CONNECTING THE ROPE TO PROTECTION • NATURAL PROTECTION • FIXED PROTECTION • REMOVABLE PROTECTION • ROCK PROTECTION ETIQUETTE • BUILDING SKILLS

CHAPTER 13

ROCK PROTECTION

The "rack and rope" are, collectively, the rock climber's protection. The rope connects two climbers—one leading a pitch while the other belays. Protection, or "pro," connects them both to the rock face. The belayer is connected to an anchor that can be natural, such as a live tree, or formed from several pieces of protection. To limit a fall, the climber on lead periodically places protection from the rack (the collection of gear used for protection) while climbing.

The quality and location of the protection that the lead climber places largely determine the consequences of a potential fall. If a climber falls while leading, the length of the fall will be about twice the distance between the climber and the last point of protection, plus rope stretch (fig. 13-1). If the last piece placed pulls out, the fall increases in length by double the distance to the next piece that holds the fall (see "Understanding Impact Force" and "Understanding Fall Factors" in Chapter 10, Belaying). Climbers need to be skilled at both selecting solid locations for protection and in making the placement.

CONNECTING THE ROPE TO PROTECTION

Carabiners and runners are the tools climbers use to connect the climbing rope to protection (fig. 13-2a). One carabiner is attached to the protection, the other is attached to the rope. The carabiner should almost always be used in the down-and-out position: the gate should point down and away from the rock surface (fig. 13-2b). This position lessens the chance that the carabiner gate will accidentally open during a fall—potentially disastrous. The rope itself should be clipped in so that it runs freely through the carabiner in the direction of travel (fig. 13-2c): the rope should travel from the rock surface upward through the carabiner and then out toward the climber. If the climbing route does not take the climber straight upward, the rope exits the carabiner on one side or the other; it should exit on the side opposite from the gate. This minimizes the chance that the rope will twist across the gate and open it during a fall (see Figure 14-9 in Chapter 14, Leading on Rock).

Runners, slings, and cordelette serve to lengthen the distance between the point of protection and the rope. This helps to isolate rope movement from the protection, keeping protection from wiggling or "walking" from its intended placement or dislodging completely, and also helps to minimize friction or rope drag on the climbing rope by allowing it to run in more of a straight line. Runners, slings, and cordelette can connect directly to natural protection (see Figures 13-3 and 13-4) or, rarely, to preexisting fixed protection without the use of an intervening carabiner. Carabiners should be placed so they are not at risk of being cross-loaded across the rock in the event of a fall.

NATURAL PROTECTION

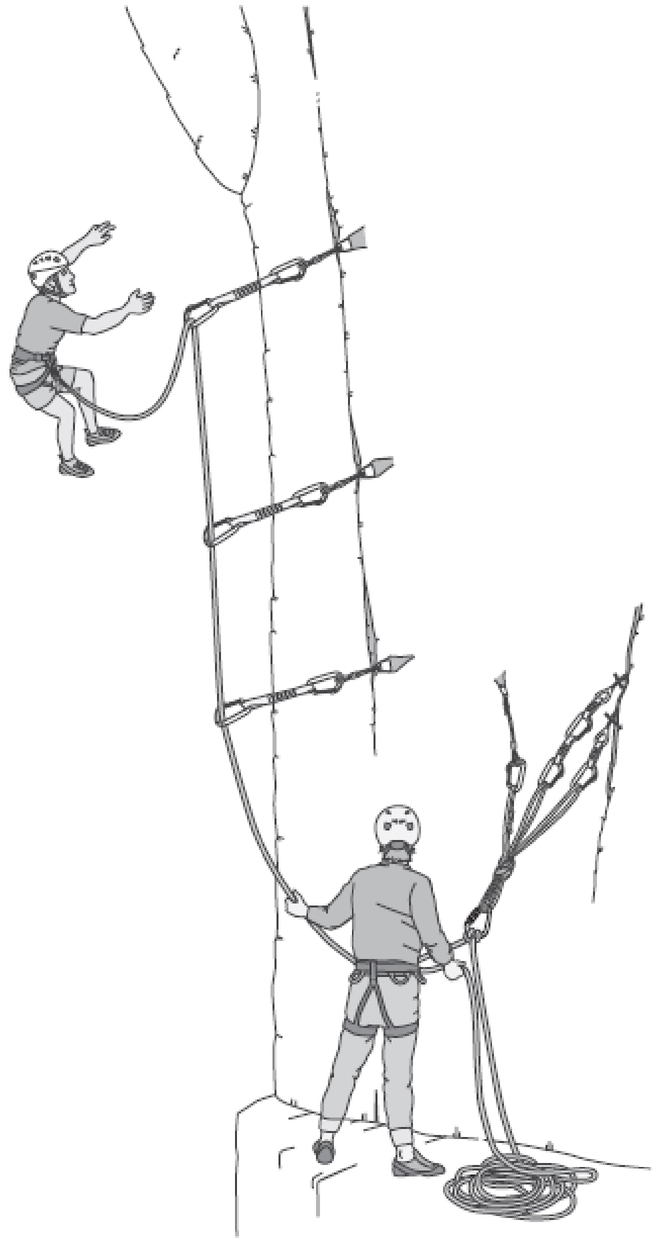

Fig. 13-1. Leader fall with intermediate points of protection in place.

Trees and rock features can provide excellent protection, conserve gear, and offer a quicker alternative than placing gear, but carefully evaluate them for stability and strength. "Test before you trust" is a good rule. Be wary of rock that is brittle, vegetation that is poorly rooted, and other suggestions of weakness. (See "Natural Anchors" in Chapter 10, Belaying.) An error in judgment could result not only in failed protection but also in a rock or tree crashing down upon the climber, the belayer, or other parties on the route.

Trees and large bushes provide the most obvious points of attachment, but do not trust a dead, brittle, weak, or loose tree or shrub. Look for a healthy trunk with live branches and a solid root system. If there is any question, test smaller trees by pushing against them with one foot. For using natural protection midpitch, single or double runners are commonly looped around the base of the trunk, with the ends clipped together with a carabiner (fig. 13-3a). You can also untie a knotted sling and retie it around the trunk. A third method is to use a girth hitch (fig. 13-3b). If using the natural protection point as an anchor, a cordelette is commonly looped around the base of the trunk and tied with a figure eight, with the resulting power point of all strands clipped to a locking carabiner (fig. 13-3c). The cordelette usually should be as close to the tree roots as possible, although with a strong tree the cordelette may be placed higher if necessary. Often a 20-foot (6 meters) or longer cordelette is needed.

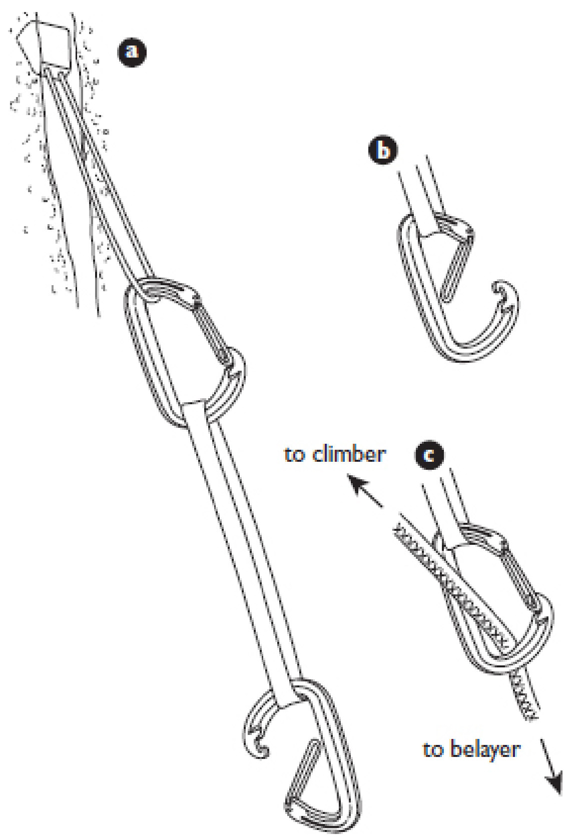

Fig. 13-2. Correct down-and-out positioning of a carabiner: a, clip the carabiner into the pro's runner in a downward direction; b, then rotate it out and away from the rock (gate opening is now down and facing out from rock); c, rope clipped through carabiner in direction of travel.

