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PROTECTION

INTRODUCTION

The leader and the belayer are a lot safer if they understand the characteristics and limitations of all climbing gear. Ropes, harnesses, webbing, and carabiners are covered in the AMC Basic School, and it would be useful to review ropes and carabiners before continuing with this chapter. The following is a discussion of the gear used for artificial, removable protection, which is usually referred to as “natural pro.” In discussing various pieces of equipment, we may discuss brand names or trademarked names and specific companies. This manual does not recommend or endorse any specific company; the mention of the name is only to clarify the explanation of equipment. We include quickdraws and runners, protection such as nuts, cams, etc., and a section on how to rack them.

QUICKDRAWS AND RUNNERS

The terms **quickdraw** and **runner** are often used interchangeably, and they are close enough that most people understand what you are talking about when you use either term. In this discussion, “quickdraw” will refer to short slings and “runner” to longer slings.

Quickdraws (draws, QDs) are usually 12 inches long or less. They are the staple of sport climbing, and are most useful when clipping bolts. They consist of 2 biners and webbing, usually sewn. The webbing is usually sewn from ½”, 9/16” or 1” nylon or ½” Spectra (called Dyneema in Europe). A sewn quickdraw is stronger than a tied runner of the same material because there are no bends in the webbing to weaken it. We recommend using sewn quickdraws if possible, as tied quickdraws may not hold a factor two lead fall. For example, a tied sling of one-inch tubular nylon may be rated at about 3800 pounds but a sewn sling of one-inch tubular nylon is rated at about 6600 pounds.

Although the pattern of stitching differs, the three main purposes are to stiffen the draw, to make it easier to clip the rope into the rope-bearing biner, and to provide stability for the rope-bearing biner. The advantage to stiffening the draw is that it extends the reach of the leader by allowing him/her to grasp the draw near the bottom. The bottom biner is easier to clip when held in place. The advantage of stabilizing the rope-bearing biner is that it is less likely to rotate or spin after the rope is clipped in and the climber moves up past the placement. If the biner rotates so the gate end is up, there is a greater risk of the gate opening due to an irregularity in the rock or bolt hanger, or of the biner getting side-loaded as it is rotating. In both of these instances, the biner is most susceptible to failure if rotating out of the normal down-and-out orientation. Since it is crucial to rely on the biner staying in place during a fall, many quickdraws also have a rubber stiffener or O-ring that helps to stabilize the biner. Some climbers tape the bottom end of the draw tightly to the biner to accomplish the same effect. The rubber stiffener also provides protection against abrasion.

The upper biner of the draw, the one that clips into the bolt hanger, is sometimes stiffened, also, to help extend the reach of the leader. It is better, however, to allow some slack in the upper biner. As the leader moves past the rope, this “independent suspension” absorbs some of the motion of the running protection (the lead rope) passing through the rope-bearing biner, reducing movement in the upper biner. When the upper biner is held in place, or biners are ganged, there is more likelihood that the motion of the running protection will twist the biners apart, or open gates, or otherwise induce a dangerous situation.

Some quickdraws have a quarter twist sewn in to force the bottom biner's spine to sit perpendicular to the rock. The upper biner, the one in the bolt hanger, usually sits flat against the rock, and the bottom biner rotates 90 degrees to point the gate away from the rock.

Quickdraws often come with two biners already attached. Some of them have the two gates facing in opposite directions and some facing the same direction. Some leaders prefer one or the other configuration, but it is a matter of preference. Regardless of the horizontal direction of the gate, the upper biner should always be nose up and the bottom biner nose down when racked on your gear loops.

Runners are usually longer than quickdraws. They are made from 1", 9/16" or ½" webbing. A quickdraw can be made from any of this webbing by tying a water knot, putting two biners in the loop, and clipping one biner to your harness gear loop. They are sometimes carried around the neck and shoulder (never around the neck alone) or doubled or tripled up to allow them to be carried on the harness gear loops. They can be used at the length they are carried (doubled, tripled) or can be extended to help reduce drag in zigzag placements or to help prevent natural pro from walking. Longer runners also may be "daisy-chained" or girth-hitched together to make longer runners; the chaining and deployment can be done one-handed, if necessary. They are also big enough to be used for girth- or slip-hitching "large" features such as chockstones or chickenheads.

A **Screamer™** (made by Yates) may be the only "dynamic" draw currently in production. It is designed to absorb the shock load of a fall by failing some of the bar-tack stitching to slow the fall. As each set of stitches rips out, it absorbs some energy from the fall, reducing the final impact force when the rope is fully stretched out. They are advertised to activate when the shock load reaches 550 pounds. One side effect of using this draw is that it magnifies the gate flutter of the rope-bearing carabiner more than with a static draw. This can be dangerous, so many people recommend using a locker as the rope-bearing biner. These are primarily used to "baby" smaller pieces when they are all you can place. The idea is to keep the peak force below the rating of the piece until the rope has had time to absorb the force of the fall.

