



Off-road triathletes sucking thin air at Xterra Tahoe last October: Ashley Burt, Melanie McQuaid, Josiah Middaugh. Photos: ©2006 Rich Cruse/XTERRA

# Sputtering in the Mountains

## ENDURANCE LEGENDS DAVE SCOTT, MARK ALLEN AND GREG LEMOND ON THE HIGHS AND LOWS OF ALTITUDE TRAINING

By Pete Gauvin

When the NCAA collegiate national ski championships were held at Donner Summit a couple years ago, coaches from Eastern schools complained that their cross-country athletes would be at a severe disadvantage due to the near 7,000-foot altitude of the course.

Although Western school coaches were somewhat sympathetic, they shot back that their nordic skiers are always at a disadvantage when the races are held at lower elevations on the East Coast or in the Midwest, as they more frequently are. Western ski racers, for the most part, are not accustomed to the faster pace and greater power athletes from lower elevations are able to train and race at, they said.

In the end, the University of Nevada, Reno, which was hosting the championships, basically took the position: 'If you want to ski on snow then we have to go where the snow is, i.e. the mountains. If snow is not that big of a deal to your skiers, well then we have a great sandbox out here in the desert. We recommend a hard wax and don't trip on the tumbleweed.'

This little cross-country X-country controversy is a good distillation of the advantages and disadvantages – the highs and lows, if you will – of training and racing at elevations that turn potato chip bags into inflatable pillows.

### EVERYDAY ATHLETES IN HIGH PLACES

If East Coast nordic skiers get their lycra suits all in a twist over a little elevation sensation, then what should you, Joe and Jane Sea-Level Athlete, know about the pitfalls of competing in events in high places like Tahoe, Mammoth or the southern Sierra this summer?

For most weekend warriors and even serious age-group athletes, altitude training may seem about as practical as a pot-bellied duffer taking golf lessons from Tiger Woods. What's the point? Get him another can of Budweiser. That'll improve his swing.

Which is to say, altitude training, ain't gonna happen ... unless maybe you have a Forest Service cabin on a 99-year lease at Echo Lake, or someplace like that, and at least a couple weeks to de-tether yourself from the office and other suburban shackles.

But that said, if you're planning on participating in any endurance events at elevations above 6,000 feet, a little knowledge about the complicated science of high-altitude training might save you a bit of misery and unnecessary suffering, not to mention improve your performance.

First, though, let's hear from a few endurance legends on the subject of altitude training. There must be some reason that

elite athletes retreat to mountain hideaways in hopes of gaining a competitive edge.

"From what I've experienced and seen, I think coming up to altitude really accelerates the ability to make large fitness gains," says six-time Hawaii Ironman winner Dave Scott, who in recent years has run a training shop for budding triathletes in his adopted home of Boulder, CO. By the way, it's no coincidence that Boulder (elev. 5,430 feet) is the nation's all but official endurance sports' capital, and not say Boca Raton (elev. 13 feet).

Scott has a little experience as a thin-air guinea pig himself. During the '80s when he dominated triathlon's premier event, Scott trained alone in the hot, dusty, windy, flat roads around his hometown of Davis, baffling his triathlon counterparts who preferred the social beach-and-palm-trees atmosphere of San Diego. After a five-year layoff from the sport following his epic eight-hour mano-y-mano duel with Mark Allen at the 1989 Ironman, which Allen won, the enigmatic Scott moved his pre-Hawaii training base to Colorado. He thought it would help maximize his capacity to wage aerobic battle in his return to the Kona lava fields. And having had his 40th birthday, he wanted to maximize every advantage he could.

Judging by his results, he did. Even after his five-year cooling-off period, Scott finished

second in the 1994 Hawaii Ironman. To top it off, in 1996 at age 42, he finished fifth in a time faster than any of his six victories during the 1980s.

Is Scott an early evolutionary specimen of Homo Supersapien? Probably. Did altitude training benefit him? He thinks so.

He attributes his amazing comeback performances on the Big Island to his time spent in the thin air of the Rockies running lung-busting trails and cranking up relentless mountain roads into oxygen-poor elevations. "The terrain," he says of Boulder's foot of the Front Range location, "is optimal (for making huge gains in fitness)."

Allen, Scott's old Ironman nemesis, who went on to win six Hawaii crowns himself and dominate triathlons both short and long for season after season, prompting *Outside* magazine to proclaim him "The World's Fittest Man" in 1997, agrees that altitude training can aid performance – if it's done right.

"I am a definite believer in altitude for certain individuals and sports," Allen says. "Not everyone can adapt, but if you can then it can become a big advantage even in long races such as Ironman. But you have to do it correctly, which means giving yourself time to adapt fully and not overtraining during that time. It also requires coming

down to sea level to race at sea level the right amount of time before.”

#### IT'S ALL ABOUT HEMOGLOBIN

While training at high altitudes might be the only legal means available of boosting lung power and muscle endurance beyond what can be gained through normal training (for non-legal means, talk to your local Tour de France coach), it's not as simple as driving up a mountain and working up a sweat.

Hemoglobin is the physiological key. Training at high altitudes stimulates the production of hemoglobin, the molecule found in red blood cells that carries oxygen to the muscles, says Dr. Richard Coast of Northern Arizona University's Department of Exercise Science. Located in Flagstaff at a smidge over 7,000 feet, NAU is home to the High Altitude Sports Training Complex (HASTC), which hosts top endurance athletes from around the globe, many of whom are hoping to win Olympic gold medals.

Like a high-revving sports car, more oxygen to working muscles allows athletes to work more efficiently at a higher aerobic threshold. Go beyond your personal red line and you enter the unsustainable and highly volatile anaerobic zone, Dr. Coast says. This quickly bankrupts you most efficient fuel source – glycogen (glucose and oxygen) – and results in the searing lactic-acid muscle burn the causes athletes to back off the throttle or bonk altogether.