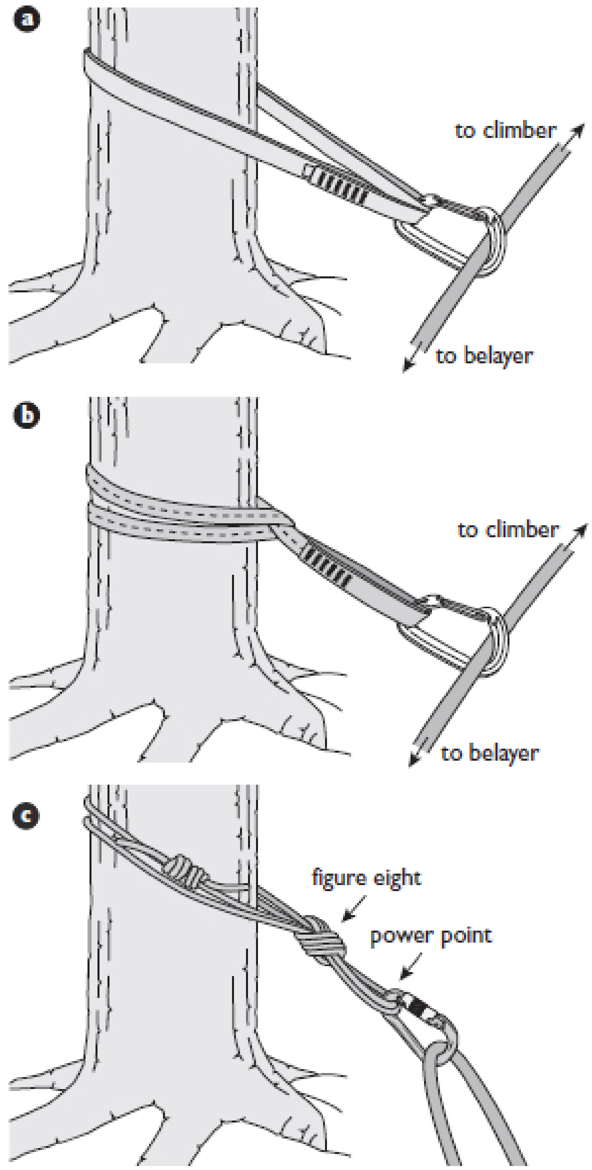

Fig. 13-3. Using a tree trunk as a protection point: a, sewn sling wrapped around trunk; b, sewn sling girth hitched around trunk; c, anchor setup with a cordelette tied around trunk using a figure eight.

Rock features—horns, columns, rock tunnels, chockstones, large and flat-bottomed boulders—are other common forms of natural protection. In evaluating a rock feature, consider its relative hardness, how crumbly it is, and whether it is firmly attached to the rock around it. Attempt to move the rock, being careful not to pull it loose. Whack it a few times with a hand or fist. Beware of hollow sounds or brittleness.

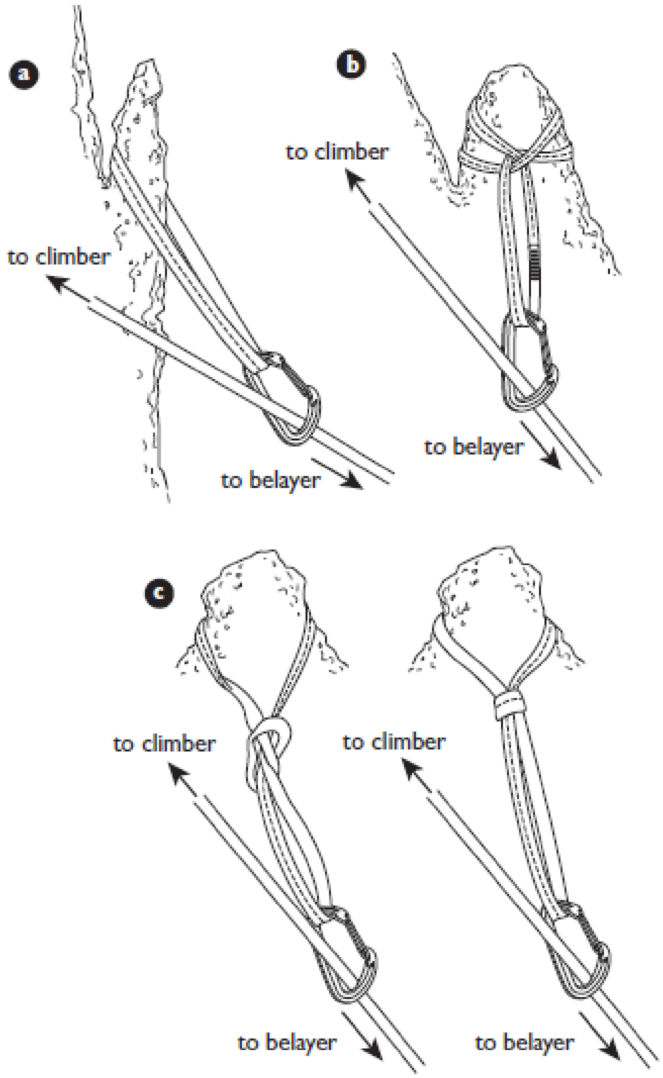

Fig. 13-4. Attaching the rope to a rock feature: a, using one runner and one carabiner to link a point of natural protection with the rope; b, securing a runner to a rock horn with a clove hitch; c, slinging a horn with a slipknot on a runner, with the dressed slipknot shown at right.

Horns (also called *knobs* or *chicken heads*, depending on their shape and size) are the most common type of natural rock protection. If there is any question about rock horns, test them by pushing against them with one foot. To attach to a rock horn, a runner can be looped over the horn and clipped in to the rope (fig. 13-4a), but it may be pulled off the horn by rope movement. Use a clove hitch (fig. 13-4b) or slipknot (fig. 13-4c) to tighten the runner around the horn to help prevent it from slipping off. The slipknot can be tied easily with one hand and requires less sling material than a girth hitch or clove hitch. (See "Knots, Bends, and Hitches" in Chapter 9, Basic Safety System.)

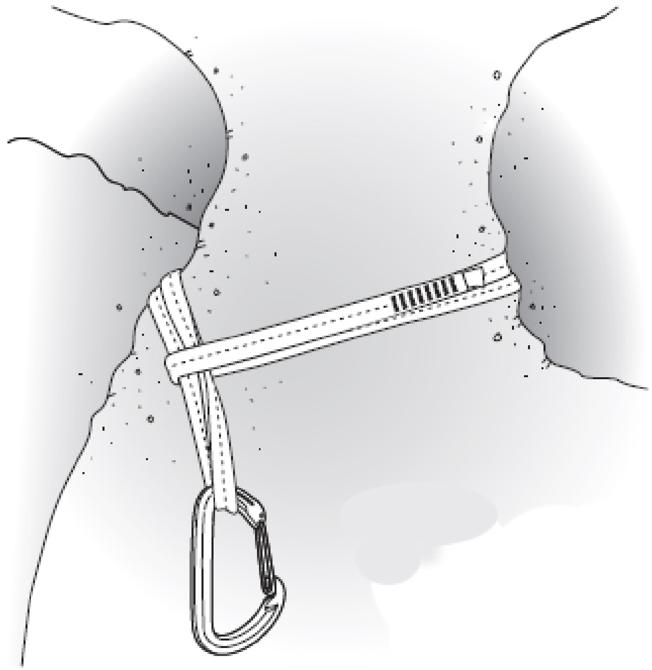

Fig. 13-5. Attaching a sewn runner to a rock column using a girth hitch.

To attach to a rock column or chockstone or through a rock tunnel, first thread a sewn runner around the feature, then clip both ends of the loop with a carabiner. Alternatively, thread the runner around the rock feature and then secure it with a girth hitch (fig. 13-5) or untie a knotted runner and retie it after threading it through the point of protection.

Take extra care when using freestanding boulders. They should not move or rock when tested. Consider not just the size but the shape of the boulder, what it rests on, and how it is affected by changing conditions such as snow or ice. Avoid any feature with a rounded bottom or a narrowed base, as well as features that rest on gravel, sand, or downsloping ledges. Sling a boulder around its base. Keep the pulling point low to minimize leverage on the boulder.

Natural protection used for anchors on popular routes often accumulates slings as each party rappels from a route and leaves yet another sling behind. Do not trust these slings with your life without inspecting and testing their strength. Sunlight, weather, and age can degrade them.

FIXED PROTECTION

On established routes, climbers may encounter previously placed bolts and pitons (see also "Fixed Anchors" in Chapter 10, Belaying). Climbers also may encounter removable protection that became fixed when someone could not remove it. On rock climbing topo maps (see Figure 14-3 in Chapter 14, Leading on Rock), bolts and fixed pitons are often shown as “x” and “fp,” respectively.

BOLTS

Bolts are most commonly seen in sport-climbing areas, but they may also be found on traditional or aid-climbing routes. Bolt hangers allow carabiners to be attached to bolts (fig. 13-6a and b). Chains are sometimes found at sport-climbing anchors (fig. 13-6c) to facilitate rappelling (see Figure 11-3 for a bolted rappel anchor setup).