PROTECTION

Protection is often referred to as **pro** or **pieces**, and falls into three main categories. The term **natural protection** refers to trees, boulders, chockstones, horns, and other naturally occurring features, although for lead purposes, most climbers refer to removable protection as being "**natural pro**" (as in "a natural pro lead vs. a bolted lead"). The broader term **artificial protection** refers to **removable or clean protection** such as nuts and cams and to **fixed protection** such as bolts and pitons. Natural protection and fixed protection are covered in the chapter on "Anchor Points." This chapter will deal only with removable protection, and will refer to it as natural pro.

Early climbers used pitons made from stove legs and Model-T Ford axles. They pounded the pitons into the rock and clipped carabiners into them, then removed some of them after they were no longer needed. As the popularity of climbing grew, they realized they were destroying the rock by the repeated insertion and removal of pitons, and started looking to other sources. The first nuts were the large ones railroad companies used to bolt down their tracks; with the inside threads filed down, they worked fairly well. Some climbers used wood for off-widths. Climbers kept refining them, and "clean," removable protection became the preferred climbing and environmental solution.

There are two types of natural pro—wedges and cams—and there are passive and active versions of each. A **wedge** creates friction (holding power) by being pulled into a constriction and applying outward force to both sides. It "wedges" itself into the constriction until it can't be pulled any farther in the direction of force. A fall simply applies greater outward force against the walls of the constriction, increasing the friction. Wedges don't work in parallel-sided cracks.

A **cam** employs a rotational force to jam one side of the piece against the wall. The camming motion allows the piece to be used in a parallel-sided crack where there is no constriction, although a cam can be also be used in most constrictions.

Passive pro has no moving parts; it is a single piece of material that sits in the placement. **Active pro** consists of multiple parts, and is usually spring-loaded. By contracting the spring, active pro is made smaller and inserted into a placement, and then the spring is released, allowing the pro to contact the walls of the placement with the components put under tension. This tension keeps the piece in place.

Passive Wedges

Wedges are also called "**nuts**," "**chocks**," or "**tapers**" (fig. 23-01) The category of wedges includes Black Diamond Stoppers™, DMM Wallnuts™, Wild Country Wired Rocks™, Hugh Banner Brass Offset Nuts™, Black Diamond Hexentrics™, Wild Country Rockcentrics™ and several other brands. Some of these pieces are squared off, with flat faces. Some have opposing convex and concave surfaces to try to fit undulations in the rock better. Most can be turned sideways to add a different size selection to your rack.

Wedges work best when more surface area contacts the rock. The leader must often "set" a wedge by giving it a tug; this helps to prevent the piece from wriggling or "**walking**" out of its placement, especially as the leader moves up

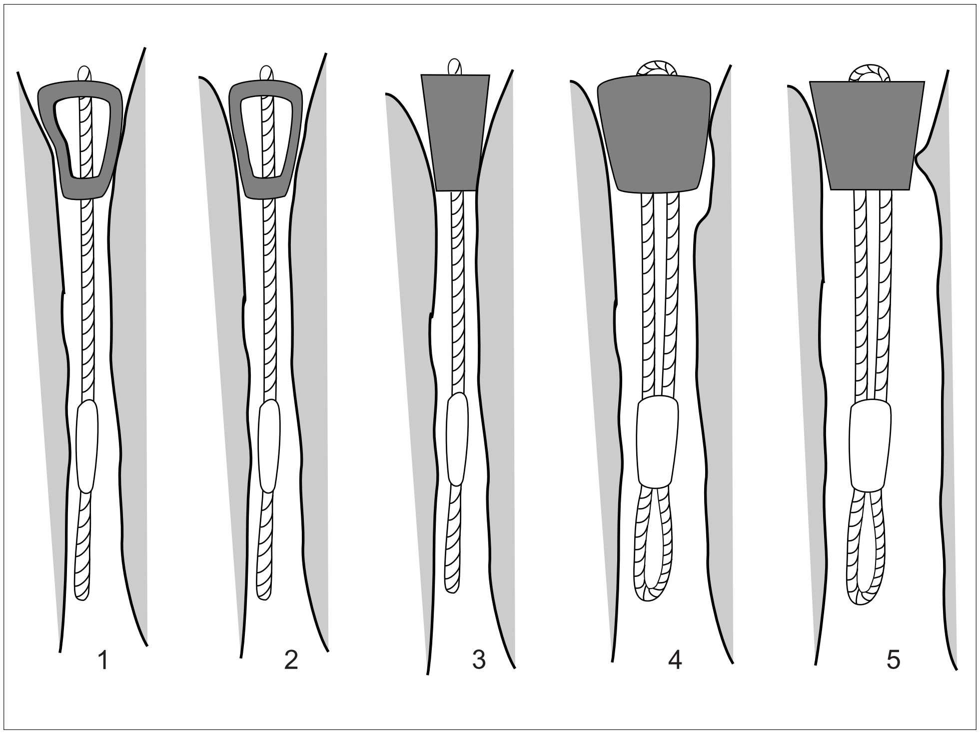

Fig 23-01
Wedge placements—surface contact is key:
1—Wedge with a concave surface on one side and convex surface on the other
2—Excellent placement
3—Smaller wedges with no curves sometimes don't fit very well; there is only slight contact on the left side, but it will hold anyway
4 and 5—Wedges placed sideways with very little contact on the right side; if wedge number 5 breaks the rock nubbin, the wedge will slide a long way

past the piece and potentially carries its rope-bearing biner up as well. Too hard a "set," though, can jam the piece too tightly to remove. This danger increases as the sides of the crack approach parallel.