The goal of altitude training is to push that redline higher up your tachometer, allowing you to maintain efficiency while working at a higher RPM. But, Dr. Coast cautions, it is critical that you choose the right altitude to bust your lungs at. A common misconception is that the higher you go, the greater the gains will be to your oxygen-carrying capacity. In actuality, training too high usually results in diminishing returns.

#### ALTITUDE VS. INTENSITY

At altitudes above 8,500 feet or so, oxygen levels are reduced to the point that the thin air can significantly impair training intensity, often without the athlete being aware of it because they still feel like they're working hard. “When you're at high altitude your performance suffers and training can also suffer,” Dr. Coast says. “You might be training at only 90 percent of max and that can lead to little or no improvement in performance.”

Thus, to get the greatest returns from altitude training you need an elevation that provides a sufficient altitude stimulus without causing a significant drop-off in training intensity. Years of studies have pegged the optimal altitude range to be between about 6,000 feet and 8,500 feet.

“Boulder is at 5,500 feet, but many of the local rides climb to near 10,000 feet, and you definitely notice it,” Scott says. “But we're not living at that altitude. I've held training camps at Copper Mountain, which is around 9,200 feet, and we've had athletes coming from places like Houston who are overcome with fatigue, headaches and nausea (because they're there around-the-clock.)”

Maintaining hydration is one of the biggest difficulties and keys to adapting to altitude training, Scott says. “And you need to be concerned, especially initially, that you allow adequate recovery time. A lot of endurance athletes lose lean muscle mass when they train at altitude. They may still gain aerobic capacity but that can be offset by a loss in muscle strength.”

While most experts say the shorter the event the less benefit altitude training confers, Allen believes that's not necessarily the case. “I felt adapting to altitude also helped in short races, partly because of the blood changes but also because at altitude you work your diaphragm much more than at sea level, and that is probably one muscle that fatigues easily in high-end efforts such as a short race,” he says. “You need to really stay on top of strength training if you live at altitude, though, because you don't work your muscles quite as hard even when you are adapted.”

#### SNORE HIGH, TRAIN LOW

An outgrowth of such experiential knowledge like Allen's and Scott's, now supported by a wealth of scientific evidence, has been the ascendance of the “sleep high, train low” approach. By living at altitude and training low (below 5,000 feet), athletes get the physiological benefits of altitude exposure without hindering their ability to train at high intensity.

“Ideally, if you had a way to do it, you'd sleep at 8,000 feet and train at sea level,” says cycling legend Greg LeMond, a native of Reno who was the only American to win the Tour de France three times before that guy Lance came along. “But there's no place in the country you can do that.” At least, not without a lot of hours in the driver's seat on a daily basis. And a nation of bulge-battling commuters testifies to the fact that that's no way to stay fit.

If your goal is to go fast over relatively short distances, altitude training is unlikely to do you much good, LeMond says. While some sports are more suited to pure altitude training (such as marathon running), sports that require a combination of endurance and power (such as rowing, cycling and shorter triathlons) can suffer from an overload of altitude training.

“For really long endurance events, altitude might not be a bad place,” LeMond says. “The longer you go the lower the percentage of your VO2 max (maximum oxygen intake) you're going to require. It's a natural because you'll have to go at a lower intensity to cover the distance. The shorter the event the closer you'll be to your VO2 max but the closer you'll be to being anaerobic also. If you think about it, you never see track-and-field sprinters from high altitude. It's almost unheard of because you can't maximize your anaerobic ability at altitude.”

So, sea-level citizens, you may not be all that disadvantaged after all. Because no matter where you train or live, the secret, says LeMond, is to train at a higher output.

“The benefit from altitude is purely an increase in red blood cells. That's it. You feel like you're working harder because you're up there straining a little more. You

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The altitude didn't slow Eneko Llanos of Spain at Xterra Tahoe. He won. ©2006 Rich Cruse/XTERRA

want to have that same strain by working at a higher output at sea level. That's why in bike racing the Colombians who come from a very high altitude do well on specific mountain climbs but they get killed in a multi-stage race like the Tour de France. They have no power. They don't have the anaerobic ability."

#### ACCLIMATIZING ADVICE

Still, if you're a pretty fit athlete at low elevations but feel like you're going to cough a lung up when you're mountain biking in Tahoe, that's little comfort.

Individuals acclimatize at different rates, but at altitudes around 7,000 feet it takes about two weeks on average. And that's just to feel comfortable. To fully acclimatize to the point where the altitude does not noticeably hinder performance, Scott believes it takes most people about six weeks or longer.

Thus, for athletes of all levels planning to participate in an event at altitude, travel arrangements are a critical concern. If you go up two or three days before, you'll likely feel lethargic the day of the event, Dr. Coast says. This is due to changes in your blood

composition that affect how well you can transfer energy to your muscles, and it's at its worst two to three days and perhaps up to five days after exposure to altitude.

"For people going to race at altitude the only way to kind of do it is to arrive within about 24-36 hours of the gun going off," Allen recommends. "Any more than that and you will not race well. But I am not convinced that you can race on a level playing field with someone who is altitude adapted when racing at altitude."

Scott has similar advice for lowlanders. Unless you can go up and do little but rest for at least a week prior to your event, you're better off to arrive within 24 hours of the start, drink plenty of fluids, and save any energy-sapping tourist stuff for after the competition.

After the event, crack a cold drink with friends and maybe take your rusty golf game out and do your best imitation of Tiger Woods.

Golf balls do fly farther at altitude, after all.

ASJ