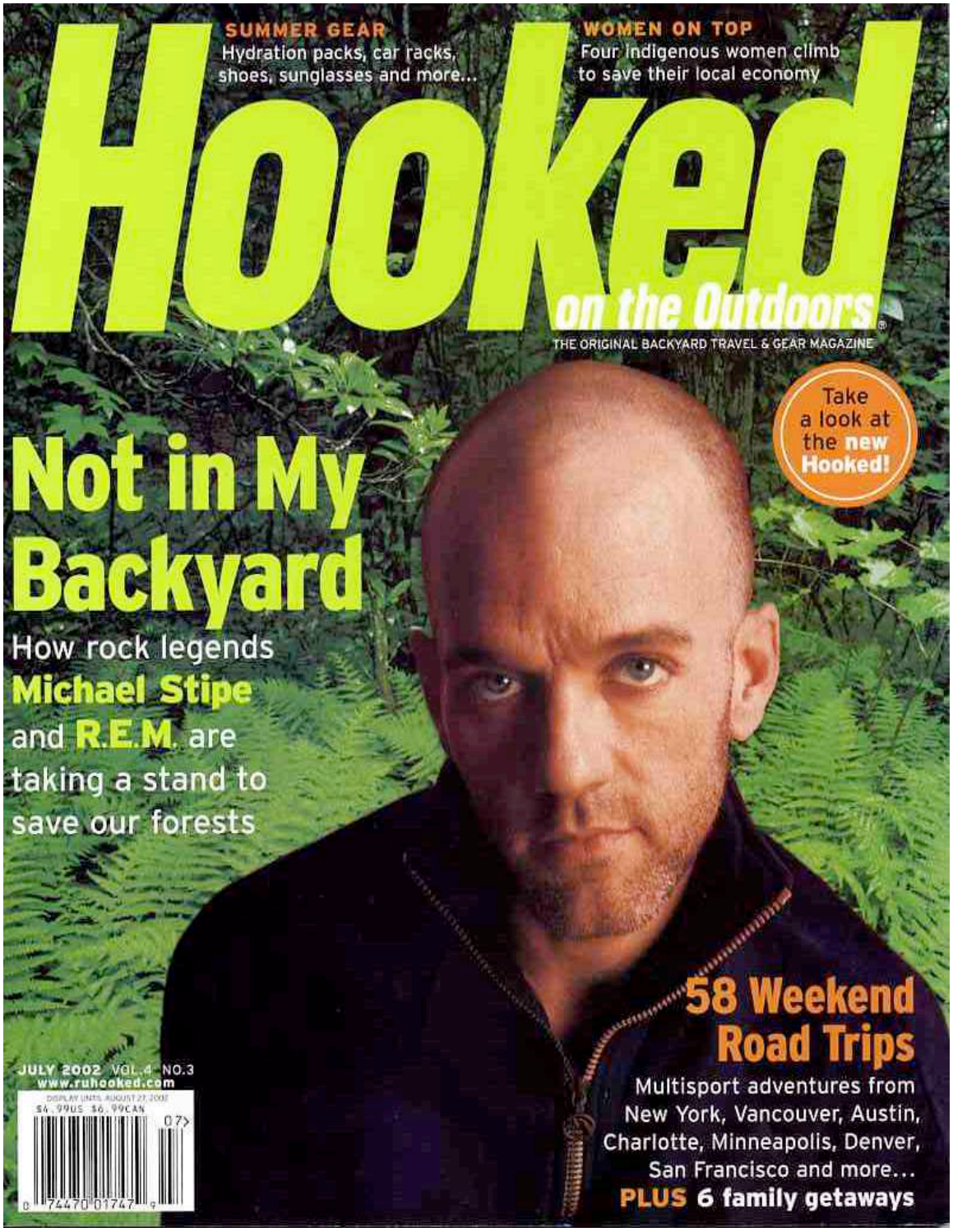
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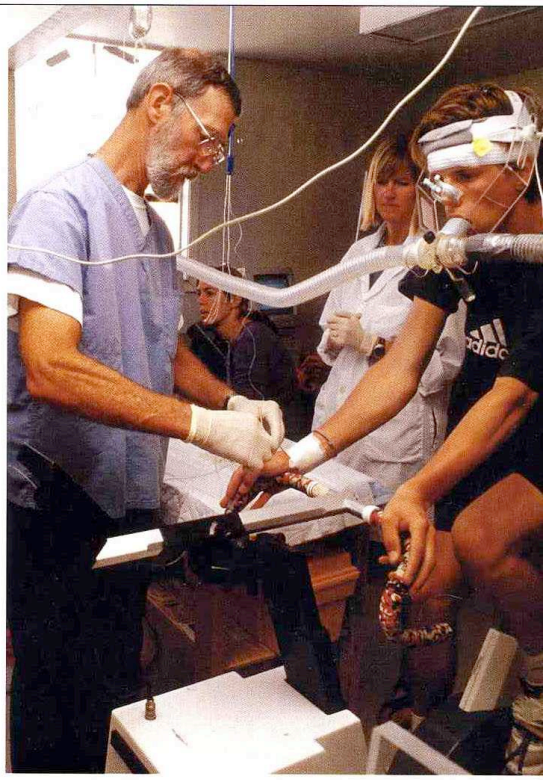
CHASING A HIGH-ALTITUDE PARADOX