Smaller wedges are usually called "**wired nuts**" because of the wire cable attached to the actual wedge. They are made of 6061 aluminum, 7075 aluminum, stainless steel, or brass. The 6061 aluminum is softer than the 7075 aluminum; this allows the rock to "bite" into the metal more easily, but that it wears out faster, also. The 7075 aluminum is what carabiners are usually made of to make them last longer. Some of the more recent offerings have come with anodized surfaces. Anodizing hardens the surface, and therefore adversely affects the ability of the piece to bite into the rock until the anodizing wears off. The purpose of the anodizing is to "color-code" the pieces and help the leader to select the right piece faster. Most people, however, carry several wired nuts on a biner and hold the selection up to the rock and select by sight, since the difference in size between nuts is sometimes subtle. Rock bites into brass easily, but not as easily into stainless steel.

The wire cable is rated in the manufacturer's literature. It is usually made of stainless steel and swaged to connect the ends. The smallest cables may be rated at only 500 pounds of force, which can easily break in a hard lead fall; these are not intended for leading, but for aid climbing. The cable usually breaks at the bend where the cable turns into the two holes in the nut, just like rope breaks most easily at a bend. Since the cable is made of several strands, it is also possible to cut one strand, thus weakening the cable for the next placement. You should get into the habit of automatically checking the cable for broken strands as you place it. The cable on a brass or steel nut is usually silver-soldered, instead of swaged, which strengthens the cable. This cable should never be girth-hitched with a sling, as the small diameter of the cable can cut the sling instantly in a fall; always use a biner to clip into the cable.

The strength ratings of these smaller nuts run from 2-12 kN, or 450 pounds of force to 2700 pounds of force. It is wise to have a feel for the strength of your individual pieces so you can judge whether or not they are appropriate for holding a lead fall. Remember, the smallest pieces are more suitable for aid climbing rather than leading. For example, Black Diamond's #1 Stopper™ is rated at 2.5 kN (560 pounds of force) and is not the best choice for the first pro on the fourth pitch of a multi-pitch climb, since the potential factor 2 fall will generate much more force than the piece can hold. On the other hand, it's better than nothing and will at least reduce the force of the fall; if you have two, you can equalize and try to make a stronger placement if necessary. Also, it may work well on the last placement before the belay stance since the fall factor decreases the farther up a pitch you go.

In addition to the strength ratings, you must consider how the nut works in a particular kind of rock. The smallest nuts, marginal in granite, are almost useless in sandstone or other soft rock. There is such a small surface contact area that it just pulls out, leaving a groove where it scrapes away the rock. Nuts should generally be placed farther back in a crack, not near the edge, which may break off.

Nuts are sometimes difficult to remove because of their small size. The leader may have worked the piece into a maze of slightly varying crack widths, which requires figuring out how to gently move the piece in some combination

