Chapter 8 Limestone and Chalk Landform

Limestone and Chalk

Limestone and chalk are *sedimentary rocks* of organic origin derived from the accumulation of corals and shells in the sea. In its pure state, limestone is made up of *calcite* or **calcium carbonate**, but where magnesium is also present it is termed **dolomite**. Chalk is a very pure form of limestone, white, and rather soft. Limestone is **soluble** in rain-water, which, with carbon dioxide from the air, forms a weak acid. A region with a large stretch of limestone therefore possesses a very distinct type of topography. It is then termed a **karst** *region*, a name derived from the Karst district of Yugoslavia where such topography is particularly well developed.

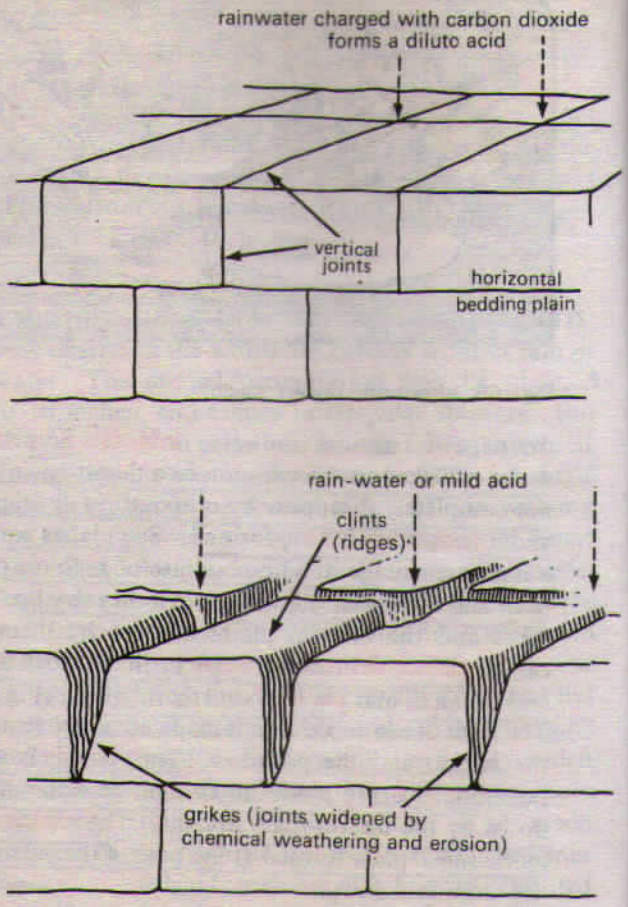

Fig. 64 Limestone pavement

Characteristic Features of a Karst Region

Generally speaking, karst regions have a bleak landscape, occasionally broken by precipitous slopes. There is a general **absence of surface drainage** as most of the surface water has gone underground. Streams rising on other rocks only flow over limestone for a short distance and then disappear underground. For the greater part of their course, they cut their way along the joints and fissures of the rock wearing out a system of underground channels. The surface valleys are therefore dry. When the water penetrates to the base of the limestone and meets non-porous rocks it re-emerges onto the surface as a spring or **resurgence**.

Limestones are **well jointed** and it is through these joints and cracks that rain-water finds its way into the underlying rock. Progressive widening by

A limestone escarpment. Notice that the valley is cultivated but the limestone is bleak and treeless
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solution enlarges these cracks into trenches and a most intriguing feature called **limestone pavement** is developed. The enlarged joints are called **grikes** and the isolated, rectangular blocks are termed **clints**. The limestone pavements may have been formed beneath the soil and are now exposed by the removal of the soil cover (Fig. 64).

On the surface of the limestone are numerous **swallow holes**, which are small depressions carved out by solution where rain-water sinks into the limestone at a point of weakness. They are also known as **sink holes**. Gaping Ghyll in Yorkshire is a fine example. These holes grow in size through continuous solvent action.

Once water has sunk into the limestone it etches out caverns and passages along joints or bedding planes. When the roof of an underground tunnel collapses, a precipitous **limestone gorge** such as the Cheddar Gorge is formed. Where a number of swallow holes coalesce a larger hollow is formed and is called a **doline** (Fig. 65). Several dolina may merge as a result of subsidence to form a larger depression called an **uvala**. Some of them are a mile across, containing much clayey soil from the limestones, weathered after their subsidence.