A well-placed bolt will last for years, but age and weather can compromise it. Be especially wary of ¼-inch bolts, which were placed primarily in the 1960s and 1970s. Bolts measuring 3/16 to 1/2 inch in diameter have been used since the mid-1980s and are now the standard. Standard metric bolts are 10, 12, and 14 millimeters in diameter.

Visually check both the bolt and its hanger for signs of weakness, especially for cracks, excessive corrosion, or brittleness. A rust streak below the bolt indicates metal wear. Do not trust an old sheet-metal-style hanger with heavy rust. Test whether the bolt is securely anchored into the rock by clipping in to the bolt hanger with a carabiner and trying to pull the bolt around or out. Any bolt that can be moved in any direction, however slightly, is probably not trustworthy. Avoid banging on the bolt, which weakens it. Back up any suspect bolt with another point of protection wherever possible.

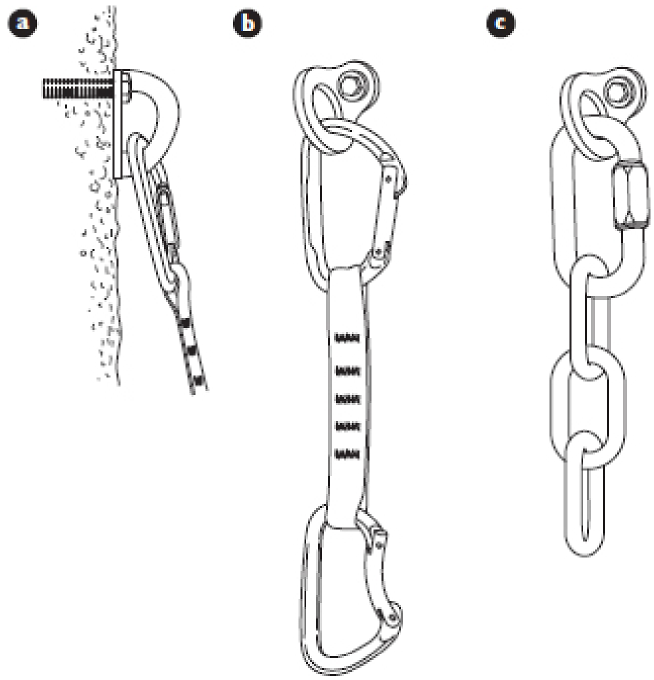

Fig. 13-6. Bolt and bolt hanger: a, from the side with a carabiner clipped to hanger; b, from the front with a quickdraw clipped to hanger; c, with quick link and chains attached.

If the bolt and its placement seem solid, use a carabiner to clip a runner to the bolt hanger. At a fixed anchor with chains hanging from the bolt hangers (see Figure 13-6c), clip the bolt hangers if at all possible, to free up the quick links, chain links, or rap rings for rappels. Some carabiners may not fit through the chains' upper links.

Bolts without hangers can be reliable protection if a hanger is added. If you anticipate hangerless bolts, carry extra hangers and nuts. If a bolt has no hanger, a last-resort solution is to slide a wired nut down its wires (fig. 13-7a), slip the upper wire loop around the bolt stud, and snug the nut up again against the bolt (fig. 13-7b). Attach a runner to the lower end of the nut wire.

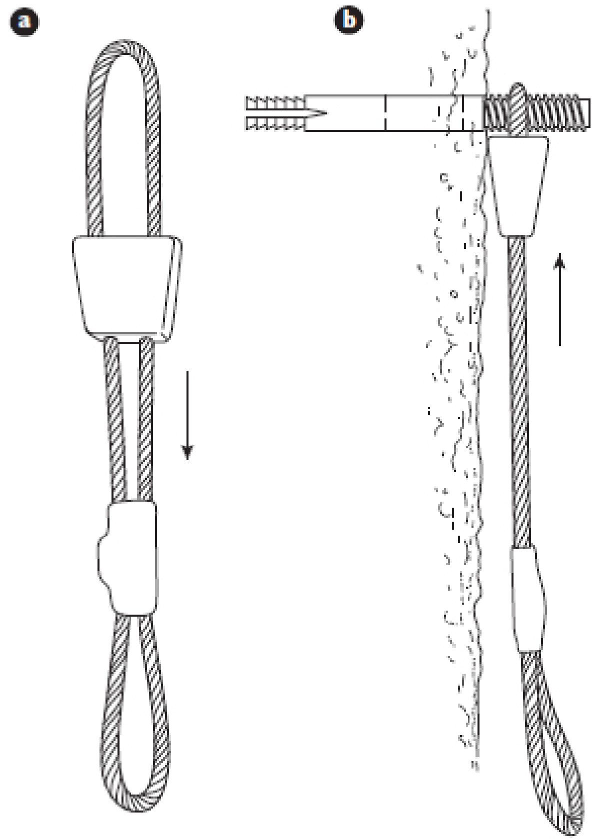

Fig. 13-7. Placing a wired nut on a hangerless bolt: a, create a loop by sliding the nut down its wires; b, slide the nut up its wires to form a noose around the bolt.

PITONS

Pitons were commonly used in mountaineering through the 1970s but are rarely used today, because placing and removing them scars the rock. However, many pitons remain as fixed placements on various routes. While it is better to rely on your own protection, these fixed pitons may be clipped as protection and might be helpful at times in retreating, when attempting to minimize gear left behind.

Pitons, even more than bolts, are vulnerable to weathering. Years of melt-freeze cycles widen cracks in the rock and loosen pitons. Examine pitons closely for signs of corrosion or weakness, and examine the cracks they are in for deterioration. Heavy use, failed attempts at removal, and falls on a piton can lead to cracks in the metal around the eye or other damage.

Ideally the piton was driven in all the way, with its eye close to the rock and the piton perpendicular to the likely direction of pull. If the piton appears secure, and in good condition, clip a carabiner (with runner attached) through the eye of the piton (fig. 13-8). Place the carabiner so that under a load it will not be levered against the rock.

If a piton is driven in only partially but otherwise is secure, or if the eye is damaged and can't accept a carabiner, use a runner to tie the piton off next to the rock with a girth hitch, clove hitch, or slipknot (fig. 13-9) to reduce the leverage on the piton under the impact of a fall. If the eye is usable, you may want to girth hitch a keeper sling to the eye and clip the carabiner in to it to catch the piton if it falls. Do not rely on this setup if there is better protection available.

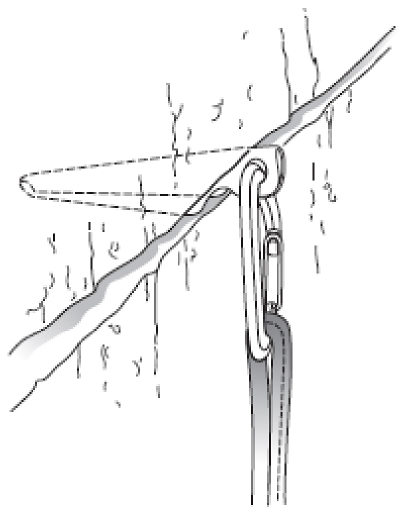

Fig. 13-8. Piton driven into rock: carabiner (with runner attached) clipped through piton's eye.

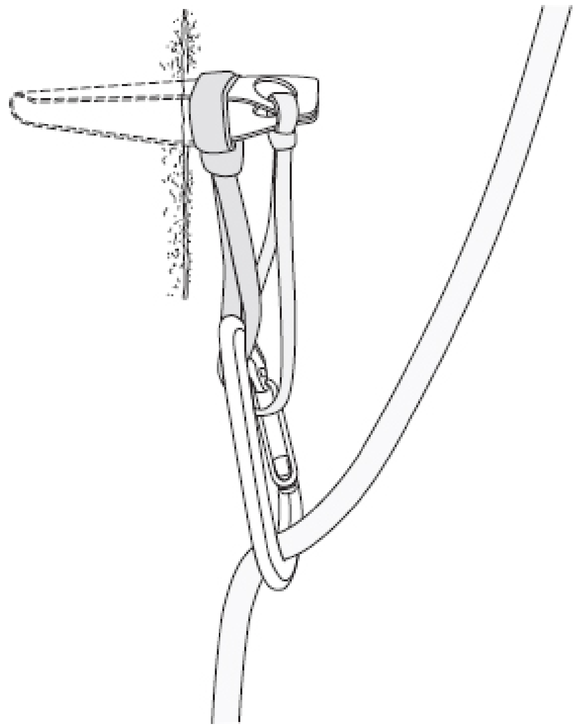

Fig. 13-9. Partially driven piton, with a runner girth-hitched to it close to the rock to reduce leverage and a keeper sling added to catch the piton if it pulls out.

OTHER FIXED PIECES

Removable protection may be abandoned when a party is unable to remove it. Do not trust removable gear that someone else placed. When these "fixed" pieces are encountered, examine them carefully and consider that the party may have abandoned it as the oldest piece on the rack that they were retiring anyway.