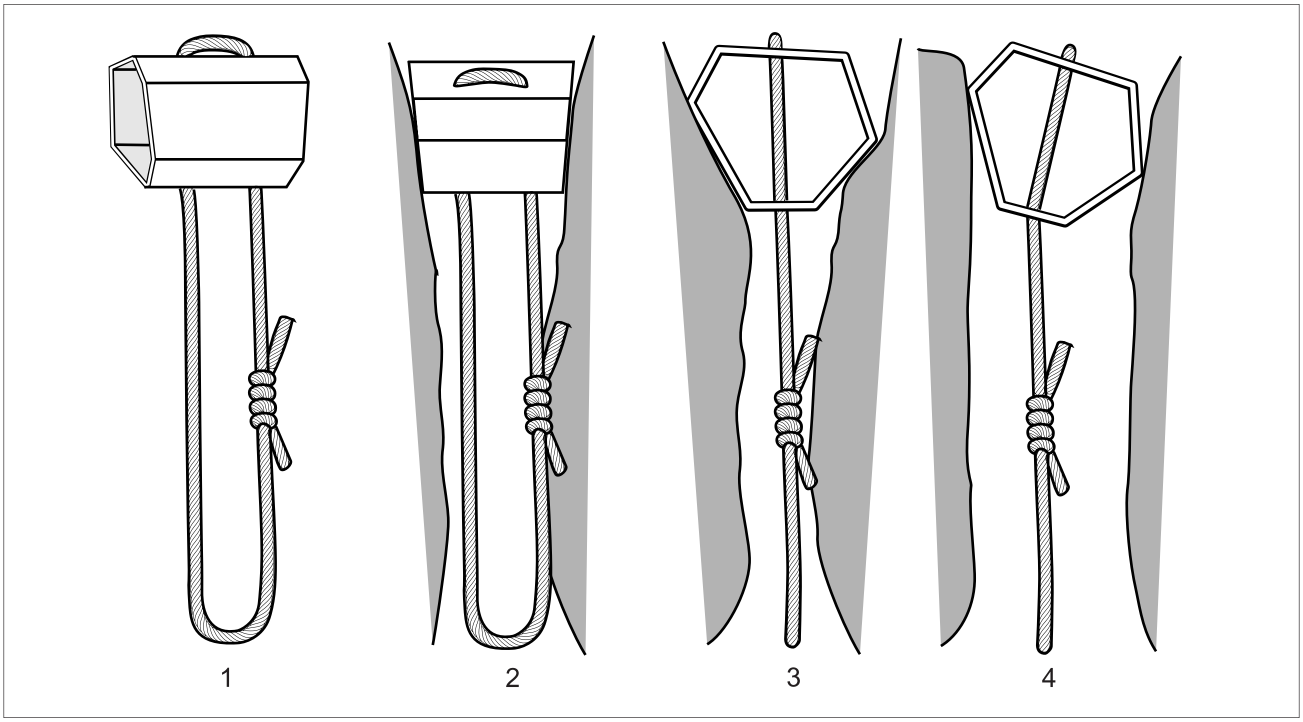

Fig 23-02—Hexes
1—A hex with cord tied in a grapevine knot; some people tie the knot so that it stays inside the body of the hex
2—A hex placed sideways, with excellent surface contact
3—A hex placed normally, wedged in the crack
4—A hex placed in camming position; force pulling on the cord (such as a falling climber) rotates the hex to the left,

of back and forth or up and down motions to remove. Also, the sharper the edges of the nut, the harder it may be to remove from the rock. Rounded edges make it easier to take out.

Hexentrics™ (**hexes**) are non-equilateral, hexagonal aluminum barrels (fig. 23-02). Opposing sides are not equal lengths or angles. They are made of 6061 aluminum, which the rock bites into very nicely. Smaller hexes have swaged cables. Larger hexes have 5.5-mm cord threaded through pairs of holes in opposing faces. They come with instructions on how much cord to put in each one. Hexes also can be turned 90 degrees and placed sideways.

Wild Country Rockcentrics™ and some other recently introduced pieces combine the concavity of nuts on one side with the size and hexagonal shape of Hexentrics™ on the other, claiming cross-functionality.

The knot in a tied sling can be used as a wedge in an emergency, taking care not to place the webbing on sharp rock, which can cut it.

Active Wedges

Active wedges consist of components that wedge between each other or between one of the components and the rock. This pro includes sliders, like Lowe Balls™, and stacked passive wedges. In addition, Black Diamond advertises that their Camalots™ can be used as chocks, although they are not true wedges.

Stacked pro can be a tricky technique. It requires that you place one passive piece against another and wedge the upper one down between the lower one and the wall. All pieces must somehow be attached together to avoid dropping one when the placement is removed.

Passive Cams

The two most commonly used passive cams are Lowe Tri-Cams™ (fig. 23-03) and Black Diamond Hexentrics™. Tri-Cams™ have a pointed side and a rounded side. Most people either love them or hate them. They take a little longer to set properly, and if you don't know the secret to taking them out, it can be frustrating to try and remove them. On the other hand, they make bomber placements when set and weigh and cost less than the equivalent SLCD's. They are also the best protection for pockets that reject nuts and SLCD's. The placement can be made stronger by placing the point in a small depression or behind a nubbin.