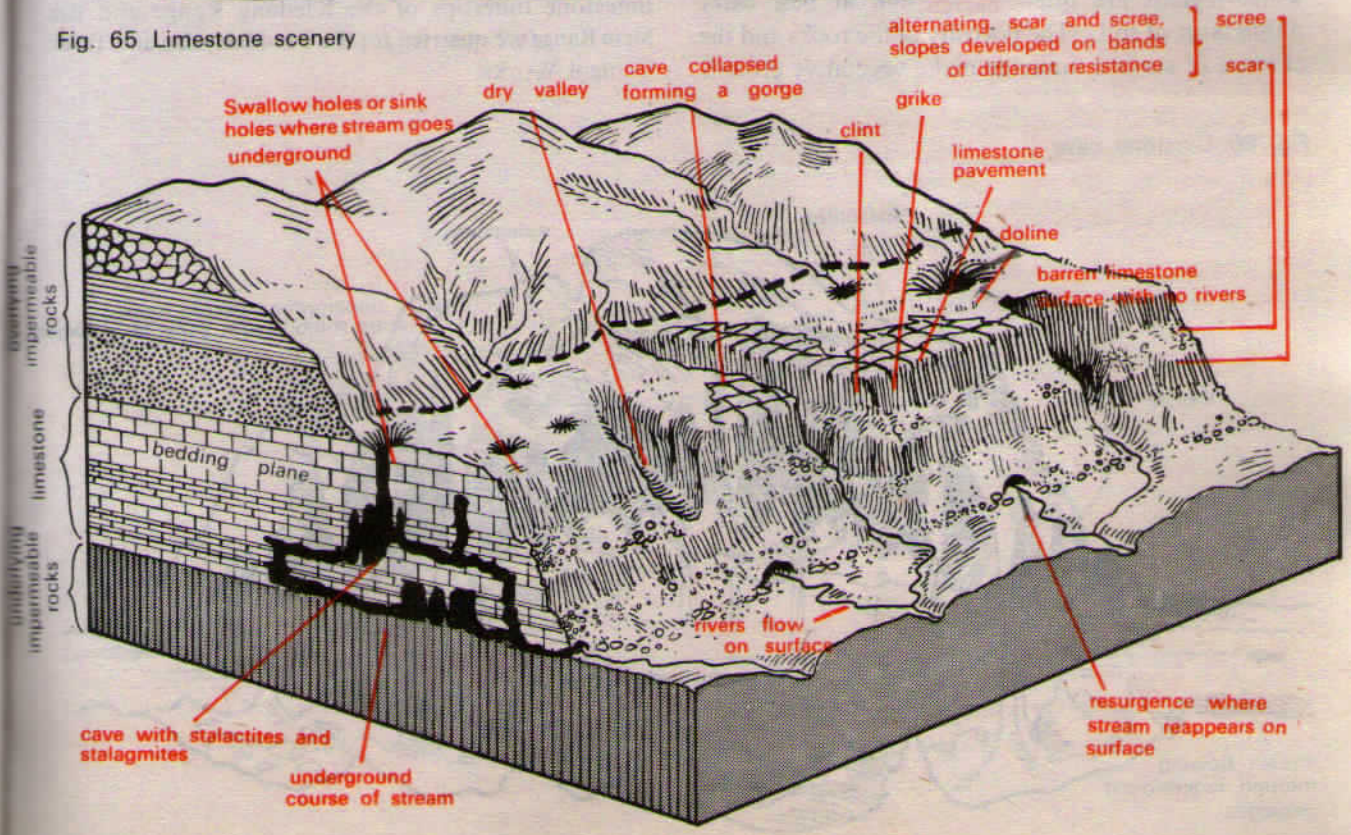
In Yugoslavia, some very large depressions called

A limestone pavement

polje may be as large as a hundred square miles but these are partly due to **faulting**. During the rainy season, parts of the floor which are at or near the water table may become temporary lakes, but the drier areas are fertile and may support large villages.

Where subterranean streams descend through swallow holes to underground passages, the region may be honeycombed with **caves** and *caverns*, some containing ponds and lakes. The most spectacular underground features that adorn the limestone caves are stalactites, stalagmites and pillars. **Stalactites**

Fig. 65 Limestone scenery



are the sharp, slender, downward-growing pinnacles that hang from the cave-roofs. The water carries calcium in solution and when this lime-charged water evaporates, it leaves behind the solidified crystalline calcium carbonate. As moisture drips from the roof it trickles down the stalactite and drops to the floor where calcium is deposited to form **stalagmites**. They are shorter, fatter and more rounded. Over a long period, the stalactite hanging from the roof is eventually joined to the stalagmite growing from the floor to form a **pillar** (Fig. 66). Such features are commonly seen in any well-developed limestone caves e.g. Batu Caves, Kuala Lumpur; Mammoth Caves, Kentucky and Carlsbad Cave, New Mexico, in U.S.A. and Postojna Caves, Yugoslavia.