In addition to examining the gear and the rock where the piece is placed, note whether the sling attached to the fixed gear appears to be worn or damaged. Because of fixed gear's questionable integrity, consider it primarily backup protection.

REMOVABLE PROTECTION

Removable protection includes the various types of artificial protection other than bolts and pitons. Removable protection generally consists of a metal device that can be secured into the rock, with a sling for use in linking the metal piece to the rope. Removable protection must be placed in high-quality rock to maximize strength. For environmental reasons, using removable protection is preferred to placing new pitons or bolts because it leaves no scars on the rock. Removable protection generally falls into one of two categories: without moving parts (*passive*) or with moving parts (*active*).

Passive removable protection pieces, also known as *chocks*, are made from a single piece of metal and a connecting sling or cable. A typical placement is into a constriction in a crack. Shapes can vary from a tapered wedge, often called a *nut* or *stopper* (see Figure 13-10), to a deformed hexagonal tube, often called a *hex* (see Figure 13-11a, b, c, and d), to the more unusually shaped passive camming pieces such as the Tricam (see Figure 13-11e) that can be used in a torquing orientation, with counterforce exerted between the piece's point and its curved side. Tube chocks, often called *Big Bros* (see Figure 13-13), do have movable parts—they telescope out to a desired size—but they are passively placed much like a hex or a Tricam.

Spring-loaded camming devices (SLCDs), which are commonly called *cams*, are active devices that use spring mechanisms to allow portions of the device to cam against opposite walls of a crack (see Figure 13-14). Loading the device increases the pressure against the rock. Triggers on the device retract the parts, allowing insertion and removal.

PASSIVE REMOVABLE PROTECTION

Multiple chock shapes fit multiple rock cracks, but chocks are strongest when the most metal is in contact with the rock. Chocks have a primary placement direction, but many chocks also are designed for multiple placement options to maximize adaptability. Manufacturers rate the breaking strength of gear, and in general bigger chocks have higher breaking strength.

Passive wedging chocks come in a wide variety of shapes and sizes, but most have a generally wedge-shaped appearance (see Figure 13-10). They are called by many names, from brand names such as Stoppers to simply "wired nuts" or "nuts." Nuts are narrower at the base than at the top (fig. 13-10a), which lets them slip down into a constriction. Variations of nuts include flat faces, curved faces (fig. 13-10b), more-curved faces (fig. 13-10c), faces with notches or grooves (fig. 13-10d),and sides that may be parallel or offset, with both horizontal and vertical tapers. Some of the smallest nuts, referred to as *micronuts*, are designed for very thin cracks and for aid climbing (fig. 13-10e). Manufacturers construct the nuts with softer metals so that the rock bites into them better than it does into standard aluminum nuts, but this also makes micronuts less durable. The thinness of the micronut's cable makes it more prone to damage from normal use. Inspect micronuts and their cables often for nicks and other signs of wear, and retire them if the cable is damaged.

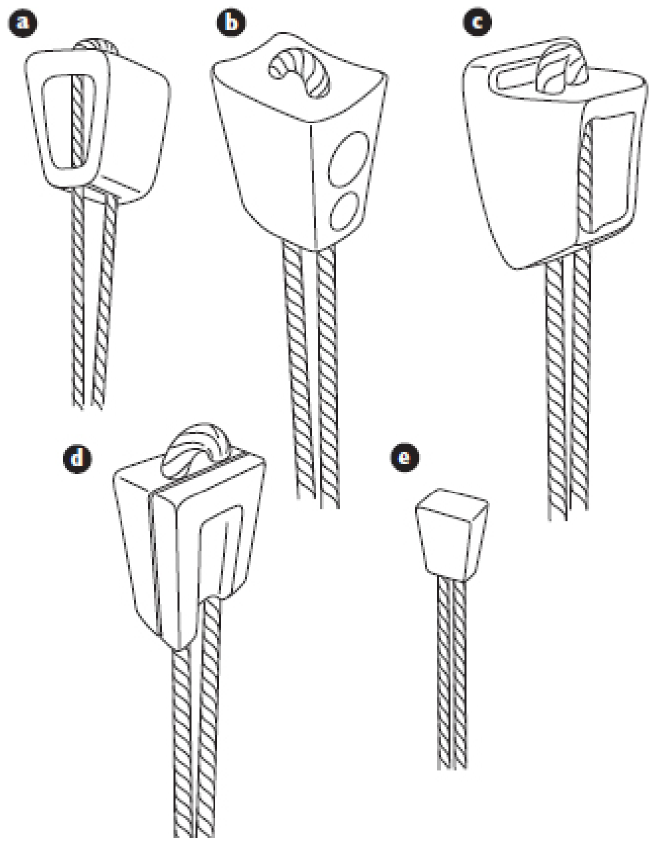

Fig. 13-10. Nuts: a, Stopper; b, curved nut; c, Wallnut; d, offset nut with grooves; e, micronut.

Hexentrics and other similar chocks take their name from their hexagonal shape (fig. 13-11a through d). Each pair of opposing sides on a hex is a different distance apart, permitting three different placement options per piece. The off-center sling creates the camming action (fig. 13-12a), or the piece can be wedged in a constriction. More-rounded versions of the hex work on the same principles.

Tricams have curved rails along one side opposite from a point, or "stinger," on the other side (fig. 13-11e). Camming action is produced by running the sling between the curved side rails and setting the stinger in a small depression or irregularity in the crack (fig. 13-12b); the load on the sling rotates the device into the rock with a camlike action. Tricams also can be used as passive devices simply set into a constriction (see Figure 13-20b), particularly those that narrow sharply.

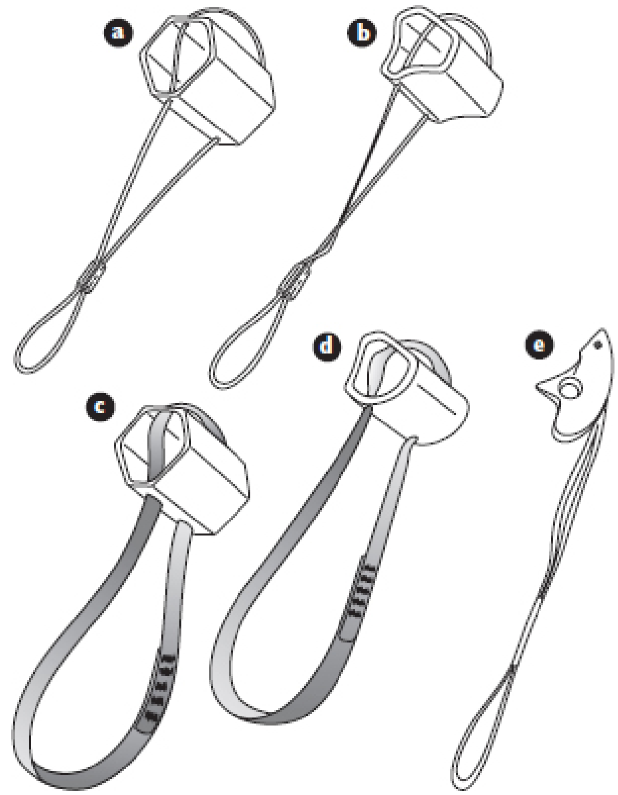

Fig. 13-11. Passive camming chocks: a, wired hex; b, wired curved hex; c, hex slung with high-strength webbing; d, curved hex slung with high-strength webbing; e, Tricam.

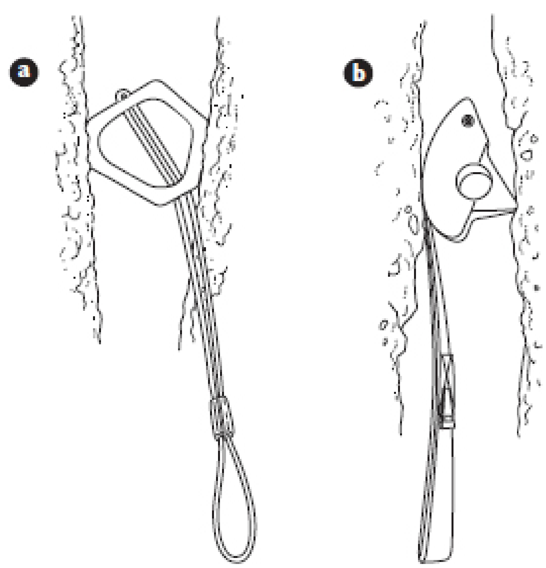

Fig. 13-12. Passive camming chocks in a vertical crack: a, Hexentric; b, Tricam.

Another device that acts as a passive cam (even though it is spring loaded) is the Big Bro, a tube chock with a spring-loaded inner sleeve that telescopes out to bridge a crack when a release button is pressed (fig. 13-13a). The extended sleeve is then locked into place by spinning the collar down snugly against the outer tube. The sling is attached at one end so a torquing action adds to stability when loaded (fig. 13-13b). Tube chocks are specialized for wide parallel cracks known as off-widths.

