



# THE GREAT



**O**f the mysteries of the geologic processes that molded California's Sierras, naturalist John Muir observed, "Patient observation and constant brooding above the rocks, lying upon them for years as the ice did, is the way to arrive at the truths which are graven so lavishly upon them."

But what if you have only one weekend? And what if it's too cold to lie on a rock for minutes, let alone years? Graduate students from Scripps encountered

BY PAIGE JENNINGS



# TREK NORTH

*Graduate Students Head for the Hills*

these obstacles during last fall's Great Trek North '94 to California's Sierra Nevada.

On this twenty-third excursion, weather forecasts called for early-season snow storms throughout the Owens Valley and Mammoth Lakes region, this year's destination. Thus, 45 students, four professors, and one writer would be trading in sandals worn with socks (traditional fall footwear at Scripps) and long-sleeved tee shirts for long underwear, thermal sleeping bags, and

waterproof tents. But, give a group of scientists-in-training the opportunity to temporarily replace backpacks full of textbooks with backpacks full of camping gear, and no complaints about weather will be heard.

Within 10 hours, the Scripps campus in La Jolla, dissertation research, and comfortable beds were a world away; replaced by snow-shrouded Sierra peaks and aspen forests shimmering with the colors of fall. Before the weekend's conclusion, geologists and nongeologists alike would obtain volumes of knowledge about the area's rock

formations and about each other.

The yearly Great Trek North began two decades ago when Professor James Hawkins of Scripps's Geological Research Division (GRD) ventured to Mammoth, California, with a couple of his students in tow to attend a scientific conference. Exploring the region's extraordinary topography between sessions fascinated the students so much that an annual pilgrimage commenced. When interest grew among other Scripps curricular groups, Hawkins offered the trip to all curricular groups and specific undergraduate programs at UC San Diego. He then developed two additional California itineraries, one to explore the coastal mountains between San Diego and Monterey,

From Bishop, north to Yosemite's Lembert Dome, highlights of California's geologic history are easily accessible to both the expert scientist and the inquiring outdoor enthusiast. This map points to many of the destinations achieved and attempted during the Great Trek North '94.



and one through California's interior including a trek through Death Valley and the Mojave Plateau.

"With these three trips," says Hawkins, "I give the students a view of how North America has evolved over the last two billion years.

"This trip is one of the few chances that students and professors have to rub elbows, camp in the snow, and sit around a campfire together," explains Hawkins, who responds to his students, in the field and the classroom, not as subordinates, but as scientific colleagues. Students also camped alongside Richard Rosenblatt, professor of marine biology and chair of Scripps's graduate department, and two additional GRD professors, Kevin Brown and Joseph Curray. Hawkins recognizes the importance of students of diverse disciplines getting to know each other, sometimes a difficult accomplishment on the growing Scripps campus with seven curricular groups.

On this weekend, students with backgrounds including marine chemistry, physics, and biology hiked shoulder-to-shoulder with their more geologically experienced peers during ascents up granitic domes, ambles across glacial mo-

raines, and maneuvers through razor sharp obsidian outcroppings.

"I want everyone to get something from this trip. For the nongeologists, we increase aware-

ness of what geology is all about; for the physical oceanographers, we look at deposits from former sea-floors; for the marine chemists, we talk about chemistry of rocks and the way the rocks have weathered; for those interested in climate change, we see the effects of glaciation, as well as glaciers that still exist; and for the marine biologists, we look at 600-million-year-



UCSD undergraduate Pamela Carr (above) uses a geologists hammer to expose delicate trilobite fossils embedded in rocks along the trail. A barren, but crowded trail (left) leads students up to Panum Dome where the peak offers a panoramic view of Mono Lake's lunar landscape below.

old fossilized trilobites, inhabitants of ancient seas.”

On the first full day of exploration, after hunting for trilobites along the roadside, the caravan crept along an icy, two-lane road up the grade of White Mountain. Waiting at the top was the Schulman Grove of bristlecone pines, among the planet’s oldest trees. Scientists use dated ring samples from these trees, some as old as 6,000 years, to calibrate the carbon 14 scale used in the dating of fossilized remains.

Leaving the persistent forest behind, a second journey through time took the group deep into a gorge cut through the Bishop Tuff, a 710,000 year old explosive silicic eruption. The tuff has a granitic composition and was erupted from a caldera now known as Long Valley. Descending a steep dirt path, Hawkins noted differences in rock formation. At the entrance to the gorge, the surface layers of the tuff

consist of rock pink in color, and light in weight because of large gas holes and fragments of pumice. Moving closer to the base of the gorge, the rocks are denser as gas holes and pumice fragments decrease in size and flatten into black glass plates. Hawkins explained that these changes result from the manner in which the eruption settled and compacted the pumice-rich flows into denser rock near the bottom.

After hiking up through an ancient forest, and down through an ancient eruption, students had tired muscles and cold feet. So, for a therapeutic respite with a geologic twist, the last stop of the day was a soak at Hot Creek—a chain of natural sulfurous hot springs outside of Mammoth Lakes. Those trekkers brave enough to remove their winter clothing in outdoor changing huts were rewarded with a bath in nature’s own hot tub. But unlike a

conventional spa, the smell of chlorine was replaced by the unappealing odor of sulfur. Currents of numbing snow runoff danced around currents of boiling water, rarely mixing. As soon as a bather secured the optimum location, the dance would change, stranding the bather in a scorching torrent or an arctic deluge.

