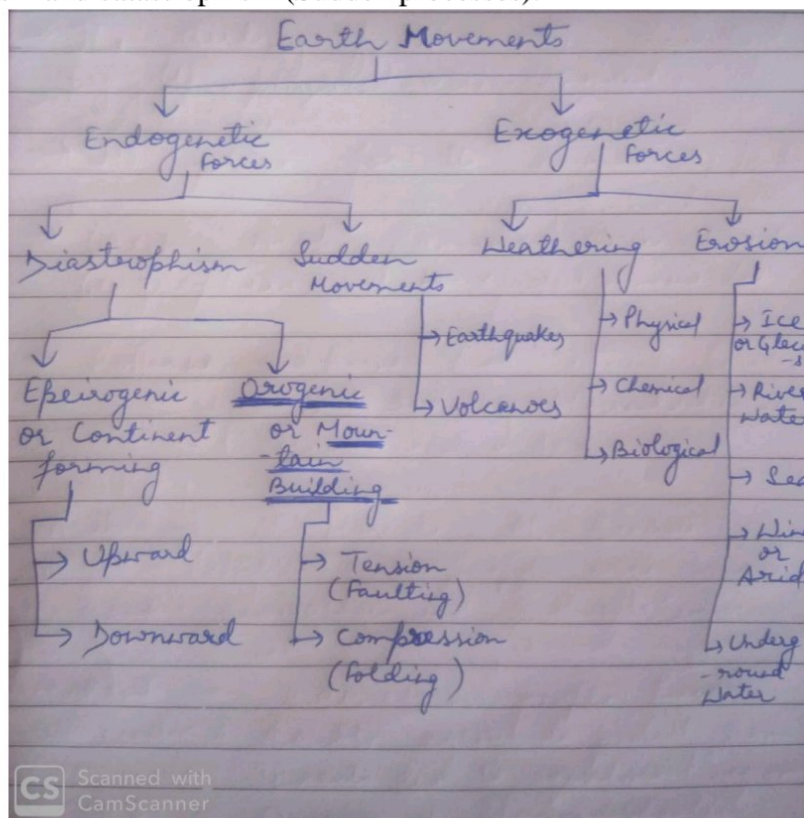


THEORIES OF MOUNTAIN BUILDING

- **Geomorphic Processes:** Geomorphic Processes is a natural process through which the endogenic and exogenic forces causing physical stresses and chemical actions on earth materials bring about changes in the configuration on the surface of the earth. It can be either exogenetic/ exogenic processes or endogenetic/endogenic processes.
- **Exogenetic Processes:** The exogenetic process originate their energy from atmosphere determined by the ultimate energy from the sun and also the gradients created by tectonic factors. Weathering, mass wasting, erosion and deposition are exogenetic geomorphic processes.
- **Endogenetic Processes:** The geomorphic processes which are caused by the energy originating from within the earth are called endogenetic geomorphic processes. This energy is mostly generated by radioactivity, rotational and tidal friction, and primordial heat from the origin of the earth. This processes are outcome of endogenetic forces. Due to variations in geothermal gradients and heat flow from within, crustal thickness and strength, the impacts of endogenetic process are not uniform and hence the tectonically controlled

original crustal surface is uneven. Endogenetic processes are further classified into diastrophism and catastrophism (Sudden processes).



Diastrophism

- All processes that move, uplift or build up portions of the earth's crust are known as diastrophism. Diastrophism is a slow process which acting over a long period of time and produces landform of higher magnitude and amplitude. They are divided into two groups.
- **Epeirogenetic Processes:** Epeirogenetic processes involves uplift or warping of large parts of the earth's crust. It is known as continent building process. Endogenetic force in this process acts along vertical section from earth's centre to the surface. Emergence and submergence of the coastline are two important impacts of the epeirogenetic process. Eastern coast of India is emergent coast while that of western coast is submergent coast.
- **Orogenetic Processes:** The geomorphic processes which include mountain building through severe folding and affect long and narrow belts of the earth's crust is called orogenetic processes. It acts along the horizontal axis and they are responsible for Folded Mountains as well as oceanic ridges. These movements are more localized in comparison to epeirogenetic, and it also include tangential forces i.e. horizontal movement, resulting in compression and tension of the crust. Orogenetic movements occur in episodes, widely spaced in geologic time and, worldwide in extent. During the long intervals between two consecutive periods of orogeny, the earth's crust remains stable or subject to slow epeirogenetic uplift or subsidence. Folding, faulting and continental drift constitute horizontal movements.

