palayam, Muthunaickanpatti, Idappadi	Used as Semiprecious stone
Garnet	Kalrayan, Shevaroys, sitteri, and Kolli hills, sittampundi	Used as Emery and as precious stones
Granite Charnakite Doleorite	In yercaud and in many other places	Used as building stones and in Decorative purposes.

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