Most nuts and some hexes are slung with wire cable, which is much stronger than cord or webbing of the same size. The stiffness of the wire cable sometimes aids in placing the chock. Other chocks have sewn slings of cord, nylon webbing, or high-strength materials such as Spectra. A few are available without slings, and the climber must tie them. The sling material should be rated for climbing forces and should be twice as long as the desired sling length, plus about 12 inches (30 centimeters) for the knot and 1-inch-long (2.5-centimeter-long) tails—or 28 to 32 inches (71 to 81 centimeters) of material to make a loop 8 to 10 inches (20 to 25 centimeters) long. Due to the greater stiffness and lower friction of Spectra and other high-strength materials, a triple fisherman's bend is recommended for tying the sling (see Figure 13-13b). Inspect cables and slings regularly for damage, and follow manufacturer's instructions for replacing or repairing them.

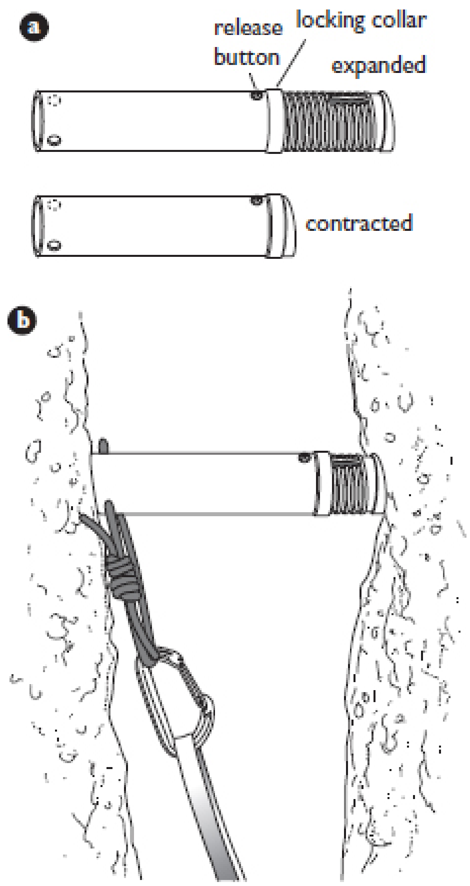

Fig. 13-13. Spring-loaded tube chock: a, contracted and expanded; b, correctly placed in a vertical crack, where it acts as a passive cam.

ACTIVE REMOVABLE PROTECTION

Spring-loaded protection devices expand the limits of free climbing by providing protection that can be placed easily with one hand and that can adapt to a variety of cracks.

Spring-Loaded Camming Devices

The first spring-loaded cams, called Friends, were introduced in the mid-1970s. Now spring-loaded camming devices (SLCDs or "cams") are manufactured in a wide size range and with multiple designs (see Figure 13-15). The basic design has four lobes—called a four-cam unit—that rotate from one or two axles, connected to a trigger mechanism on a stem. When the trigger is pulled, the lobes retract (fig. 13-14a), narrowing the profile of the device for placement in a crack or pocket. When the trigger is released, the lobes open up against the sides of the rock (fig. 13-14b). The cams move independently of each other, permitting each to rotate to the point needed for maximum contact with the rock. This movement sets the device in place. If you fall, the stem is pulled downward or outward, increasing both the camming action and the outward pressure of the cams on the rock.

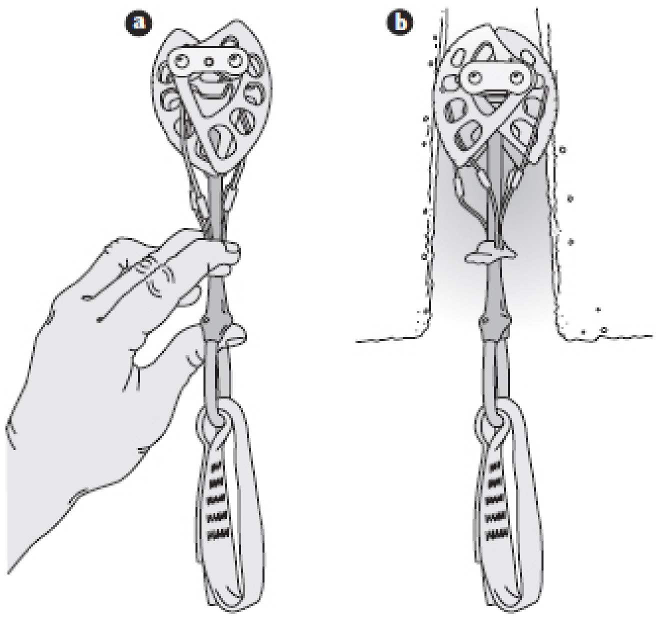

Fig. 13-14. SLCD or cam: a, retracted; b, correctly placed in a vertically oriented crack.

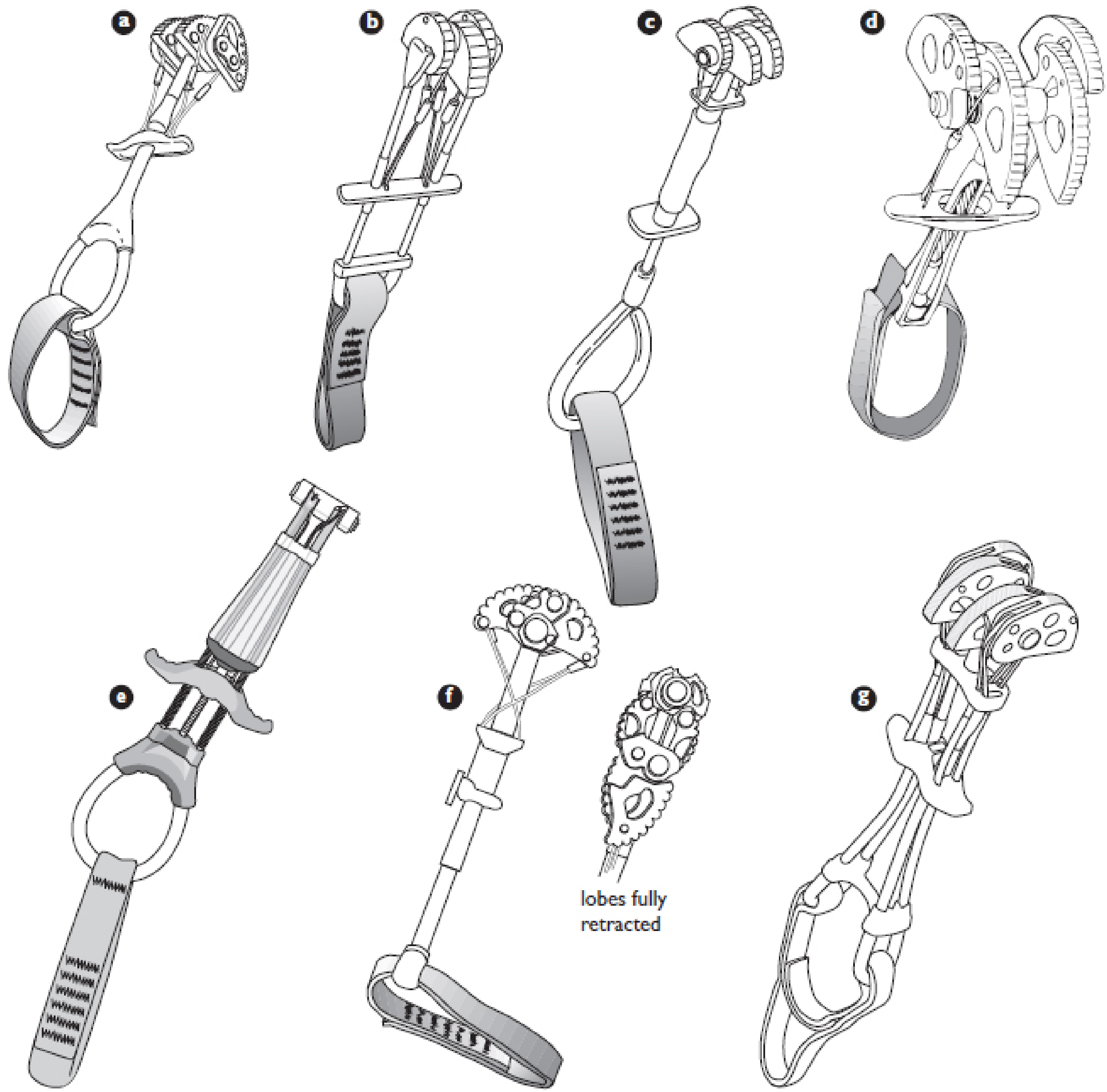

Fig. 13-15. SLCDs: a, Black Diamond Camalot C4; b, Metolius three-cam unit (TCU); c, CCH Alien; d, Wild Country Technical Friend; e, Black Diamond Camalot C3; f, Omega Pacific Link Cam, g, Totem Cam.