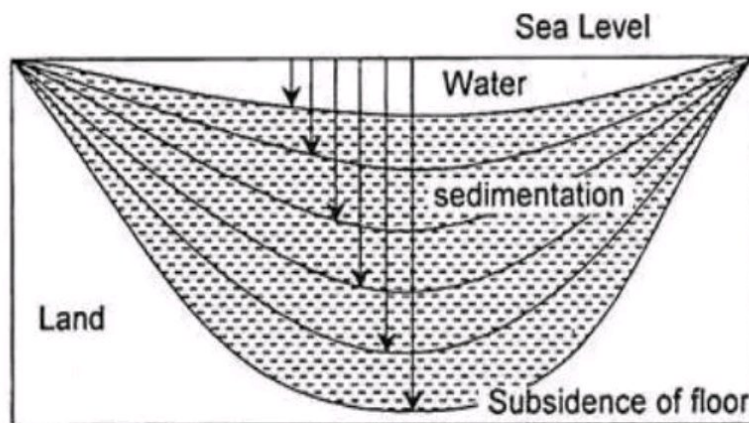
- **Folding:** Wave like bends are formed in crustal rocks due to the tangential compressive force resulting from horizontal movement caused by the endogenetic force creating deep within the earth. Such bends are called ‘folds’ where in some parts are bent up and some parts are bent down. The up folds are termed anticlines (crests) and the down folds are termed synclines (troughs).
- **Fold Mountains:** Fold Mountains are result of large scale earth movements under stress sets in the earth’s crust. Stress lead to generation of compressive forces that produce folding along the lines of weakness. Folded mountains are also rich storehouse of minerals including tin, copper, gold and petroleum. All the major mountain systems of the world including Himalayas, Alps, Andes, and Rockies etc. are the example of young fold mountains.
- **Faults:** When the crustal rocks are displaced due to tensional movement caused by the endogenetic forces along a plane the resultant structure is called a fault. The different types of faults are:
 - **Normal Fault:** If the displacement of the rock blocks is down to the direction of the dip then the resultant fault is called Normal fault. Normal faults are formed due to the displacement of both the rock blocks in opposite directions due to tensional force.
 - **Reverse Fault:** Reverse faults are formed due to the movement of the fractured rock blocks towards each other. In reverse faults, the rock beds on the upper side are displaced up the

fault plane relatively to the rock beds below. During the reverse faulting the horizontal stress is maximum on the rock, while the vertical Stress is minimum.

- **Rift Valley:** Rift valley is a major relief feature resulting from faulting activities. It characterizes a trough, depression or basin between two crustal parts. Rift valleys are formed due to displacement of crustal parts and subsidence of middle portion between two normal faults by horizontal and vertical movements travelled by endogenetic forces. Rhine rift valley is the best example of rift valley. Other example of rift valleys are Jordan River valley, Death Valley of southern Californian and Dead Sea in Asia etc.
- Folding, faulting, volcanic activity, igneous intrusion and metamorphism can all be parts of the orogenic process of mountain building.
- **Mountain Building Theory by Kober**
- Kober attempted to explain the theory of origin of mountains based on his geosynclinal theory. He considered long and wide mobile zones of water in places of present-day mountains called geosynclines or orogen which were surrounded by rigid masses called kratogen (forelands) e.g. Canadian shield, peninsular India etc. Mountains are formed out of these geosynclines.
- He proposed three stages of mountain building:

1. Lithogenesis:

The first stage is related to the creation of geosynclines due to the force of contraction caused by the cooling of the earth. Erosional material from the kratogen is deposited in the geosyncline causing sedimentation and subsidence.

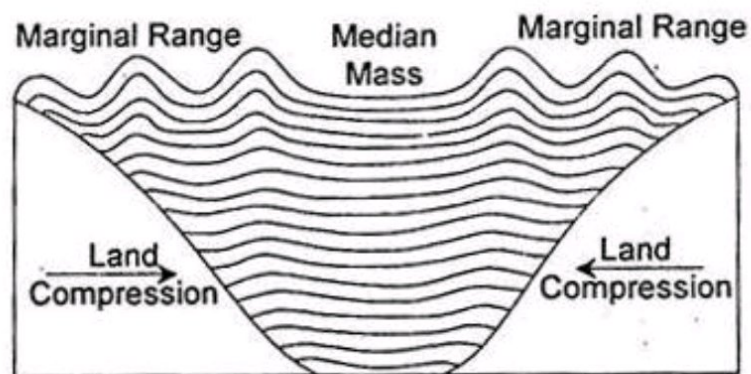


2. Orogenesis:

In this stage, the kratogen start to move towards one another due to horizontal movements caused by force of contraction. The compressive force thus generated, causes contraction, squeezing and ultimately folding of the geosynclinal sediments to form mountain ranges. The parallel ranges formed on either side are termed as randketten.

3. Gliptogenesis:

The third stage is characterised by a gradual rise of mountains and their denudation by fluvial and other processes. Continuous denudation results in a gradual lowering of the height of mountains.



- The theory can be evaluated as follows:
 1. It accounts of various aspects of mountain building as in this theory, folding depends upon the intensity of compressive forces. If the forces are of moderate intensity and normal, only the marginal sediments are folded into randketten while the middle segments are unaffected and lead to the formation of median mass e.g. Tibetan plateau between the Kunlun Mountains and the Himalayas.
 2. After the advent of plate tectonic theory, the concept of Kober that both forelands move together has been validated as in seen from palaeo-magnetic evidence and seafloor spreading.
- Limitations of the theory are as follows:
 1. The force of contraction generated due to cooling of the earth as envisaged by Kober is not sufficient to cause mountain building.
 2. Though it explains the east-west extending mountains like the Alps and the Himalayas, it does not explain the north-south extending mountains like the Rockies and the Andes.
- Thus, though it had its limitations as seen above, Kober's theory is given credit for advancing the idea of the formation of mountains from geosynclines.