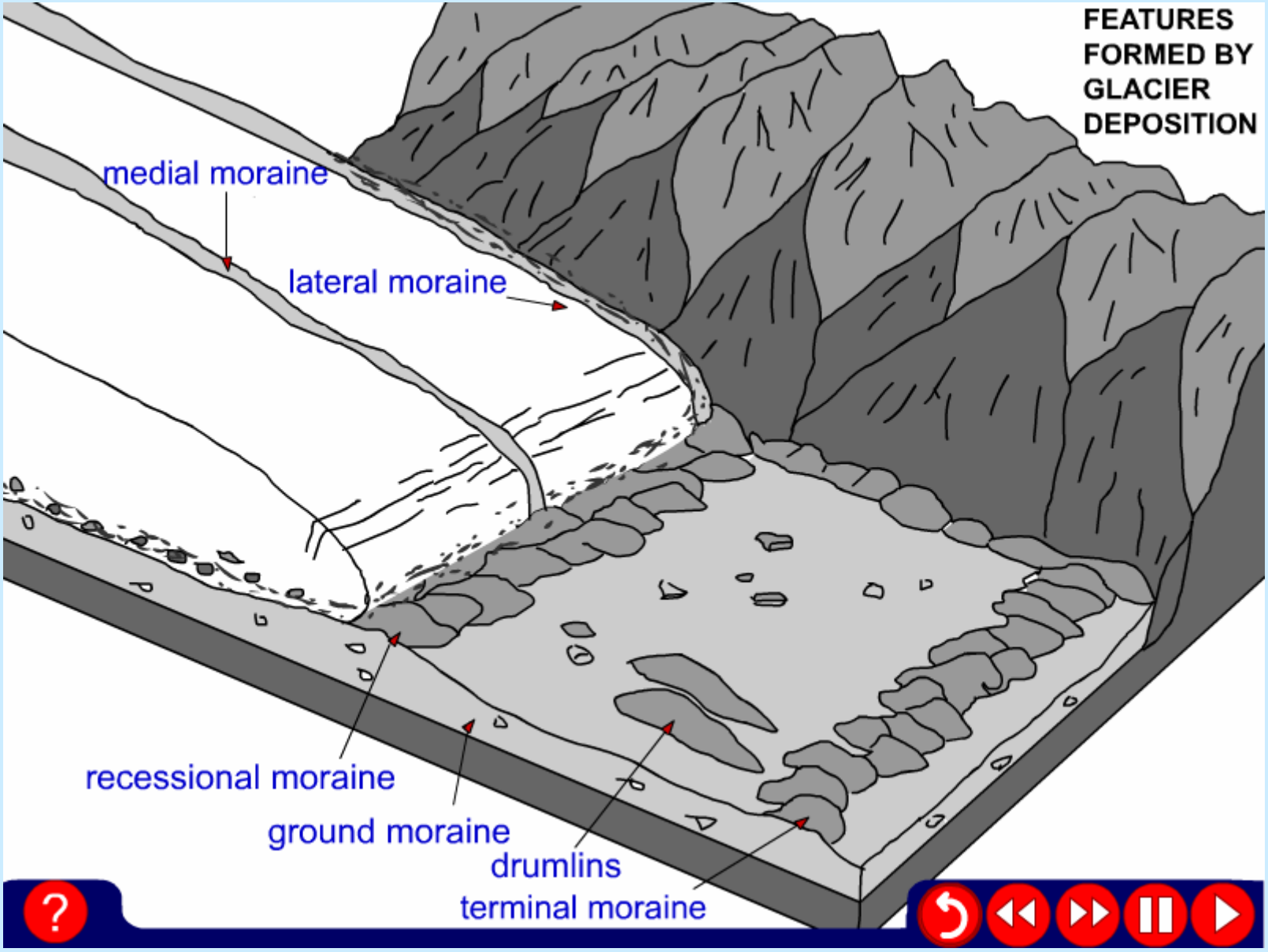
Glacial and fluvioglacial Deposition

Erratic	Lines of loose rock fragments which have been weathered from the valley sides above the ice the deposited material near to valley sides.
Till	Where two glaciers meet, lateral moraines join together.
Lateral Moraine	Unstratified glacial deposit composed of finely grained rock flour (sands and clays) mixed with rocks of different sizes and shapes. Can be deposited by actively moving glaciers or stagnant ice.
Medial Moraine	At the snout of the glacier, material is deposited as a crescent-shaped mound.
Recessional Moraine	Small, oval mounds which consist of sandy till. The deposition occurs when friction between the ice and rock was stronger than adhesion between material and ice.
Terminal Moraine	Large boulders foreign to the local geology. They are dumped by the ice in flat areas.
Drumlin	Mark the site where the snout of the glacier halted for brief periods during the retreat of the ice front.

