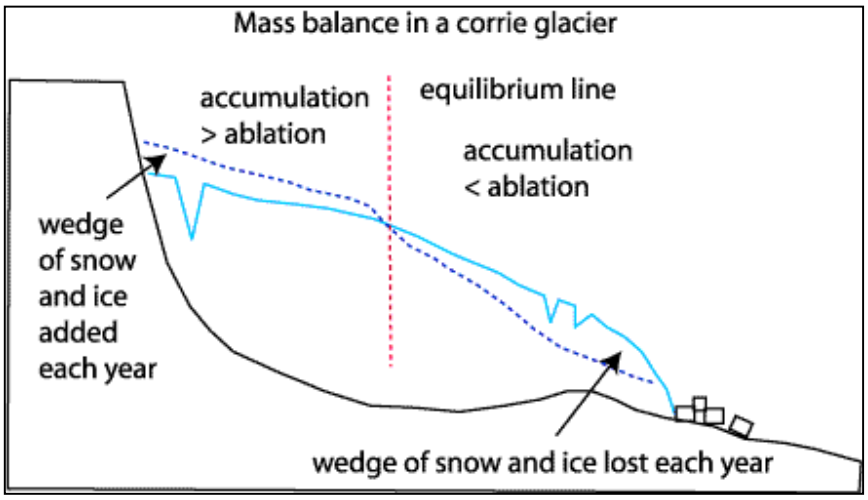
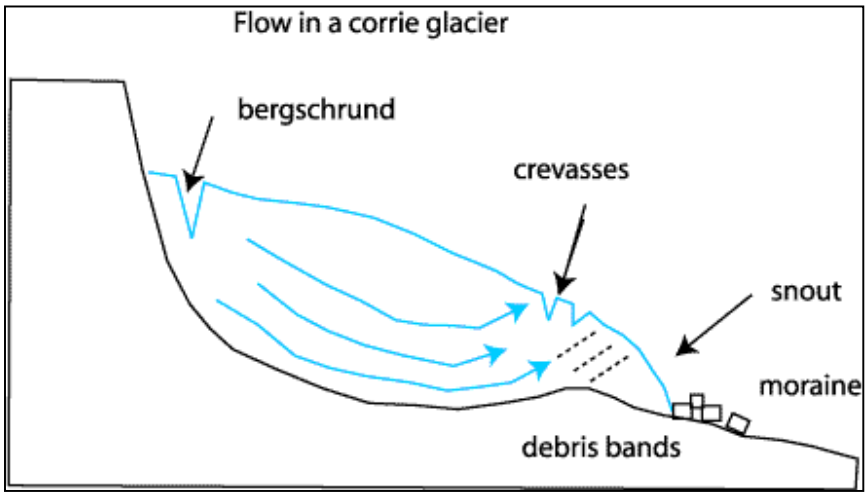
Corrie or Cirque Formation

Corries or cirques are mountain valley heads which have been shaped into deep hollows by the erosion of small glaciers. In Britain, many corries were last filled by glacier ice around 12, 000 years ago but these corries have held glaciers on many occasions during the last 2.4 million years. In high mountains elsewhere in the world cirques hold glaciers today. This allows presently-acting processes to be related to the landforms exposed on British corrie floors on the now exposed beds of former glaciers.

