

A Sweltering Experience

The two hikers were not worried about a thing. The day was beautiful; warm and clear, with a pleasant breeze sweeping off the high desert. The canyon trail offered great views. Monique and her father, Nelson, tromped enthusiastically downward. They stopped to enjoy the brilliant wildflowers and watched their steps as they skirted around a narrow switchback. Monique cried out in delight as she spotted an eagle soaring nearby, riding the warm air currents rising from the canyon depths.

They never thought about the distance, trekking downhill over 14 km (9 miles) of trail before they began to grow tired. They stopped to rest. Nelson removed his jacket, tying it around his waist, while Monique applied more sunscreen to her face. They remarked, with some surprise, that it was much warmer in the canyon than they had expected.

It was then that Nelson pointed out that they had finished most of the water from the single canteen they had brought. Neither of them was tired. But given the heat, and the distance remaining to the bottom, they decided they had better turn around and start back up toward the rim where they had left their car in the parking lot.

Almost immediately, the effects of gravity became apparent. A trail that had been an easy stroll going down now became a daunting ramp rising steeply upward. Their progress was slow, and the canyon rim seemed impossibly high overhead. Monique started to feel concerned as, after an hour of climbing, they finally reached the switchback that had been just a few minutes away when they were going down.

They were very thirsty but had to ration the last few mouthfuls of water carefully. Frequently, they stopped to mop the sweat from their faces, drawing deep, ragged breaths of dry air that didn't seem to refresh them much at all. They had no strength for conversation, merely plodded along slowly, kicking up clouds of dust with each footstep on the dry, gritty trail.

Suddenly, Monique cried out in pain and slapped at her leg, swatting away a bee – but not before the insect had driven its stinger through her skin. Grimly, she continued on. But within minutes, her leg began to swell around the sting. Limping in pain, she moved even slower than before and soon she had to stop and rest.

Nelson was growing frantic. They still had 5 or 6 km (3 or 4 miles) to go to reach the parking lot. They had seen no other hikers during the whole day. Their cell phones were useless in the desolate canyon. Nelson found a small patch of shade near the trail and told Monique to stay there while he went for help. Leaving her the canteen, with its remaining sip or two of water, he started climbing as fast as he could. He hoped to find a ranger or call for help if his cell phone found a signal at the top of the canyon.

Climbing with all his strength and speed, gasping for breath and sweating profusely, Nelson still took two hours to reach the rim. When he arrived at the car, he was badly dehydrated. His

body could no longer cool itself adequately through perspiration. He was dizzy and nauseous, suffering from an excruciating headache, so confused that he couldn't think of what to do next.

It was only good fortune that a ranger who was a trained paramedic drove into the parking lot on a routine patrol. Immediately, he noticed that Nelson needed help. The hiker was breathing loudly and rapidly through his mouth, and the skin of his hands was hot and dry to the touch. Yet his face was not very flushed. Even as he radioed for a backcountry rescue team to go after Monique, the ranger knew that Nelson himself was dangerously ill.

The rescuers reached Monique three hours after she had been stung. Her condition was alarming. They quickly loaded her onto a stretcher and carried her to the nearest clearing wide enough for a helicopter to land. Meanwhile, the ranger reported Monique's condition to the emergency room personnel.

"Her vision is blurred, and her breathing labored. Her leg is red and swollen near the bee sting, and she has a rash over her leg, spreading to her stomach. Her lips are cracked – she had trouble drinking when we gave her water."

The helicopter flight will not take long, but Nelson's and Monique's fates both remain uncertain. It is up to you, the emergency room personnel, to save them.

1. List at least 4 human body systems that need to respond to restore internal balance (homeostasis) in the hikers. Next to each system you list, write why you think that system would need to respond.

2. From your personal experience, describe 2 disruptions of homeostasis that happened to you or to someone you know. Describe the effect on the person's body, his or her body's response and the response of other people such as parents or doctors (if involved). Finally describe how the experience affected your emotions and decision making (if at all).