Glacial deposition



Fluvio-glacial Deposits

Fluvio-glacial depositional landforms are different from glacial deposits because they are made of sediment such as clay, sand and gravel that is layered or stratified.

Meltwater is an important agent of sediment transport and deposition in warm based glaciers and during phases of climate warming and de-glaciations.

Meltwater stream are found:

1. On the ice surface – supraglacial
2. In tunnels within the glacier – englacial streams.
3. Beneath the glacier – subglacial streams.

Meltwater streams carry debris and deposit this during active ablation (melting, evaporation etc), de-glaciation or prolonged periods of ice stagnation.

Example – Briedamerkurjokull glacier, SE Iceland

Prolonged Drift

Material dropped by glacial lakes. When glaciers retreated, lakes frequently formed as temporary features. Material was then deposited into these lakes from seasonal meltwater. Summer meltwater produces coarse material deposits, winter was finer.

Outwash Plains (Sandur)

Glaciers contain large amounts of sediment, picked up as they erode the underlying rocks. At the snout of the glacier, meltwater can carry this sediment away from the glacier and deposit it on a broad plain. Material is well sorted by the meltwater streams. Coarsest materials deposited first, finer materials carried down the valley and then deposited.

Outwash Plain

Eskers

Elongated ridges of coarse, stratified (layered) Fluvio-glacial material (sand and gravel).

The ridges usually meander e.g. Scandinavia, where they wind for 100km between lakes and marshes.

Material was deposited in sub-glacial meltwater tunnel during lengthy ice stagnation.

Example – Trim Esker in Ireland.