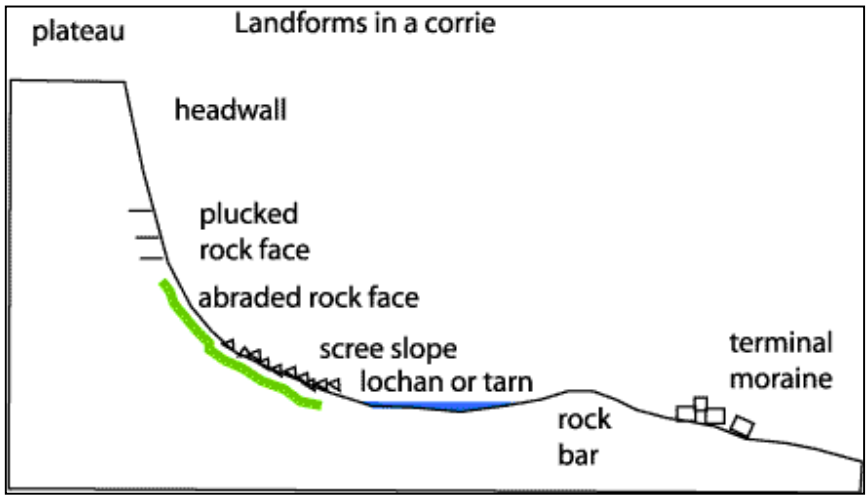
Godard plotted the orientations of all the corries in the Northern Highlands of Scotland and found that 71% faced between north and east. This indicates that in Scotland corrie glaciers develop in preglacial hollows on shaded slopes that receive snow blow from the prevailing south-westerly winds. Snow blow is particularly important in feeding glacier development because corrie glaciers are relatively small glaciers that form during periods only just cold or snowy enough for glaciation. Under more intense conditions ice caps and ice sheets form and the corries may feed ice into larger glacial systems.



Corries offer many opportunities to link the flow of the glacier to the processes of glacial erosion and to the form of the corrie. The flow is traditionally depicted as rotational but this style of flow can only develop once the rock basin has formed. In the early stages of corrie deepening, it is the high through flow of ice, combined with its maximum thickness, which gives greatest erosion of the corrie floor at the equilibrium line. This allows the rock basin to be gouged out, although structural weaknesses may also be important.



Careful examination of the landforms found within corries such as Coire an t-Sneachda reveals a series of process zones. Here the features found on the former bed of the glacier can be used to identify the processes of erosion. The location and size of the zones varies considerably between corries but the sequence is a general one. The zone of deposition may rest directly on abraded bedrock - this is a reflection of the small size of the last glacier that occupied the corrie compared to earlier glaciers.



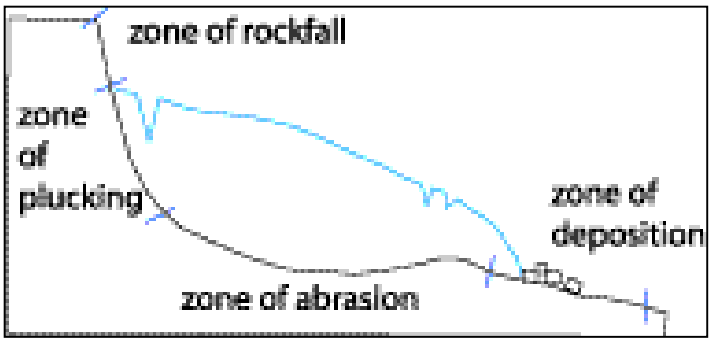
The role of non-glacial processes in shaping corries is often understated. The headwall is steepened by glacial erosion and becomes unstable when the support of the glacier is removed if it melts. This can lead to rock slope failure. where a large part of the headwall or sidewall. More routinely, it gives accelerated rock fall and the loss of loose rock debris to avalanches and summer deluges.

The bergschrund crevasse often provides a formidable obstacle to the climber. This crevasse forms at the back of the cirque. Ice is frozen to the backwall. The rock-ice bond is stronger than the ice so the glacier splits internally. The bergschrund is one route by which avalanche and rockfall debris can enter the body of the glacier.

The flow of a corrie glacier is driven by mass transfer of ice due to gravity. The highest parts of the glaciers are coldest and most shaded. On balance through the year more ice accumulates than is lost to melt. Conversely, the lowest parts of the glacier lose mass to sun and rain and generates a great deal of meltwater. Glacier flow evens up the mass balance by transferring ice to the base of the glacier by flow. The discharge of ice is greatest at the equilibrium line, where accumulation and ablation are equal.

Cirque glacier in the European Alps

Moraine at the edge of a cirque glacier



If the former glacier did not fill the corrie then its headwall was exposed to frost shattering and rock fall above the ice. This part of the rock wall is typically riven by deep gullies and has lots of loose rock. Below the rock surfaces may be fresher and sharp-edged but large slabs and sockets are evident where the glacier has been frozen on to the rock wall and pulled away or *plucked* blocks from the headwall. The smoothest slabs occur towards the base of the headwall and probably continue beneath the scree cover. Here abrasion has been active and the rock may be polished or striated