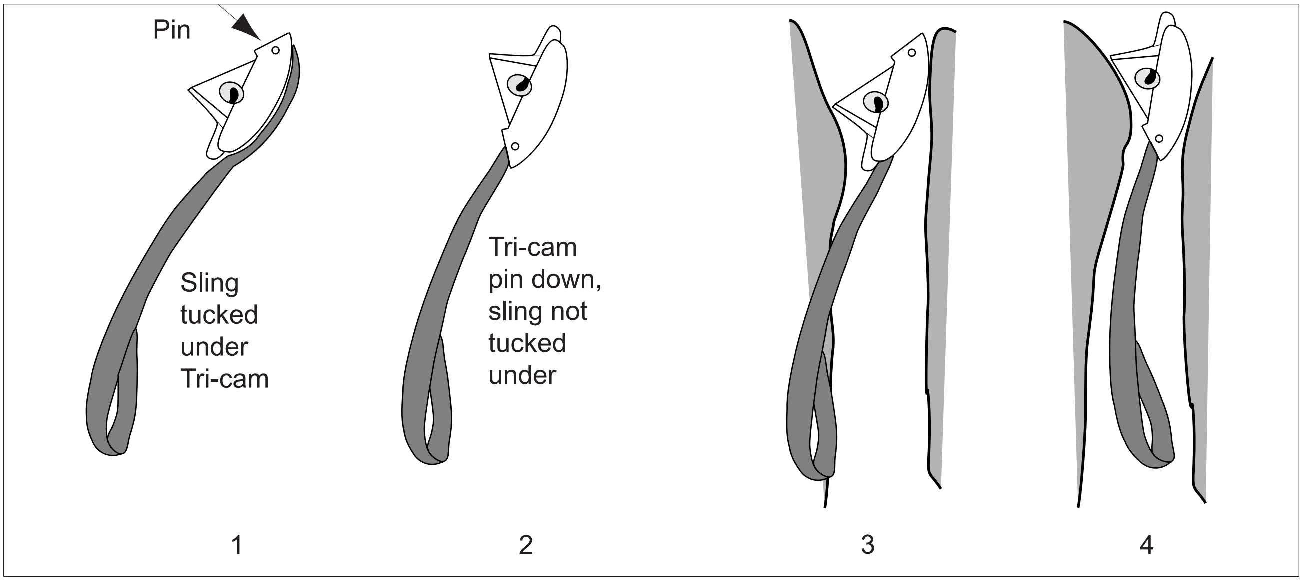

Fig 23-03—Tri-cams
1—Tri-cam in camming position; the sling pulls down on the upper end of the body where the pin is, rotating the piece to the right
2—Tri-cam in wedge position, with the pin on the bottom
3—Tri-cam in camming position; placing the point against a hole, nubbin or undulation in the rock keeps the piece solidly in place. To remove, push the bottom of the metal body to the right and up

By placing hexes so the cord hangs to one side, you get a camming motion against the wall (fig. 23-02).

Active Cams

Spring-loaded camming devices (SLCD's) are made of either three or four "**cams**" with **springs** that are retracted around an **axle**. The springs are strong enough to exert a force that pushes the cams outward. By pulling the "**trigger**" bar that moves parallel to the **stem** to retract the springs, and placing the SLCD into a crack, you set a piece that stays in place on its own, but is easy to remove by again pulling the trigger. In the case of a fall, the force simply pulls harder on the stem and exerts more force in an outward direction, increasing the holding power in proportion to the increased impact force of a fall.

SLCD materials and construction. The cams themselves are made of the same 6061 or 7075 aluminum as passive nuts. The same arguments apply to these cams as to nuts: the 6061 is softer so the rock bites it better, but the 7075 lasts longer. The cams are usually designed with grooves or teeth on their contact surfaces to better handle irregularities in the rock. Smaller cams, however, tend to be smooth to maximize their already tiny surface areas. Some bigger cams have holes drilled in them to reduce weight and allow a purchase point for helping to remove them when stuck. Most SLCD's have four cams, which provides a more stable placement, but a three-cam unit takes up less lateral space, and can fit into narrower placements. Colorado Custom Hardware's Aliens™ are built with internal springs, which narrows their profile even more.

The SLCD stem is either a single flexible cable, a flexible U-shaped cable, or a rigid stem. The thick, stiff cable stem facilitates placement and bends easily over an edge. The rigid stem can break if levered over an edge; you must "tie it off" close to the edge with a short sling to reduce this leverage. The U-shaped cable is too small a diameter to be girth-hitched with a sling, just as with wired nuts. The trigger bar pulls the cams toward each other, retracting the spring. There are a number of different trigger designs, and the best one is the one you feel comfortable with and can use the fastest. The axle around which the cams rotate is engineered to hold the brunt of the fall; if it were to break, the whole piece would fail. Black Diamond Camalots™ are built with two axles, resulting in a larger range of placement sizes but a little more weight.

SLCD placement. Place SLCD's so that the direction of force in a fall is parallel to the stem and away from the cams (fig. 23-04a). The ideal placement is when the cams are retracted about two-thirds of the way through the advertised range of the piece, or something that looks like a "Pacman." One study found that cams are safest when retracted (closed) 50-90%. (An SLCD hanging from your rack is 0% retracted; fully retracted cams are 100% retracted.) The wider open the cams are, the less stable the piece is; however, when the cams are almost closed, they still exert excellent holding power.