The group greatly missed the warmth of the hot springs on the third and fourth days, as temperatures dropped and skies threatened snow. Storms during the night sealed off roads leading to several trek destinations. Luckily, Hawkins is an accomplished mountain climber, Sierra enthusiast, and has experienced 23 years of nature’s unpredictable weather on these treks.

“I spent a month getting this trip organized, planning for all possible conditions. You always have to have plan B, C, and D, especially on this trip with the constant threat of snow.



The Schulman Grove of bristlecone pines provides a dramatic tour among ancient trees and a spectacular view of the surrounding snow-covered mountains.



During a cold and drizzly hike across Panum Dome (left), Professor James Hawkins discusses the characteristics of obsidian—a black or dark-colored volcanic glass, usually of rhyolite composition. On the shore of Mono Lake (below), graduate students Tegan Eve, Andrew Walker, and Holly Burch examine tufa towers up close. Tufa towers, composed of calcium carbonate, are formed by evaporation around the mouth of a spring or seep.

and widely known Mono Lake. Throughout the West, ‘Save Mono Lake’ is a familiar rallying cry as conservationists’ efforts have culminated in a state water board decision to protect the lake’s ecosystem and the Mono Basin environment. The board required that the lake be restored to an elevation of 6,392 feet, a level 15 feet above the present level, but still 25 feet below the 1941 level. This was to reestablish the lake to its 1941 condition, before its tributaries were diverted to the Los Angeles aqueduct. Ecological controversies aside, the unique topography surrounding the lake, including two-story tall tufa towers, makes it a must-see for the geologically inclined.

As the afternoon progressed, fears grew that passage to Yosemite would be blocked off with that

If it rains, you can still sit in the car and look at the formations, but if it snows, you really have to have another card up your sleeve.”

When park rangers refused entrance to Devils Postpile National Park, a trip favorite, the caravan moved on to Inyo Craters—post-caldera explosive vents active as recently as 1400 AD ( $\pm 60$  yrs). Here the Scripps group crossed paths with a group of researchers and students from UC Santa Barbara and the United States Geological Survey (USGS). Roy Bailey, a geologist with USGS and leader of the group, held an impromptu lecture on the geology of the surrounding area. While the majority of the group circled tightly around him, a fringe group made up of Scripps and UC Santa Barbara graduate students

listened on while testing eye-foot coordination during a pick-up game of hacky sack.

This same troupe was re-encountered at the peak of Panum Dome, overlooking the Mono Basin





night's snowfall. Although days, if not years as Muir believed, are needed to truly experience Yosemite, only hours of sunlight were left. A quick trip over Tioga Pass landed the group at the first prominent feature, Lembert Dome. As a group scrambled up the dome's face, some getting to its peak, other less accomplished climbers attacked it more cautiously.

"One student," according to Hawkins, "got up too high on the face and was stuck like a fly on a rock. I didn't want to embarrass him by hauling him down, so I talked him through it and now he knows that he can stick to a rock and not fall, even when he thinks he's going to."

Leaving the park, with little hope of returning the next day, half the caravan took the long way back to camp for a scenic drive along the June Lake Loop, while the other

half hotfooted it to Hot Creek for one last soak. For both groups, it would be the last bit of warmth until packing back into the vans for the next day's long drive home. As temperatures dropped into the teens that night, thoughts turned to the migration south—back to La Jolla, dissertation research, and comfortable beds. 🌐

The High Sierras (above) provide a perfect, but cold, setting for an impromptu discussion between students and professors regarding the basics of field geology. When road conditions canceled a visit to Devils Postpile, the group diverted to an undated earthquake fault (below) near Mammoth Mountain before moving on to Inyo Crater.



# High Sierra High Jinks

If you believe that scientists subsist solely on data, vending machine coffee, and 18-hour workdays, you need only spend one weekend in the California wilderness with some Scripps graduate students and professors to discover otherwise. They are a talented, interesting, diverse group of individuals; people that know how to have fun.

The adventure started before the first night's camp was set for the Great Trek North '94. As the group was returning to the vans, along a bleak, rocky path, from exploring fossilized waterfalls outside of Bishop, California, four students lost their way among outcroppings of basalt. Luckily, they were found before sunset.

The steaming, sulfurous spring waters at Hot Creek are welcome therapy for tired trekkers and wintertime visitors to the Mammoth area.

While students relaxed around the campfire late another night, the word got out that Michael O'Brien, a fifth year student of geology, was capable of singing the entire theme song to *Fiddler on the Roof*. He did so, to everyone's delight. They even called him back for an encore medley of Frank Sinatra favorites.

During the second day, as the group sought shelter from bitter winds along the shore of endangered Mono Lake, with water temperatures in the 40s, geochemistry/marine chemistry student Constanze Weyhenmeyer exhibited Olympic ability and bravery. She stripped down to her bathing suit and paddled through the lake's whitecapped shallows. No one joined her (except for the one million waterfowl living on the lake).

Another day, several students re-created an additional Olympic event—luging. They pilfered a stash of large plastic trashbags from one of the vans, cut two holes in the bottom of them, stuck their legs through, and plunged down the steepest snow banks they could find.

And, for those on the trip missing the flavor of microbrewery beers available in San Diego, two students brought along a small keg of their own home brew—a rich amber ale that delighted the thirsty trekkers.

The entire trip met with the group's satisfaction because James Hawkins designed the trip with two goals. "One, to get the students' feet out in the real world and experience field geology. And two, to have a lot of fun." 🌐

