Title of the unit: unit-

4. Module name:

Structures and textures of metamorphic rock.

My name is Kimberly Fiona Afonso.

In this particular module,

we will highlight what are textures

and structures of metamorphic rock,

as well as outline the definition

of fabric in metamorphic rocks.

Also, we will list the subdivisions used

in classification of metamorphic rocks.

At the end of this module we

will be able to define textures,

structures and fabric of

metamorphic rock and name the three

fabric subdivisions used in the

classification of metamorphic rocks.

So what are structures?

Structures are large scale features.

The arrangement of the parts of a

rock mass irrespective of scale,

including the spatial relationships

between the parts,

their relative size and shape,

and the internal features of the parts.

So a microstructure would be a

structure that is seen at a thin

section or a smaller scale level, or,

mesostructure as a structure at

the hand specimen scale and a mega-

structure is at an outcrop level,

or even a regional scale to

a very large scale.

Microstructure can be

synonymous with texture.

So what is texture?

It is the relative size,

shape and spatial interrelationship

between grains and internal

features of the grains in in a rock.

Also,

it can be defined sometimes

as the presence of preferred

orientation on a microscopic scale.

If so,

it can be used synonym with micro-fabric.

It refers to basically small scale

features in the rock that are penetrative,

meaning, that, the textures occurs

on virtually all of the rock

body at the microscopic

level.

So, fabric is the relative orientation

of the parts of the rock mass.

It is commonly used to refer

to the crystallographic an/ or

shape orientation of the mineral

grains or a group of grains,

but can also be used on a larger scale.

Whenever we have a preferred

linear orientation of parts,

it is termed as linear fabric.

Whenever we have preferred

planar orientation,

it is termed as plannar fabric and a lack

of any sort of preferred orientation,

is referred to as random fabric.

So fabric is the arrangement

of the components features of

a rock that is, the size,

shape and mutual relationship

between the adjacent minerals.

The few factors responsible that will impart

fabric to a rock includes the textures,

the composition,

the microstructure,

as well as a preferred orientation.

We need to remember, that metamorphism

takes place essentially in solid state.

Therefore,

the fabric of a metamorphic rock is

a result of mechanical deformation

that accompanies metamorphism, as

well as, the mineral reconstitution

of the pre-existing rocks.

Fabric can be grouped as either

relict fabric or crystaloblastic

fabric. Relict fabric is that when you

have sort of features of the parent

rock that survives metamorphism and

therefore preserved in the rocks as a relict,

whereas crystaloblastic fabric

is due to recrystallization

that occurs in solid state.

This is called as crystaloblastic fabric,

and these textures are newly

imposed on the rock.

Porphyroblastic and granoblastic are the

most common types of crystallographic fabric.

These include the isotropic and anisotropic

fabric that we will see in the next module.

Xenoblastic fabric is where in the

mineral develops within irregular

outline. In those rocks where you have

good crystal faces then the term idio-

blastic is used. Porphyroblastic is in

which you have large crystals that are

embedded in a fine green matrics.

Foliated imposed fabric is exhibited

by rocks like slates, phyllites,

schists, gneisses, and migmatites.

Its degree of perfection decreases

with an increase in the grain size.

If the minerals are dominantly

prismatic or tabular. This texture,

as described as Nematoblastic.

However, if they are flaky,

it is called as lepidoblastic.

Let us look at the geometric

aspect of fabric.

The three dimensional geometric array

of the grain boundaries and the grain

aggregate boundaries in a metamorphic

rock can be classified into two groups,

the isotropic or the random boundaries,

and anisotropic,

wherein you have boundaries having a

different aspect in different direction.

The anisotropic can be further

Planar, linear and planar linear.

The geometry of the imposed fabric in

metamorphic rocks will reflect the

pattern of cohesive deformational

flow or a lack of flow that occurred

during the metamorphic event.

It also points directly to the

nature of stresses that are

being applied to the system.

That is, if the stresses of non

hydrostatic kind or hydrostatic stresses,

we need to remember that hydrostatic

stresses, are stresses, that are

uniformly acting in all directions

but non-hydrostatic or not.

The mineral composition of the

rock that reflects the pressure,

temperature and the chemical nature

of the system has a strong influence

on the expression of fabric.

Because of the characteristic shapes

of the mineral grains themselves.

For example,

If we have a interlayered body

consisting of quartzites and schists,

that are metamorphosed under the same

pressure, temperature, environment,

this rock may display a different

development of foliations.

The schists may be strongly foliated.

As compared to the gneisses,

that is because the schists contain abundant,

micas having preferred orientation,

while quartz on the other hand

is weakly foliated because it is

made up of discoidal quartz grains.

Therefore the mineral composition

does have an influence on the

fabric of metamorphic rocks.

Let us look at the three fabric subdivisions.

The three fabric subdivisions

that can be used to classify

metamorphic rocks are as follows:

The 1st is a strongly foliated rocks.

These are those rocks wherein,

the rock readily cleaves or breaks along

the foliation into plates or slabs.

Usually, but not necessarily,

because of the abundant oriented

mica or other phyllosilicate flakes.

This texture,

when it when you have phyllosilicate flakes

is called a lepidoblastic fabric.

The next we have the weakly foliated rock.

Here it is where in the foliation,

though is perceptible,

is mechanically rather passive

or insignificant.

The rock tends to break across

the foliation rather than along it.

And the last we have,

those kind of rocks that are

called as non-foliated.

These essentially have a isotropic

fabric wherein, they look the same

almost in all the directions.

So this is a table which shows

this classification of metamorphic

rocks based on the fabric.

That is the strongly foliated rock

towards my left, weaklyfoliated rock at

the center and non-foliated to very

weakly foliated rocks to the right.

The examples in each other in the

first you have the slates, schists,

and the phyllites, in the middle one,

wherein you have weakly foliated.

You have the gneisses and the migmatites

and the non-foliated includes:

Granofels, your hornfels,

the quartzites, marbles, skarn, etc.

These are your references.

Thank you.