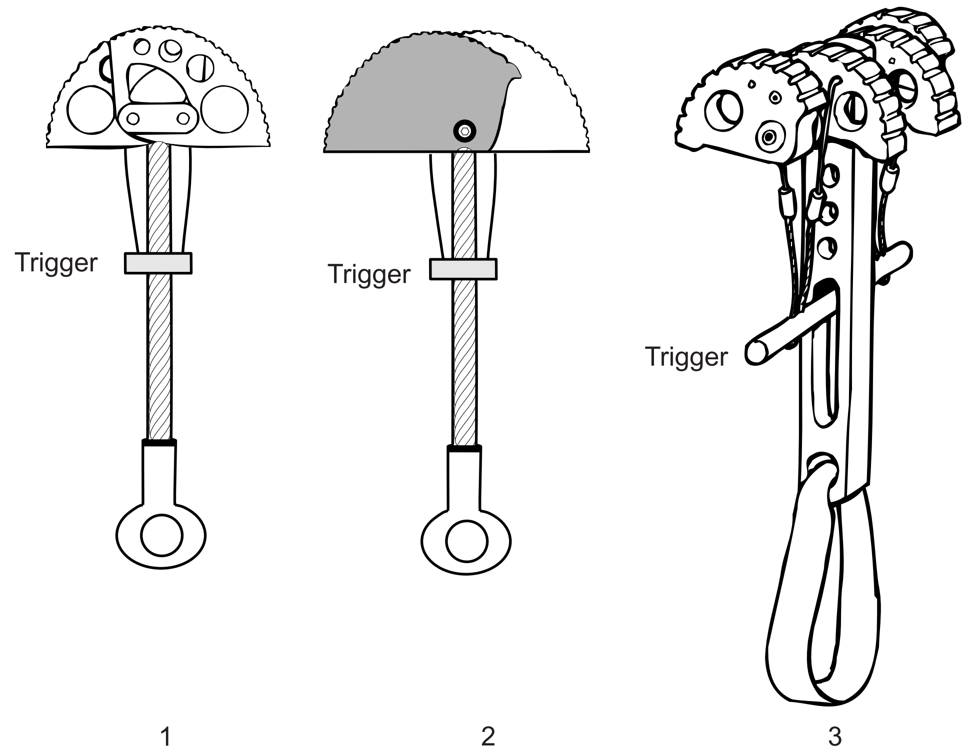

Fig 23-04a—Spring-loaded camming devices (SLCD's), or cams
1—The double-axle Camalot; the cam lobes are retracted by pulling the trigger. Spring-loading returns the lobes to their unretracted position
2—A single-axle SLCD
3—A rigid-stem SLCD

Ideally, all cams should engage the rock. The cams' holding power is based on friction between the rock and the cam surface; if the rock is slippery, like in some limestone, the cams will slip. In some sandstones, the cams slide until the cam digs into the rock. There are cam tracks on the insides of many Indian Creek cracks.

If all cams are not retracted equally, there is less outward force on the more open cams. Although not always possible, it is better to minimize the disparity between the cam angles.

In an absolutely parallel crack, the cams are engaged at the same angle. Most placement walls are irregular, resulting in a different angle of engagement for each individual cam. This sometimes leads to problems where three of the cams are nicely positioned, but the fourth opens up all the way. These should be reset if possible. However, sometimes a placement allows only 2 or 3 of the cams to engage. The worst case is if one of the end lobes is the one not engaged, which causes a less stable placement. At least try to shift the SLCD so the "floating" cam is one of the inner two. If this is the case and no better placement is found, consider it a marginal placement and pro again as soon as you can.

In horizontal placements, position the SLCD's stem or sling to bend over the edge toward the direction of the fall without pulling the SLCD to one side or the other. Be careful in horizontal placements. The stem should rest on the edge it will be pulled over and still be centered between the two sets of cams. If it isn't, the upper two cams will be opening wider than the lower two cams. Cams that are wider open are not as stable (fig. 23-04b).

An "over-cammed" SLCD (one with fully retracted springs) that is placed in a crack the exact width of the retracted unit will probably hold, but may be impossible to get out. There is no room to pull the trigger to retract the springs and cams to allow enough slack to slide the unit out. The opposite effect, the "umbrella," is where a SLCD is placed in the crack with no retraction of springs, turning it into a chock, which will probably slide out. Although it may be hard to conceive of someone placing it this way, it can happen when a normal placement "walks" farther back in an inward flaring crack and the cams open up.