The Major Limestone Regions of the World

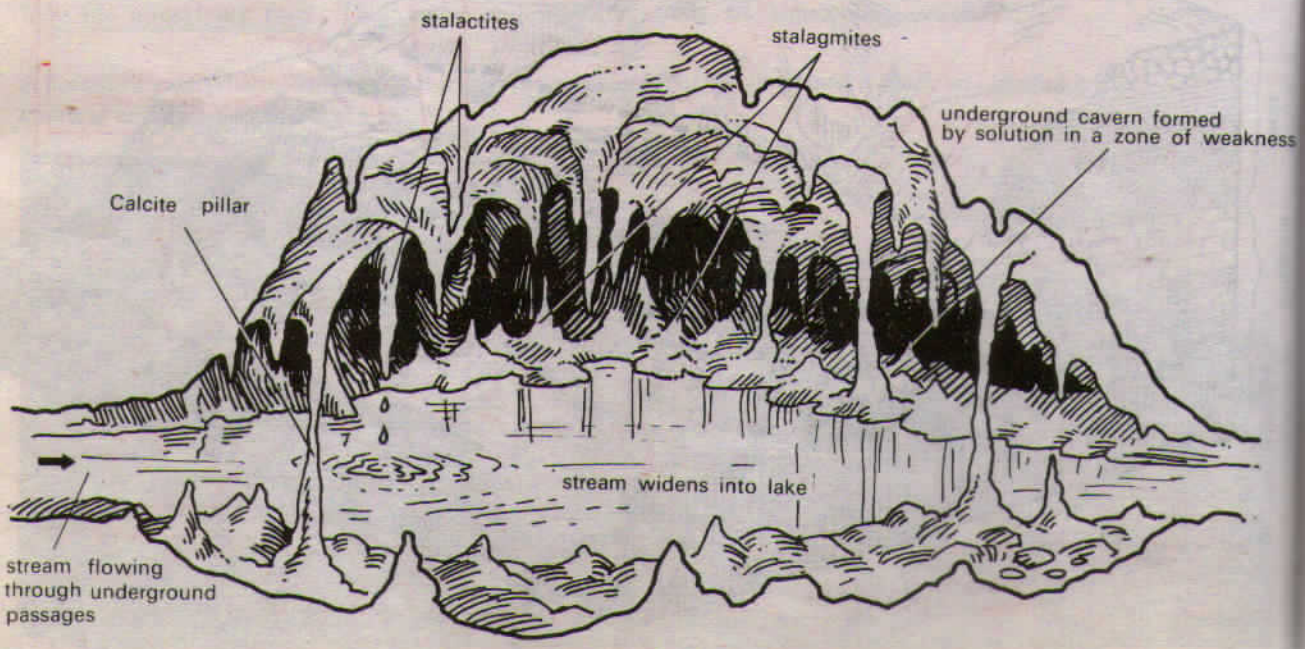
The most characteristic stretch of limestone occurs in north-west Yugoslavia. Other regions include: the Causses district of southern France, the Pennines of Britain, Yorkshire and Derbyshire in particular, the Kentucky region of the United States, the Yucatan Peninsula of Mexico, the Cockpit Country of Jamacia, and the limestone hills of Perlis.

Human Activities of Karst Regions

Karst regions are often **barren** and at best carry a thin layer of soil. The porosity of the rocks and the absence of surface drainage make vegetative growth difficult, so that limestone can usually support only poor grass and short turf; some sheep grazing is possible. Limestone vegetation in tropical regions, however, is luxuriant because of the heavy rainfall all the year round. Settlements are scattered and the population is often sparse. The only mineral of importance is **lead** which occurs in veins in association with limestone. Besides this, good quality limestones are often used as **building** materials or quarried for the **cement** industry. In West Malaysia, the limestone outcrops of the Kledang Range and the Main Range are quarried for the Pan-Malaysian and Tasek Cement Works.

A dry valley in the chalk region of southern England

Fig. 66 Limstone cave



Chalk

The landforms of chalk are rather different from those of other limestones. There is little or no surface drainage and valleys which once contained rivers are now dry. These are often called coombes. The chalk forms low rounded hills in southern and south-eastern England, where they are called downs and in northern France. The chalk is covered with short turf, and in places with woodland, and is used for pasture and sometimes for arable farming. Because of the friable nature of the rock, swallow-holes and underground cave networks do not generally develop.

QUESTIONS AND EXERCISES

1. Choose *three* outstanding features of a karst region. With the aid of diagrams describe their appearance and explain how they have been formed.

2. The following features are associated with karst topography.
   (a) Clints and grikes
   (b) Dolines and uvalas
   (c) Stalactites and stalagmites

   For any *two* of them, with the aid of annotated diagrams, explain their origin and locate an actual example of each.

3. Explain why:
   (a) Karst regions have very little surface drainage.
   (b) Subterranean streams produce a magnificent underground scenery.
   (c) Limestone areas have little agriculture and are sparsely peopled.

4. With the aid of labelled diagrams, describe and account for the development of physical features which result from the action of *water* in:
   (a) limestone regions
   (b) arid deserts
   (c) granite uplands

5. Draw a large diagram of a karst region and indicate the following: swallow holes, limestone gorge, dry valleys, limestone pavement with clints and grikes. Describe briefly how any *two* of them have been formed.