Variations of SLCDs include double-axle cams that can be used in the totally open position—called Camalots (figure 13-15a is a C4)—and those that cannot; specialized cams that fit into narrower placements (side to side) such as three-cam units (fig. 13-15b), called TCUs, and Aliens (fig. 13-15c), as well as two-cam units; cams with rigid stems or flexible stems; specialized cams designed to hold better in sandstone—called Fat Cams; cams with different trigger designs; specialized cams designed for flaring cracks, such as the Hybrid Alien; lightweight cams that cover wide ranges (figure 13-15d is a Technical Friend); cams for small cracks (figure 13-15e is a C3); extended-range cams (fig. 13-15f) that maximize the range of a single piece of gear; and flexible-body cams (figure 13-15g is a Totem Cam) with a wide expansion range. Some manufacturers, such as Metolius, indicate the optimal camming range with colored dots on the sides of the camming units.

Spring-Loaded Nuts

Spring-loaded nuts (fig. 13-16a) use a small sliding piece to expand the profile of the nut after it is placed in a crack. To place one, first retract the smaller piece by pulling back on the spring-loaded trigger, thereby narrowing the profile of the nut so it can be inserted into a thin crack (fig. 13-16b). Then release the trigger, permitting the smaller piece to press up between the larger piece and the rock, filling in the gap and increasing the area of the nut that is in contact with the rock (fig. 13-16c).

Spring-loaded nuts work particularly well in small, parallel-sided cracks where other devices may be difficult or impossible to place. But like micronuts, these nuts have less holding power than larger nuts with no moving parts because of the smaller surface area gripping the rock and because the spring may allow some movement—or “walking”—within the crack after placement.

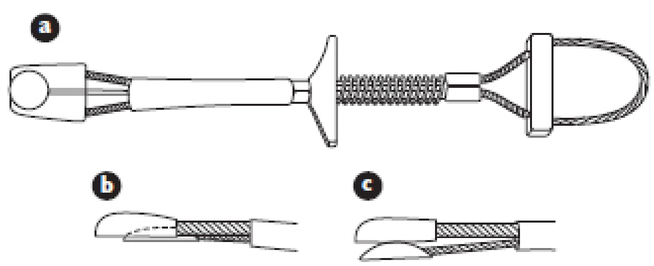

Fig. 13-16. Spring-loaded nuts: a, C.A.M.P. USA Ball Nut; b, contracted; c, expanded.

PLACING REMOVABLE PROTECTION

Placing solid protection is both art and science. Developing an eye for good placement sites and then placing the right piece into the right place securely and efficiently require practice to perfect (see the “General Considerations in Placing Removable Protection” sidebar).

Good placements start with good rock; in poor rock, even apparently good placements may not hold a fall at all. In good rock, look for constrictions in a crack, irregularities in crack surfaces, and prominences behind a flake. A good site for protection placement has solid rock sides—free of vegetation, dirt, or deteriorating rock. Avoid crystals or irregularities that may not be bonded strongly to the surrounding rock. Check for loose blocks or flakes by shaking or hitting the rock with your fist; if the rock moves or sounds hollow, look for a better spot.

GENERAL CONSIDERATIONS IN PLACING REMOVABLE PROTECTION

To climb confidently and safely, climbers must know how to place protection efficiently. Consider these guidelines when selecting where to place protection on difficult terrain.

- **Select high-quality rock** and avoid rock that crumbles or flakes.
- **Learn to estimate the right chock size and shape** for a particular placement. Use your hands to size the crack to the equipment. The better your estimate, the more efficient the placement.
- **Cams or hexes are often best in parallel cracks,** while offset cams or Tricams are best in flaring cracks. Chocks with slings or flexible stems are best in horizontal cracks.
- **Use your fingers to place the piece** just where you want it. Avoid dragging the chock blindly through a crack and hoping it catches.
- **Reinforce doubtful placements** with another chock, use a load-limiting runner to decrease forces on the piece, or find a better placement.
- **Remember the climber who will be following** behind you and removing the protection. Make your placements secure, but also try to make them reasonably easy to remove and within reach of a shorter follower if necessary.
- **Let your follower know (if possible) if an intricate series of moves was necessary** to place the piece, so your follower can reverse the moves and return your gear.
- **Avoid shallow placements** where chocks can easily pull out of the crack, but avoid very deep placements that are hard for the follower to retrieve.
- **Recheck the chock after it is placed.** Look to see that it is in good contact with the rock. Give the piece a strong tug in the direction of

pull to set the piece and test the reliability of the placement.

- **Clip a runner between the chock and the rope** to minimize the effect of rope movement on the piece. An adequate length of runner not only prevents pulling on the piece but also helps prevent rope drag (see Chapter 14, Leading on Rock).
- **Use a cam or oppositional chocks as the first placement** to avoid the zipper effect caused by an outward or upward pull in a fall (see “Using Opposition Placement,” later in this chapter).

The next consideration is the type of protection to use. Wedges work best when placed behind constrictions in a vertically oriented crack. Hexes or Tricams work well in horizontal cracks and behind small irregularities in cracks or flakes where it may be difficult or impossible to position wedges. Tricams often are the only pieces that will work in shallow, flaring pockets. SLCDs are easier to place, but they are relatively heavy and expensive, and placement integrity can be more difficult to evaluate. However, SLCDs often work in parallel-sided or slightly flaring cracks where it is difficult or impossible to get anything else to hold.

More than one type of device may work in a given spot. Make a choice based on ease of placement and what may be needed later on the pitch. Ration the pieces that will be needed higher up.

Placing Nuts

The basic procedure for placing nuts (passive wedging chocks) is quite simple: find a crack with a constriction at some point, place an appropriate piece of protection above the constriction (fig. 13-17a), slide it into place (fig. 13-17b), and pull down on the sling to set the nut firmly in position (fig. 13-17c). Slot the nut completely into the crack, with as much of the metal surface as possible contacting the rock. Use your fingers to set the piece in the best spot, although sometimes threading the cable behind a protrusion is the best option.

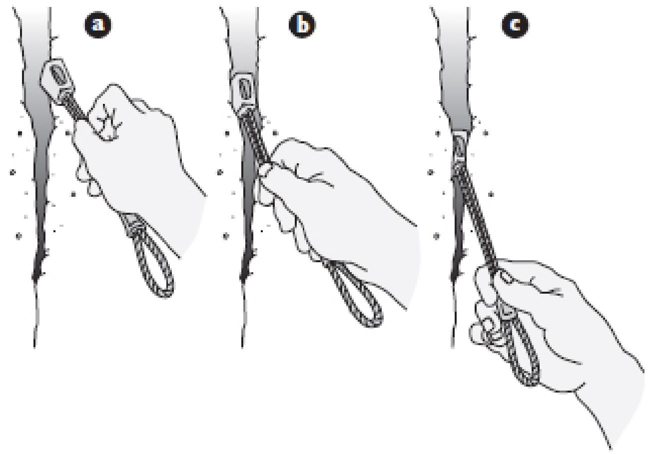

Fig. 13-17. Placing a nut: a, place nut into crack above constriction; b, slide it into place; c, tug on nut wire to set it.

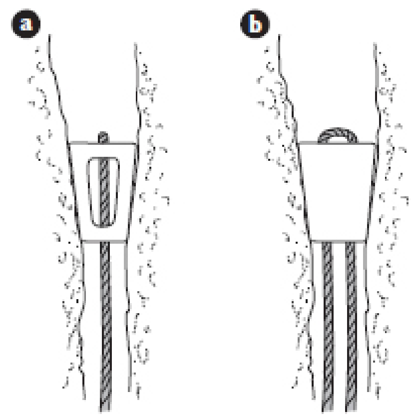

Fig. 13-18. Placement of nuts: a, stronger placement with wide sides in contact with rock; b, weaker placement with ends in contact with rock.

The best choice of nut for any given placement is whichever size and shape offers the best fit. As a general rule, greater contact between nut and rock means a stronger placement. Therefore, larger nuts generally are stronger than smaller ones, and wide-side placements (fig. 13-18a; presenting more surface area) generally are stronger than end placements (13-18b); however, the fit is most important. Micronuts must be placed especially carefully and have excellent contact with the rock, given their lower strength.

Evaluate nut placements from multiple directions if possible. Even if the front looks good, the back may not be in contact with the rock. If it looks doubtful from other angles, find a better placement or piece. Carefully evaluate the potential effects of rope drag and the direction of loading in the event of a fall. In vertical cracks, setting a nut with a downward pull usually keeps the chock in place, although the rope may pull sideways or upward. In horizontal cracks, nuts will be pulled outward. Climbers can also place two nuts to equalize or oppose for greater security (techniques discussed in "Using Opposition Placement" and "Equalizing Protection" later in this chapter).

