

# Bolt Climbing - Vertical from the Bottom Up

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*Disclaimer: Vertical caving is a potentially hazardous activity. The following discussion is not intended to teach proper bolting techniques or to cover all details of vertical caving. Get proper training before entering any vertical cave.*



## **Introduction**

The majority of vertical caves are rigged from the top down. In other words, one enters the cave and descends various drops to get to the bottom. This is certainly the easiest approach, because pitches may be rigged with the aid of gravity. However, occasionally one encounters a vertical drop from the bottom, with no ready access to the top. In this case more involved procedures are required to get up the drop. A few very deep caves have been explored almost exclusively from the bottom up. The most famous is Austria's Lamprechtsofen, which was explored to a depth (height) of over 1000 meters before an upper entrance was connected.

Many techniques have been used to climb vertical drops from the bottom, some quite ingenious. The simplest drops may be scaled by free climbing or chimneying. Sometimes one caver can boost another up into a high lead. When the climb is relatively short a rigid ladder can sometimes be brought in to gain access. A related technique involves a scaling pole, where a segmented metal pole is carried into the cave and assembled at the climb. A rope or cable ladder is suspended from the top of the pole and climbed to gain access to the upper passage. If there are appropriately positioned projections or formations a rope may sometimes be used to lasso an anchor, or a grappling hook can be used. In a few cases helium balloons or sling shots have been used to drape a line over an anchor so that a rope could subsequently be pulled up. These latter techniques are rather risky because one cannot examine the anchor to see if it is strong enough or if the rope is securely in place. Special care must be taken when approaching the lip of such a climb, because the change in direction of pull on the rope as one tops out may dislodge it.

## **Bolt Climbing**

The most reliable method of reaching a high lead from the bottom is bolt climbing. Before the 1990s this was a laborious process using hand-driven expansion bolts. Two technological innovations have changed this dramatically for the better. Lithium-ion batteries have made battery-powered drills much lighter and more practical, and LED lights have allowed cavers to see much further up domes and tall passages in search of high leads. Nowadays bolt climbing has become almost routine, so much so that any dome can now be considered a viable lead. A great deal of additional passage has been discovered in this way. By way of example, in Shoveleater Cave in Germany Valley, WV we have climbed almost every dome in the cave, and there are dozens. Of the cave's 5.3 miles total length, 3.5 miles (66%) has been accessed by bolting on multiple fronts.

The route to be followed on a bolt climb is best determined in advance, although this can be difficult because one may not be able to see the top of the climb. Even if one can see the entire route, unanticipated sections of bad rock may force a deviation from the plan partway up. Examples of bad rock include mud, shale, chert, flowstone, shattered zones, and breakdown. The best routes follow clean, solid bedrock and avoid falling water and overhangs whenever it is practical to do so. While it is certainly possible and often necessary to bolt up overhangs and even across a flat ceiling, it requires much more effort and is less efficient when there is nothing solid for the climber's feet to push against.

To bolt up a drop, one sets an expansion bolt in the wall as far overhead as is possible. A short section of webbing ladder called an etrier is suspended from the bolt. This typically

contains from three to six steps and provides an easy method for progressing vertically up the wall. A daisy chain is also attached to the bolt and is used to pull the climber's waist up to the bolt and keep him/her upright while climbing the etrier. Traditional daisies consisted of a length of nylon webbing with fixed loops sewn into place. A more versatile modern version is the adjustable daisy consisting of a single piece of webbing that can be drawn up through a buckle to provide a variable length attachment. Similarly adjustable etriers are available and provide variable length steps for the feet. (Other items such as the Raumer Stick-Up and bolting platforms have been developed to make bolt climbing more efficient, but these are not in widespread use, at least in the U. S.)

A quickdraw (short piece of sewn webbing with a carabiner at each end) is also attached to the bolt. A dynamic belay rope tied to the climber's sit harness runs through the other end of the quickdraw, much the same as in rock climbing. A separate person controls the belay, which will catch the climber in the event that a bolt or other hold fails. Ideally the belayer should be in a sheltered position away from the fall zone, but still within sight of the climber. By repeating the process with another bolt, etrier, daisy chain and quickdraw, the climber advances up the wall, alternately moving the etriers and daisy chains upward as he goes. What is left is a trail of bolts and quickdraws running up the wall and holding the dynamic rope.

In addition to the bolting gear, a bolt climber also wears normal vertical gear and trails a static rope to be rigged at the top of the climb. All of this equipment hanging from one's body gets heavy, and careful attention to gear management is required to keep from getting tangled. One must also consider the order in which pieces of gear will need to be moved during the climb, in order to avoid weighting something out of turn. When hanging from a single point of attachment it can be very difficult to remove a piece that is underneath something else that is weighted.

Many bolt climbs can be completed as a single pitch in a matter of a few hours. How far one can go is mainly limited by the number of bolts and quickdraws available, and the length of the belay rope. (For safety, the belay rope should be twice as long as the pitch being climbed so that the climber can be lowered back down at any point if necessary.) On longer climbs one or more intermediate belay stances may need to be established. Ideally this will occur where a ledge, alcove or other feature is present to provide some footing and shelter for the belayer. In the absence of such features, one can establish a hanging belay where the belayer is suspended from bolts on the shear face of the climb. In especially long or difficult cases one may use a portaledge, but transporting it far into a cave can be a major effort.

When a pitch is completed, the route needs to be cleaned. After setting a permanent anchor with static rope attached, the climber may clean the route as he rappels down, removing the bolt hangers and quickdraws as he goes. More laboriously, he can also downclimb the route in reverse, retrieving each piece as he moves below it. Alternatively the belayer or other member of the party cleans the route while ascending the static and/or dynamic rope. When the route of the climb is substantially overhung or deviates a long distance sideways, cleaning from the bottom up is generally the more practical approach. Sometimes removing pieces under tension can be difficult, and may involve interesting gymnastics and significant swings on the rope. If

the bolt holes have been slightly over-drilled, one may pound the cleaned bolts into the wall, leaving little evidence of the climb.

To retreat from a climb that does not go or is no longer needed, one may either downclimb the drop in reverse as described above or rig a pull-down, which usually involves leaving some sort of anchor behind. The former is more efficient in terms of hardware, but is more time-consuming. For a pull-down, the main rope is doubled through the top anchor and the caver rappels on one side with the other end tied off or blocked, or on both of the ropes simultaneously. Once on the bottom of the drop, the caver pulls the free end of the doubled rope through the anchor until the rope falls to the ground. Some sort of hardware at the top of the drop is generally sacrificed in this case.

Domes over 300 feet high have been climbed by this method, and much passage has been discovered that would never have been seen otherwise. In West Virginia, of the 8 known drops over 200 feet deep (all in Germany Valley), all but one have been climbed from the bottom up. This includes the three longest drops in the state, two of which are over 300 feet. We are currently working on another very high dome that could be the deepest (highest) yet, with potential to go over 400 feet. For the well initiated, bolt climbing has become an almost routine exploration technique that should continue to grow in popularity. It has the potential to breathe new life into caves once considered completely explored.

*Remember, vertical caving is a potentially hazardous activity. Get proper training before attempting any of the techniques discussed above.*

## **Bibliography**

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