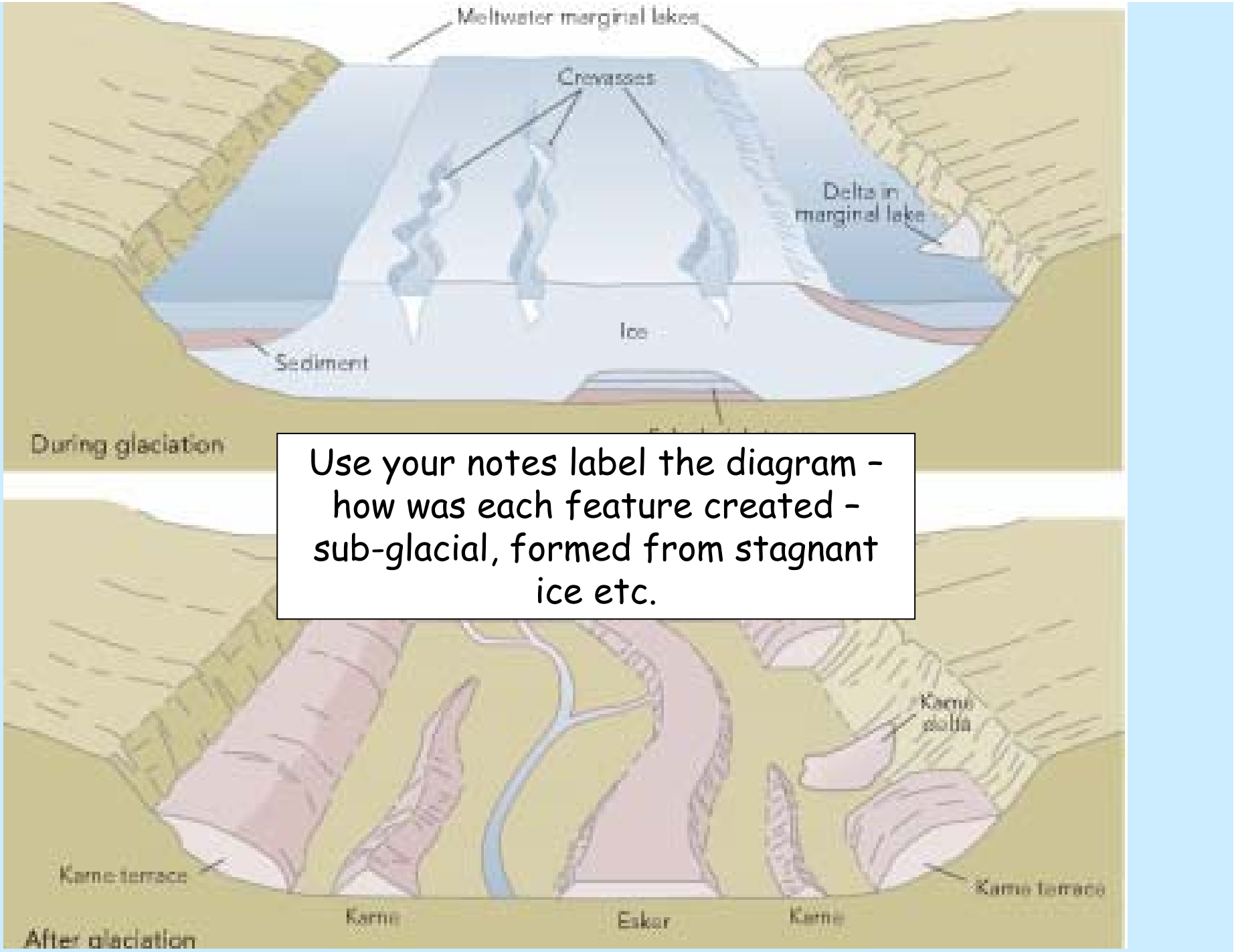
Kames

- Irregular mounds of bedded sands and gravels, arranged in a chaotic manner. Flat topped – usually 20-30m in height.

- True Kame/ Kame Delta – a small delta formed where meltwater stream flowed out beneath an area of stagnant or slowly decaying ice, into a lake dammed between the ice front and drift material.

- Characteristic feature of kames is small shallow hole – Kettle Hole – due to deposition of material around blocks of ice broken off from the front of the stagnant ice body. Each block of ice would finally melt leaving a hole. Holes are often filled with water.

- Kame Terraces – Formed along an ice edge, laid down by streams occupying the trough between the ice and the valley side. Appear narrow and flat topped, terrace like ridges


Meltwater marginal lakes
Crevasses
Delta in marginal lake
Ice
Sediment
During glaciation
Use your notes label the diagram – how was each feature created – sub-glacial, formed from stagnant ice etc.
Kame delta
Kame terrace
Kame
Esker
Kame
Kame terrace
After glaciation