BY **CLYDE SOLES**



"YOU'RE GOING *where* TO DO *what*?!" To my friends and family, volunteering to be a lab rat in a high-altitude research experiment sounded like my most cockamamie plan to date.

Why would anyone want to live on a barren, 12,500-foot-high mountaintop for eight weeks and have big needles stuck in him before riding a bike to the point of puking? I could be altruistic and say "in the name of science." But the real appeal to this bachelor was not cooking for two months while I worked on my next book in a quiet location.

For Sue Hopkins, the overachieving scientist (MD/PhD/athlete) who recruited me, this was an opportunity to chase the "lactate paradox," a poorly understood phenomena where the body defies logic by decreasing its lactic acid production (the muscle byproduct of hard physical exertion) after two weeks at altitude, a time when it is expected to remain elevated.

Scientists have been studying the effects of altitude on humans for more than a century, and still gaps remain in understanding the physiological changes that occur at altitude. In particular, a detailed timeline of how the body adapts to reduced oxygen has been missing. Though controlled, short-term (two to three week) studies have provided hints, prior to my sojourn at altitude, a longer and more conclusive study had not been conducted, even on mountaineers.

Our test team—myself, three Dutch medical students who crunched the data and a self-professed climbing bum—convened in San Diego for the first battery of tests at the University of California. The fun began with riding an exercise bike as hard as possible to determine our sea level aerobic capacity (VO_2 max). After a brief rest, things got downright painful when we repeated the test while breathing a gas mix that simulated high-altitude air. On average, oxygen makes up 21 percent of the air we breathe. To simulate higher elevations, the oxygen content is reduced to 12.5 percent. This instant hypoxia (lack of oxygen) puts the hurt on even the most fit athlete.

From here, we were transported to the White Mountain Research Station on Mount Barcroft, the highest facility of its kind in North America. Just a few miles east and 8,500 feet higher than Bishop, California, the Barcroft Lab is an array of buildings frequented by astrophysicists, biologists and geologists. For the next 60 days, it would be our home above treeline.

Soon after our arrival at Barcroft, another series of experiments began that required breathing into a mask for an hour while the scientists played with gas mixes by increasing or decreasing the oxygen and carbon dioxide content (high CO2 is most unpleasant). This ventilatory response study was conducted each week to see how our breathing acclimated to the altitude.

During our stay, we were allowed to run, bike and play as long as we never went below 10,000 feet and always slept at or above the research station. With White Mountain nearby, the third highest peak in the state (14,246 feet), we had ample opportunity to bust a lung. And, considering we had Internet access, satellite TV and cooks to serve us, we weren't exactly roughing it.

The dreaded bi-weekly exercise study—preceded by the painful insertion of an arterial blood line—was a repeat of our first tests, only this time we breathed local air (21 percent oxygen) and then enriched air (35 percent) to simulate sea level.

Our tests generated three scientific papers and ultimately a better understanding of how the body adapts to reduced oxygen. It now appears that at altitude, our breathing returns to normal after three weeks of acclimatization, yet we need at least a month for our lungs to reach full efficiency. Although one study had suggested the lactate paradox would disappear, this did not prove to be the case at Barcroft.

For my part, I was paid $1,200 for eight weeks (roughly $100 per needle hole), which certainly isn't enough incentive to volunteer. But the real score was the chance to hang out for two months in a scenic, remote location that the public seldom sees—not to mention consume great home-made meals for free.

And yes, I did finish my book, *Climbing: Training for Peak Performance* (The Mountaineers Books, Fall 2002). HOOKED

PHOTO BY CLYDE SOLES