Placing Hexes and Tricams

In addition to being used as a chock in a constriction, a hex or a Tricam also is designed to cam under load. In parallel-sided cracks, this feature must be used for the placement to work. A good placement is tight enough to have good contact with the rock and to avoid being displaced by the rope, yet positioned to allow camming action under load.

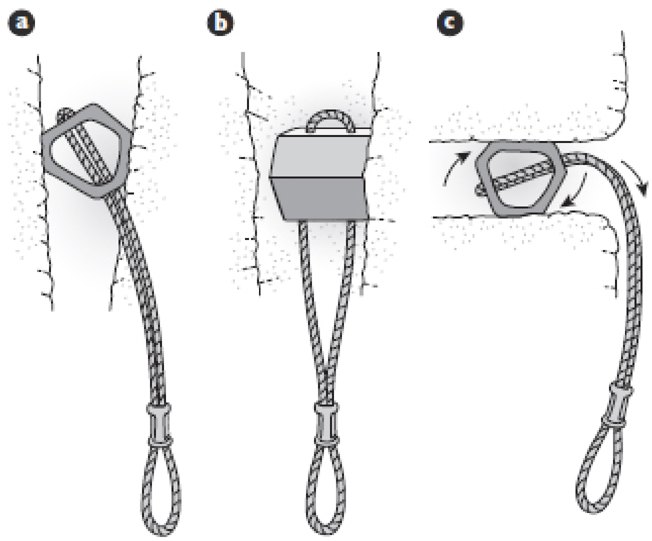

Fig. 13-19. Placements of a hex: a, in a vertical crack as a passive cam; b, sideways in a vertical crack as a passive wedging chock; c, facing out in a horizontal crack as a passive cam.

In vertical cracks, the piece will be more secure if it is placed just above a constriction or irregularity in the crack and if it is oriented so that the camming action pulls it more tightly against any irregularity (figs. 13-19a and 13-20a and b). Placed as a passive wedging chock, a hex's camming surfaces face out (fig. 13-19b).

In horizontal cracks, the piece should be placed so that the downward or outward pull of a fall would maximize camming action. Hexes should be positioned so that the sling exits the crack closer to the roof than to the floor (fig. 13-19c) to maximize camming action. Tricams should be placed to optimize overall fit, and the sling and rails can be either down or up (Figure 13-20c shows rails and sling up).

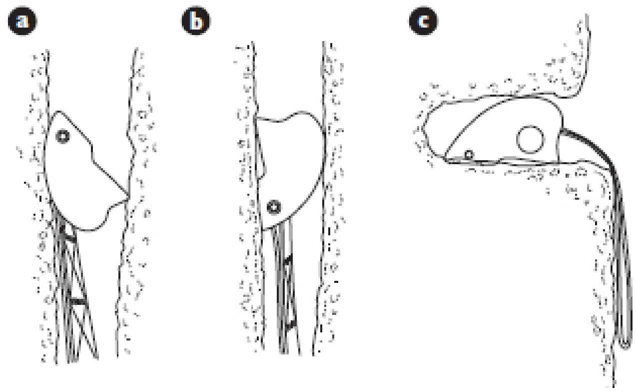

Fig. 13-20. Placements of the Tricam: a, as a passive cam in a vertical crack; b, as a passive wedging chock in a vertical crack; c, as a passive cam in a horizontal crack.

Placing Spring-Loaded Camming Devices

An SLCD can be placed very quickly. It is the device of choice for parallel-sided cracks that lack the constrictions or irregularities needed for passive chocks. It also can be used in slightly flaring cracks and in cracks under roofs where other chocks may be slow or difficult to place or questionable to use.

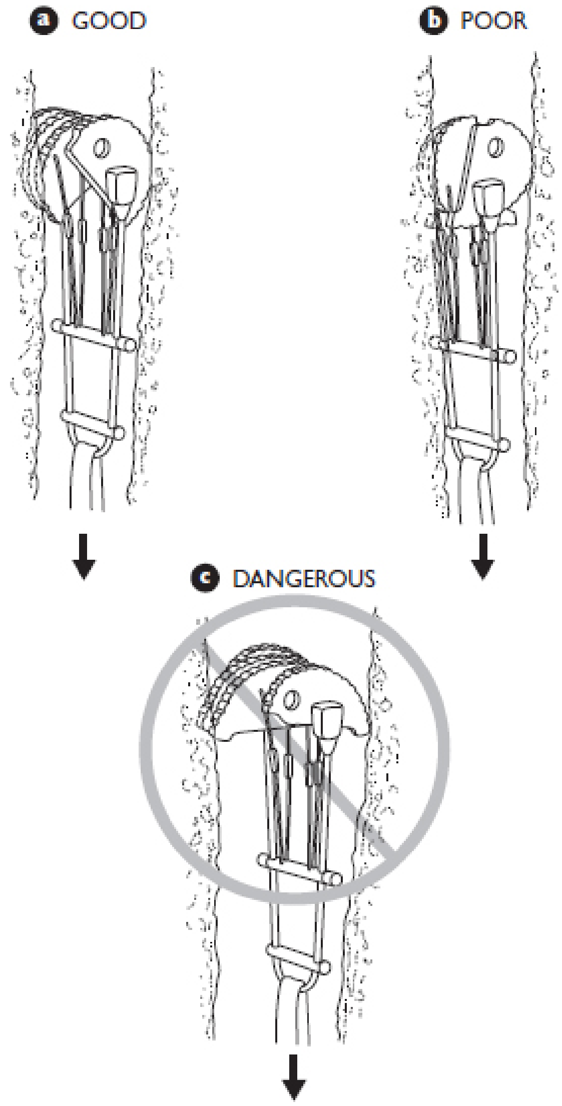

Fig. 13-21. Placement of SLCDs: a, cams expanded to midpoint—stem in likely direction of pull (good); b, cams are over-retracted—hard to remove (poor); c, cams are overexpanded—failure likely (dangerous).

TIPS FOR PLACING SLCDS

- **Be certain all cams contact the rock** so the placement is stable (see Figure 13-21a).
- **Be aware that the device may become jammed** in the crack and impossible to remove if the cams are fully retracted in the placement (see Figure 13-21b).
- **Do not overexpand the cams**, since little camming action can then occur (see Figure 13-21c), making the device more likely to pull loose during a fall.

- **Remember that SLCDs placed in soft rock can be pulled out by a hard fall**, even when they are placed properly. This is true of sandstone and limestone.
- **Place SLCDs with their stems pointing in the direction of pull from a fall.**
- **Make a careful placement and use a suitable runner** to minimize "walking": rope movement can cause the entire piece to "walk," moving it either deeper into or out of the crack, jeopardizing stability of the placement.
- **In a horizontal crack**, place a three-cam unit's side with two cams on the bottom for best stability. In **vertical cracks**, place the two cams on whichever side provides the best fit in the crack.

Within their given range, the three or four individual cams in the device will adjust to the width and irregularities of the crack as the trigger is released. The stem of the device must be pointed in the likely direction of pull during a fall to provide maximum strength and to help keep it from being pulled out of position. SLCDs work best in harder rock such as granite rather than sandstone and in cracks with relatively even sides.

When placed well (see the "Tips for Placing SLCDs" sidebar and Figure 13-21), SLCDs can protect against somewhat multidirectional loads, and climbers may use these to decrease chances of the zipper effect (see Chapter 14, Leading on Rock). After clipping a runner to the SLCD and rope, wiggle the rope and make sure the SLCD does not walk back in the crack. SLCDs have a flexible stem that will hang out over the edge of the crack in horizontal or near-horizontal cracks (fig. 13-22).

Placing Spring-Loaded Nuts

Spring-loaded nuts can be used almost anywhere a passive nut would be used, but they really come into their own in thin cracks, including parallel-sided cracks (fig. 13-23). When placing spring-loaded nuts, select just the right size for the crack, because the placement size range for any one of these devices is quite narrow. They are susceptible to being pulled out of place by rope movement, so attach a runner to the piece. As with any piece of protection, place the device so it is strongest in the direction of the force of a potential fall.

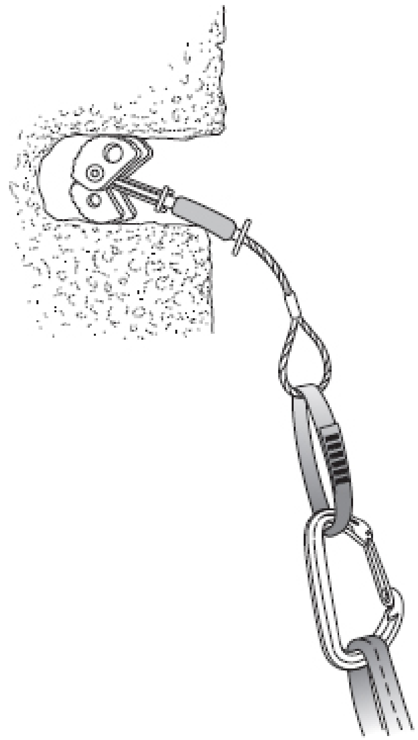

Fig. 13-22. SLCD placement in a horizontal crack: the flexible cable stem can bend and adjust to the direction of pull.