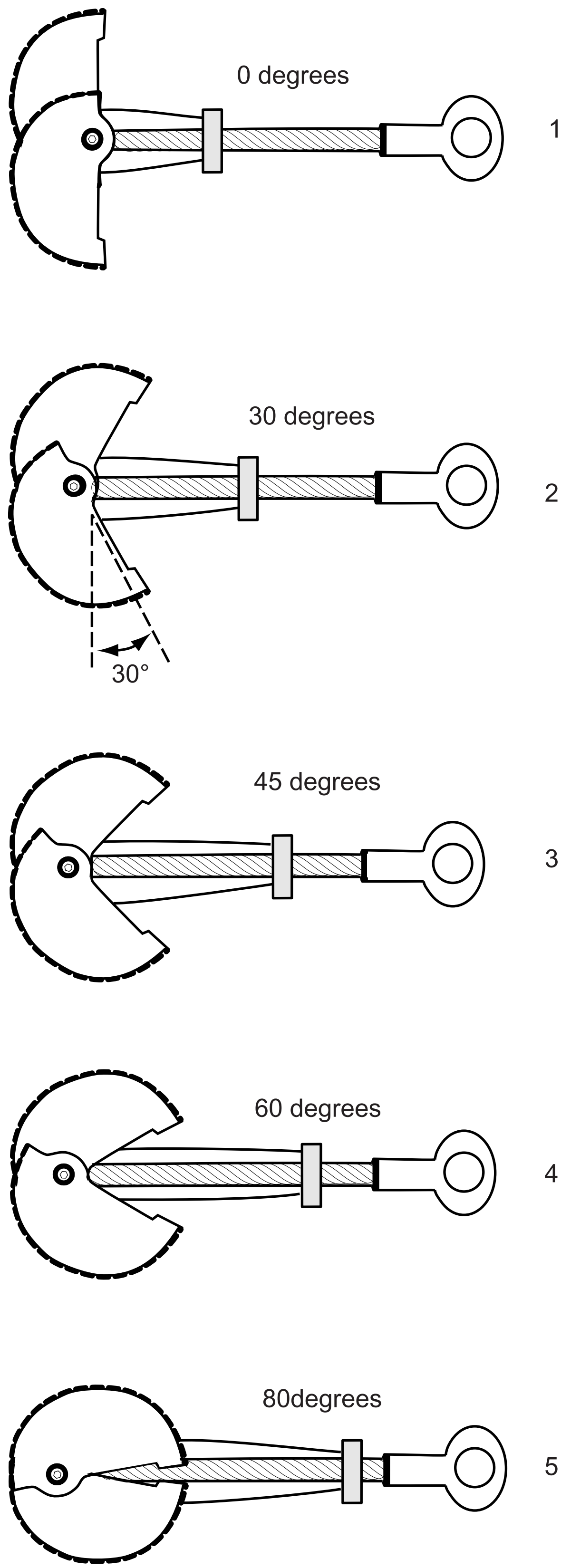

Fig 23-04b—SLCD placements
1—Cams not retracted at all, the SLCD in a storage position
2—Cams retracted 30° each; the cams are too wide open for this to be a safe placement
3—Cams retracted 45°; this is approximately the beginning of the safety zone
4—Cams retracted 60°; this is a solid placement
5—Cams retracted 80°; this is a very solid placement, and may be too solid. If the cams are retracted all the way, there may not be enough room to pull the trigger and loosen the cam to remove it

A cam placement can be made stronger and more "walk" resistant by seating one or more of the cam lobes in a depression or behind a nubbin.

Trango Big Bros™ are another type of active cam called expandable tube chocks. Pushing the button releases the spring and forces the inner tube out. A screw collar holds the outer and inner tube in place. A rope-bearing biner is clipped to the cord slung through the other end of the tube. Any fall will exert the force on the slung end, camming it downward. One big advantage of a tube chock is its use in a crack leading out from under a roof. After you have turned the roof and are in a vertical crack, the rope wants to slip into the crack (path of least resistance). If you have placed an SLCD, the rope tends to turn it or get caught up in it, whereas the rope slides effortlessly over the smooth tube without changing its position.

THE EXPANSION FORCES OF PROTECTION

It is also important to understand how **expansion forces** build up in wedges and cams. The potential expansion force in a wedge depends on the angle of the wedge. This is sometimes referred to as the "**wedging factor**." The "angle" of a wedge is the angle between the faces as the piece widens. The smaller the angle, that is the more the angle approaches parallel, the greater the expansion forces on the sides of the placement. For example, nuts generally have a smaller angle than hexes do, and therefore exert a greater force. And it is harder to pry a wired nut from a placement after a leader fall than it is to remove a hex.

When you place pro, expansion force is what keeps the "taper" set. It is your friend. But like all forces, too much of it can be a bad thing. When you place pro behind a flake, it is possible to pry the flake from the wall with the expansion force. Therefore, it may be desirable to place large angle wedges like hexes behind flakes instead of small angle wedges like wired nuts.

As noted earlier, SLCD's work by exerting outward force on the sides of a placement. This is also an expansion force—the force of the fall is redirected outward against the sides of the placement as the cams try to expand against the walls. The SLCD's outward force is at least twice the impact force of the falling climber—half on each wall. In a four-cam unit, all four cams share an equal amount of the force being exerted on both sides. In a three-cam unit, the two outer cams exert half of the total force in one direction and the single middle cam exerts the other half of the total force in the other direction.

The cams' expansion force is concentrated on the small area of the cams' outer surface that actually contacts the rock. The force is not spread over a larger surface area like the expansion force of a wedge. Therefore, SLCD's exert more concentrated force in one spot, which can pop a flake off the wall easier than a wedge.

HOW TO CLEAN PRO

Whereas it is usually easy for the second to unclip the draws on a bolted climb, there is an art to "cleaning" (removing and collecting) natural pro. The second needs to be familiar with the kind of pro being placed and must be able to use a nut pick to remove "well-set" pieces. This job can be very difficult if the leader has fallen on a particular piece, or if a piece has "walked" into an unintended orientation or position.

To clean bolts, unclip the draw's "upper" biner from the bolt hanger and clip it to a gear sling (or gear loop), then unclip the "lower" biner from the rope. This sequence reduces the chance of accidentally dropping the piece. Also, on overhung climbs, it prevents you from swinging away from the wall and leaving the piece "stranded."

It can be tough to clean an overhanging climb on rappel or if you keep falling. You have to pull yourself in to the wall long enough to unweight the draw. Use the draw to pull yourself in, but then you must find a way to hold yourself in just long enough to unclip the draw. You will often go swinging after the unclip, but at least you will have the draw clipped to the rope.

When cleaning pro, follow the same sequence. First, remove the piece. Since it is still attached to the rope-bearing biner or a runner, you won't lose it. If the piece is attached to the rope only by a biner, unclip the biner from the rope and re-clip the biner and piece to your gear sling. If there is a runner attached to the piece as well, clip its "upper" biner to your gear sling. Remove the piece and its biner from the runner and clip it to your gear sling. Remove the sling's "lower" biner from the rope and either let it hang from your gear loop or shorten the runner the way you and the leader normally carry it. You may have the same difficulty in removing the piece on an overhanging climb as you do on a bolted climb.

