the gate, and there were none. The gouges on the spine make "spine impact" the more likely culprit in this case. (A simple "sticky gate" scenario is not likely since the gate moved freely after the accident.)

Although we don't know the actual force on the carabiner, Baxter and his gear weighed 225 pounds and his belay absorbed little energy—his clove hitch did not slip and there was no belayer or force-limiting belay device at the anchor to reduce the impact. The carabiner probably met its design specifications but, like the rope, was overwhelmed.

Carabiner failures are pretty rare. Harmston knows of only half-a-dozen out of several hundred thousand Chouinard and Black Diamond units sold, and they were all due to open gates. Nevertheless, current models, whether the traditional design or the newer wire gate type, seek to reduce the effects of "spine impact" by stiffening the gate spring and/or decreasing the mass of the gate.

While the chance of a carabiner failure or the rope unclipping is low, don't hesitate to use two reversed and opposed carabiners if you suspect a critical situation like this one. Perhaps more important, back up the placement itself if you can—a fixed copperhead or piton is more likely to fail than the carabiner.

We are all eager to hear about equipment "failures", but it's important to get the facts right: preserve what's left of the gear (don't touch freshly broken surfaces, for example), get the names of participants, photograph or draw the scene if possible, and notify the manufacturer. (Source: John Dill, NPS Ranger, Yosemite National Park; Steve Nagode, REI; Chris Harmston, Black Diamond Equipment, Ltd.)

STRANDED, INADEQUATE CLOTHING AND EQUIPMENT, WEATHER

California, Yosemite Valley, El Capitan

On May 16, 1996, the National Park Service rescued Austrian climbers Christian Zenz (22) and Christian Wassertheurer (27) from The Shield on El Capitan, after the pair had been exposed to a storm without a fly for their portaledge.

The pair got advice about the route from friends and from Yosemite Climbs. Zenz had also read the guide book chapter entitled "Staying Alive," which describes Yosemite storms and tactics for surviving them.

On Sunday morning, May 12, they checked the weather forecast, which called for sunny skies with a slight cooling trend, and started climbing. By Tuesday night they had completed one pitch above the Shield Roof. Tuesday was windy and cloudy but, in their opinion, not indicative of a storm. This was the first hanging bivouac they had encountered on the climb, and the first time they had needed their borrowed portaledge. When they set it up, they discovered that there was no rain fly. It rained that night, but they stayed fairly dry by using plastic tube tents over their sleeping bags.

The rain stopped Wednesday morning, allowing them to dry their clothes and sleeping bags in the breeze. They had 11 pitches to go, it was still cloudy, and without the fly they were completely exposed to further bad weather. Retreat was an option. The 25-foot roof would be difficult to down climb, but it was fixed and they had a cheater stick. However they thought the weather might improve, so they decided to continue up.

About 1400, before they could begin climbing, the rain began again. This time it was heavy, with a strong wind that blew their portaledge around. The wind and rain, mixed with sleet, continued through the night, and the temperature dipped below freezing with ice coating the wall. They were now soaking wet and very cold, in the "hardest" bivvy of their careers.

Wassertheurer was using a down sleeping bag. It was rated to well below freezing but it became useless as it got wet. They wore Gore-tex storm jackets and pants but claimed that the wind blew water through the fabric. Although they now realized they should rappel, their hands had become too cold to operate carabiners and they would certainly deteriorate further if they tried to descend. Thursday morning, knowing they were trapped, they called for a rescue.

The rain stopped by midday. After attempts to deliver a portaledge and bivvy gear by helicopter were thwarted by strong downdrafts, the rescue team was flown to the summit and one rescuer lowered to them. Zenz and Wassertheurer were able to jumar about 1000 feet to the rim without difficulty.

Analysis

Zenz and Wassertheurer each had eight years of climbing experience and climbed 5.13. They had climbed in many parts of the world, on multi-day routes, in rain, snow, wind, and cold temperatures. They had climbed the Nose on El Capitan just prior to attempting the Shield.

They stated later that they had borrowed the portaledge in Austria and had assumed the fly was in the same sack as the ledge; when they packed for the climb they did not attempt to check its condition, let alone that it was there in the first place. They agreed that they would have borrowed a rain fly before starting the climb, had they known theirs was missing.

Down is well known to lose almost all insulative value when wet. Wassertheurer relied on the shell material because it was supposed to be "highly water-resistant." He had apparently never tested it in truly wet conditions. Neither climber had bivvy sacks. We recommend (but do not guarantee) them as a second line of defense against condensation or leaks inside a portaledge.

Zenz and Wassertheurer were cited by the NPS for "creating a hazardous condition" by unnecessarily putting rescuers at risk, under 36 CFR 2.34 (a) (4). They pled guilty and were placed on one year's probation on the condition that they pay rescue costs totaling $13,325. (Source: Keith Lober, John Dill, NPS Rangers, Yosemite National Park)

ACUTE MOUNTAIN SICKNESS (AMS), PARTY SEPARATED, WEATHER

California, Mount Shasta

On May 25, Mike Turegun (35) and John Cain (49) approached Mount Shasta via Northgate, setting up a base camp at 9,000 feet on the bench near the Hotlum/Bolam Route. On May 26 they began climbing the Hotlum/Bolam Route. They left a pack with clothing, food, and insulin for Cain on the "step" at 12,000 feet and continued up the route. At 1400, Cain became altitude sick at 13,000 feet and stopped climbing. Cain wanted to turn back, so Turegun continued on to the summit (14,163 feet). As Turegun was returning to where he left Cain, a sudden snow storm hit, causing a whiteout. Turegun was unable to find the descent route and was guided back to his base camp by yelling to another climbing party. When Cain did not return to base camp by the next morning, Turegun walked out to their vehicle and drove to the USFS Ranger Station in Mount Shasta to report Cain missing. Cain was described as being in good physical condition with a lot of outdoor experience, having climbed Mount Shasta in the past via the Avalanche Gulch route. However, he was diabetic and also had mid-range multiple sclerosis. He wore braces on both legs below the knees.