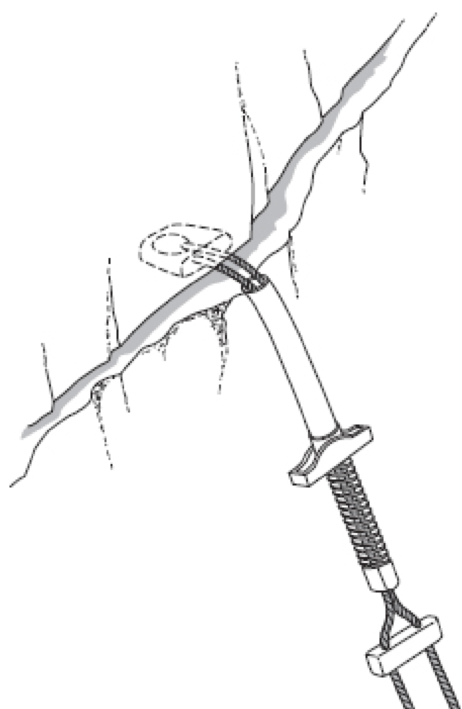

Fig. 13-23. Placement of spring-loaded nut.

USING OPPOSITION PLACEMENT

Sometimes a second chock must be placed in order to keep the initial one in position, such as the first placement on a pitch to avoid the zipper effect (see Chapter 14, Leading on Rock). Single placements can sometimes be dislodged by sideways or upward pulls on the rope as the lead climber advances, because of changes in the direction of the route (see Figure 14-10 in Chapter 14, Leading on Rock).

To form an opposition placement, place two pieces that will pull toward each other when linked. Use carabiners with slings to link the chocks. Ideally the chocks should be held together under a slight tension. Use clove hitches to tie a runner between the carabiners on the chock slings, then cinch up the runner; the climbing rope may then be clipped to the long loop of the runner (fig. 13-24a). Or just clove-hitch the runner to the upper carabiner, which tensions the lower carabiner, and clip the climbing rope to the runner (fig. 13-24b).

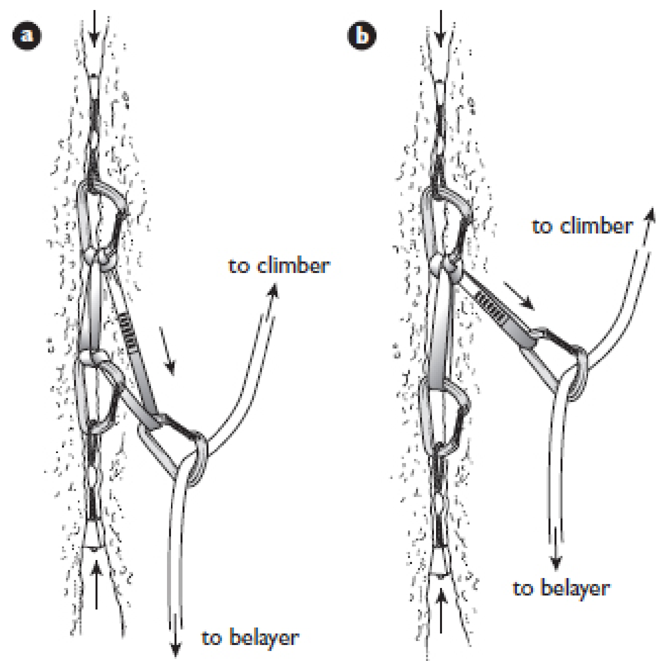

Fig. 13-24. Opposing chocks in a vertically oriented crack: a, connected by a runner secured with clove hitches to each chock's carabiner; b, connected by a runner clove-hitched to the upper chock's carabiner, which tensions the lower carabiner.

EQUALIZING PROTECTION

A leader who is faced with a hard move or questionable protection may decide to place two pieces of protection close together. If one piece fails, the other remains as a backup. Another option is to equalize the load over two protection points, subjecting each to only a portion of the total force. (For equalizing protection to establish an anchor, see “Equalizing the Anchor” in Chapter 10, Belaying.)

It is possible to equalize the forces between two points of protection with one hand and only one runner. First clip the runner in to both chocks. Next put a half twist in the middle of one length of the runner and pull the resulting loop down to meet the other side of the runner (see Figure 10-22, the sliding X, in Chapter 10, Belaying). Then simply clip an extra carabiner through both runner strands, with the rope attached to this carabiner. If one chock later pulls out, the twist in the runner will slide down and catch around the carabiner, but some extension will occur. Clipping in to the twist is essential because without it the entire setup will fail if one chock comes loose.

STACKING

If nothing on a rack will accommodate the crack in which protection must be placed, the advanced technique called stacking can sometimes help. Place two passive wedges in opposition, with the larger one on top (fig. 13-25).

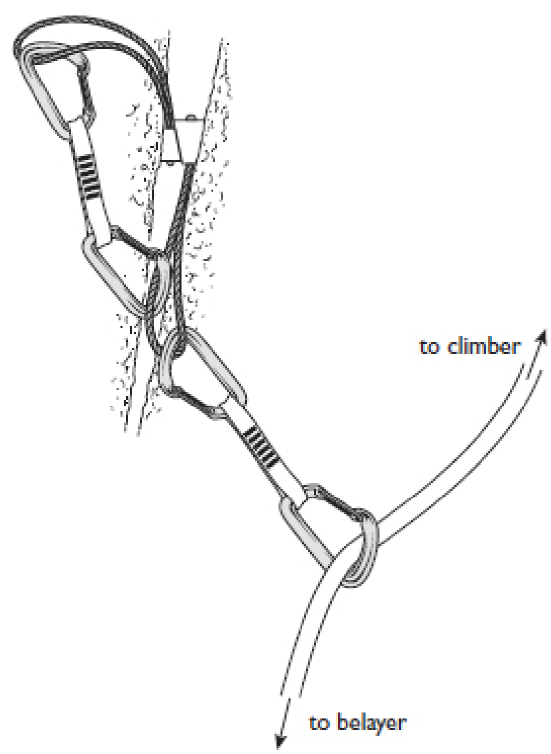

Fig. 13-25. Stacking chocks.

A downward pull on the larger chock causes it to wedge between one side of the crack and one side of the other chock. Seat the larger chock with a firm tug before using it, and connect it to the rope in the usual way. Use a runner to clip the smaller chock in to the wire of the larger chock or another runner to keep the smaller chock from becoming a flying missile when it is removed by the follower or if it comes loose in a fall. Use only chocks that seat well against one another; otherwise, stacking is not effective.

REMOVING PROTECTION

Removable pro can be easy to place but sometimes difficult to remove, whether for the leader who wants to choose a different piece for a crack other than the one just placed or for the follower cleaning the pitch. A nut tool (also known as a *cleaning tool* or *chock pick*) is a specialized tool to assist in removing protection (see Figure 14-4 in Chapter 14, Leading on Rock). Nut tools often are racked separately on the harness, sometimes with retractable cord to avoid losing them if dropped. Nut tools can be used to apply force underneath a stubborn piece to push it up and to reverse how it was placed. In a narrow crack, the tool can be used to grab the cable at the top of a wedge and pull it out from above.

ROCK PROTECTION ETIQUETTE

Chapter 12, Alpine Rock Climbing, discusses the issue of ethics in placing protection. Specifically, many climbing areas expressly forbid placing or even replacing bolts, and it is each climber's responsibility to understand the rules before installing a bolt. Some land managers request that climbers receive permission before placing or replacing bolts. Common practice for sport-climbing routes is for the first ascensionist to place the only bolts.

Popular routes where natural features such as trees and horns are common rappel stations often collect slings from various parties over time. If climbers find damaged slings, they should cut the slings off and remove them from the route. Many climbing areas encourage the use of natural-colored bolts and slings for those that are left on routes, to address aesthetic concerns of nonclimbing visitors.

BUILDING SKILLS

The way to become proficient at placing protection is very simple: practice. First, practice by placing protection while standing on the ground. When following as a second, observe closely how the leader places protection. Practice placing pieces while climbing on a top rope. When you believe you are ready to try leading, start on an easy pitch that you have already climbed as a second or while on top-rope. Place more pieces than are needed, just for the practice. Do not be discouraged if the first time turns out to be harder than it looks. Bring along a knowledgeable, experienced climber as your second—it is a great way to get valuable feedback. Just keep at it, and soon you will be the one giving advice.