Here are some tips for working on hard-to-remove pieces.

- If you as a leader are making a tricky placement, tell your second what you are doing.
- You can try to remove a stuck piece by unclipping the rope-bearing biner and yanking on it for better leverage. There is a risk of losing the piece since you have disconnected its safety line. If this concerns you, add a runner with enough slack so that it doesn't interfere with the yanking; if you drop the piece, it is still attached.
- If you can't unweight the piece on an overhanging climb, place an extra piece above the problem piece and pull on it to unweight the lower piece. In this case, there is a risk of losing the upper piece if it is not connected to

you. Again, add a runner, but connect it to the rope or your harness (not a flimsy gear loop). SLCD's are ideal for this upper piece, because when the stuck piece is freed, it is much easier to just pull the trigger and go flying.

- If a wired nut is stuck, use a runner or draw to yank it upward.
- Use a nut pick to tap a stuck nut off-center or between its two cables in the opposite direction of its load bearing force.
- Use a nut pick to tap against passive cams in the opposite direction of their rotational force. Tap Tri-cams™ on the end of the "rail" side, but in the direction of the sling attachment.
- Remove stuck SLCD's by nudging slightly inward—but be careful; if the problem is that the SLCD is already backed up against the back of the placement, you will only make it worse. Sometimes the lobes "jam" in place, and need to be knocked loose.
- Use your nut tool to pull on stuck SLCD camming lobes. You can also pry the lobe loose a little bit. By working the lobes back and forth a little at a time and working gently with the trigger, you can usually free the SLCD.
- On older "ladder-style" Camalots™, run a short string of 3-mm accessory cord through the central hole in the trigger bar and the plastic cable guard. Tie a knot with almost no tail on the end in the trigger bar and a loop in the end on the cable guard. If the SLCD walks too deeply into the crack, and you can't get your fingers in deep enough to pull the trigger bar, simply pull on the loop, which will pull the trigger bar for you.
- There are some devices on the market that are designed to help clean stuck pro, such as the Friend of a Friend.

HOW TO RACK GEAR

Racking gear is largely a matter of personal preference, but here are a few suggestions that have worked for other people. First, there are three general ways to carry gear for easy access. Your climbing harness usually has **gear loops**, where a limited amount of gear can be clipped. A **gear sling** is designed to be worn around your neck and shoulder on one side of your body, or as a double sling that rests on both sides of your body. These increase the capacity for carrying gear, but may not distribute it very well, pooling it all at the bottom of the sling and creating a heavy load that interferes with climbing. The last option is a **chest harness**, which distributes the gear over a larger area, making for a more comfortable carry.

Use the gear loops on your harness to carry quickdraws for sport climbing. Rack some on both sides, to allow for access by either hand, depending on which one is being used to lock off on the stance. If the climb is short and seems to require just a few pieces, such as a set of Friends™ (cams from Wild Country), you can rack the pieces on the gear loops.

Rack quickdraws by clipping them into the gear loops. It is a matter of preference to rack quickdraws either gate out or gate in on the gear loop; you should try both ways and choose. When leading on natural pro, it is helpful to carry different length runners that can be extended to reduce rope drag or prevent "walking." Some people carry additional, longer runners around the head and shoulder. Longer runners can hang down and get in the way of your legs when climbing. Shorten them by passing one biner through the other and clipping both strands of the sling coming from the other biner. When you need it, release any two strands and the draw will extend to its full length.

Some people rack each wired nut with its own biner. This requires better skills at sizing and selecting the right nut, or else you have to replace the nut and get another one. Some people rack several nuts on the same biner, which saves weight. It also requires greater care in working with the biner, since dropping it loses a bunch of pieces as opposed to a single piece. Ovals work best for this purpose. To place the nut, pull the biner with the probable correct size and hold the nuts up to the placement. Select the right one, place it, and set it. Add the draw or runner and clip the rope. Only then do you unclip the biner with the rest of the nuts and replace it on your rack. Remember, your only goal before you clip and put yourself temporarily on "top-rope" is to place and clip; removing and replacing the rest of the nuts is not essential to the clipping process.

It is usually better to put each of the larger wedges and most of your cams on individual biners. Although you save weight by eliminating a few extra biners (for comparison, 10 biners at an average weight of 70 grams each is 700 grams or about 1.5 pounds), you save time in placing, adding a draw and clipping. This will help you to develop the speed necessary for longer climbs.

Many people rack natural pro by size and type. Rack the biggest pieces in the back and successively smaller pieces toward the front. If you need two sets, put one on each side, so that if the side you need to pull from is stuck against a chimney, you can pull from the other side.

Again, try several styles and use the one that suits you best. Ask friends who lead what their preferences are. Once you know your own preferences, rack it that way consistently. If you want to do longer climbs where you "swing" (switch) leads, you will be more efficient if you both rack the same way.