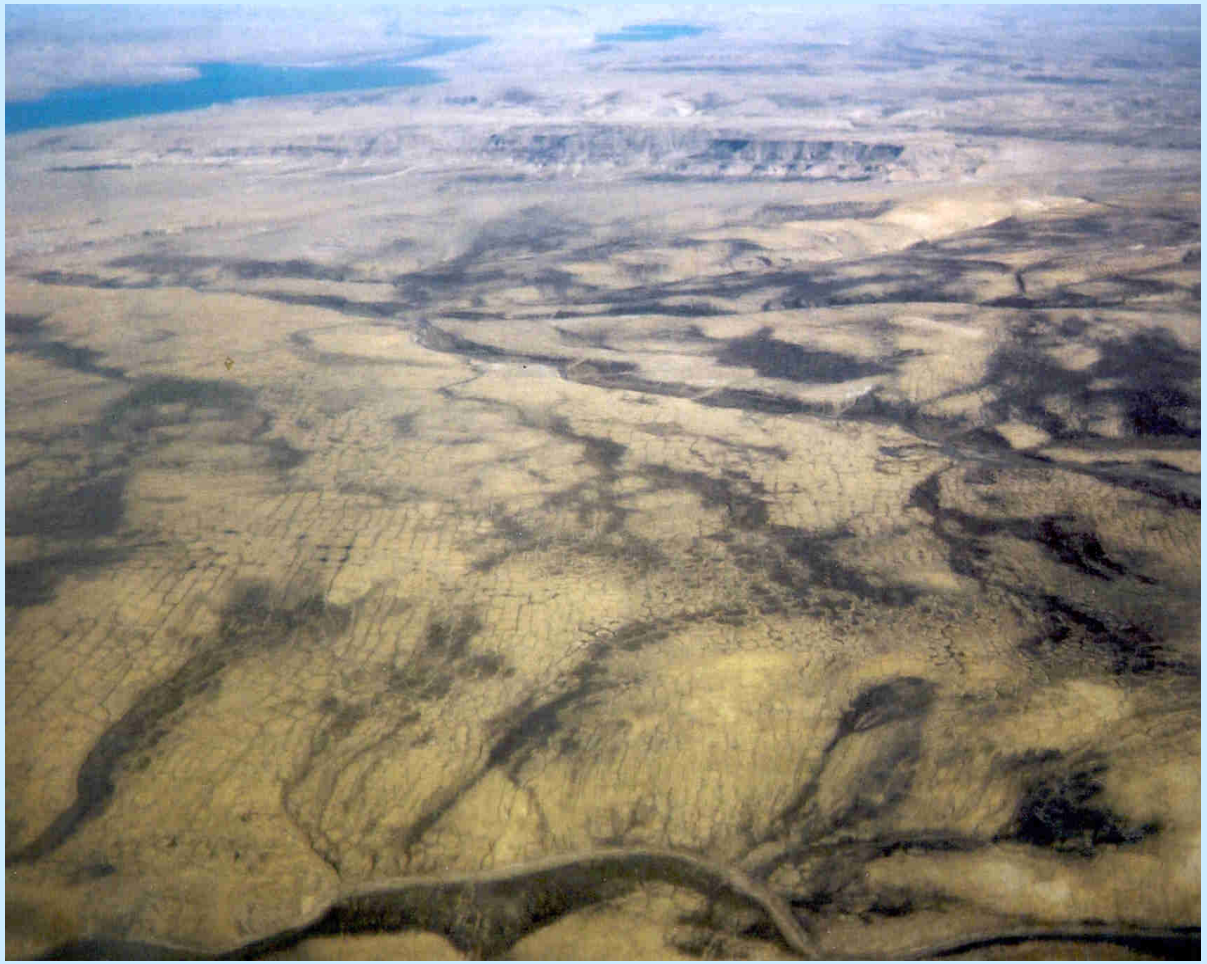
Periglacial features

Patterned ground

- Intense freezing and thawing in periglacial climates sorts surface rock into a variety of geometric patterns.
- Patterns can vary from a few cm in size to cover 100m. Includes a variety of shapes – circles, polygons and stripes.
- Circles and polygons are more common on flat ground.
- Stripes are more common on slopes between 5 and 30 degrees.
- Slopes over 30 degrees mass movement is too rapid to allow patterned ground to form.

Causes of patterned ground

Frost heave – help move larger stones to the surface.
Intense cold – ground cracks and stones may roll into cracks.
Surface wash – important for formation of stripes



Pingos

Isolated, cone shaped hills up to 100m in height. Only in PERIGLACIAL areas.

Form as a result of freezing water under pressure.

- **<u>Open system pingos-</u>** formed in valley bottoms when the source of the water is distant.

- In areas of discontinuous permafrost. Groundwater forces its way to the top and freezes (expands).

- The ice forces overlying sediment upwards into a dome-shaped feature, in the same way that frozen milk lifts the cap off its bottle.

Closed system pingos

An isolated feature on flat, low-lying areas where the permafrost is continuous.

Formed when a lake in a permafrost area is in-filled with sediment. This causes an increase in the amount of insulation and the permafrost expands.

This traps a body of water (talik) which freezes. Expands and creates a pingo.

Relict (Past features)

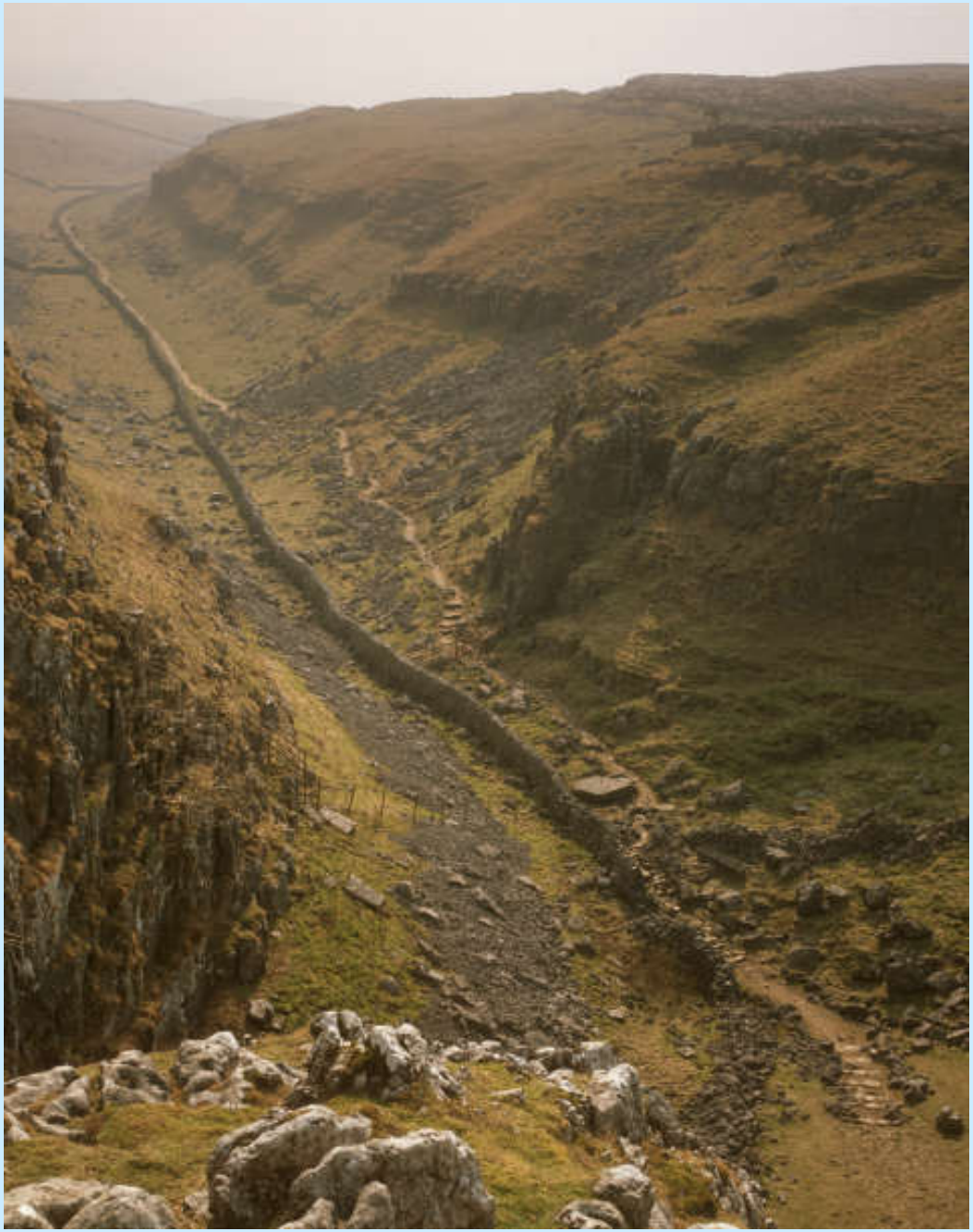
Dry Valley

River valleys without rivers – common on chalk and limestone such as The Manger at Uffington.

During periglacial period limestone and chalk become impermeable – permafrost- therefore rivers flow over the surface.

High rates of river erosion occur because of springmelt, (flooding in spring because of melting winter snow) highly weathered nature of the surface and high rates of carbonation.

At the end of periglacial period, normal permeability returns, water infiltrate into permeable rocks and valleys are left dry.



Dry Valley,
Malham

Misfit rivers

Small rivers/streams that occupy large valleys – result of periglacial activity.

Some rivers (eg River Windrush and Evenlode in Cotswolds) are too small and ineffective to create steep valleys with wide floodplains.

During periglacial phase, rapid runoff from snowmelt would have allowed these rivers to carve steep, over deepened valleys, which bear no relation now to the small streams and rivers that flow in them.