



LOST IN THE DESERT!

by
David Evans
Natural Sciences
Penn College/PSU
Williamsport, PA

Part I: July 13th, AM

Mark, a white, 35-year-old male weighing approximately 70 kilogram (kg) started a three-hour drive across the desert on US 95 from Yuma, Arizona, to Blythe, California. He set out at 7 AM on what was expected to be a very hot July day. He anticipated that it would take him about three hours to reach Blythe—plenty of time to make his 11 AM appointment with Sarah, his fiancée. When he failed to appear by noon, Sarah became concerned and called the highway patrol.

By 12:30 PM, Search and Rescue Officer Maria Arroyo, who was patrolling nearby, reported finding an abandoned car on the side of the road with a damaged radiator that matched Sarah's description of Mark's vehicle. Maria noticed shoe prints leading into the desert toward some low mountains in the distance. At that point Maria called for helicopter assistance, consulted her GPS, and relayed the exact coordinates to base.

By 1 PM Henry Morningstar, paramedic and a member of the helicopter crew, reported a shirtless, hatless man wandering down a desert wash. The local radio station reported at about the same time that the air temperature was hovering at 105° F in the shade (and there was darned little of that). The relative humidity was less than 5%. The helicopter crewmembers spotted a man staggering on the desert. They realized they had found Mark. His driver's license identified him as the missing man. Mark was still conscious but clearly delirious. Henry also noted that Mark was weak, nauseous, disoriented, and complained of a headache. His blood pressure was quite low—70/50—and he was not sweating despite the oppressive heat. His body temperature was also high—105°. The patient was diagnosed as having **heat stroke**. The paramedic also noted **first degree burns** on his face and back.

Suddenly, Susan Liu, the pilot, reported that they had lost radio contact with the hospital. It was all up to Henry now!

1. Define the terms in the case study highlighted in boldface.
2. Given the conditions, what should Henry do to try to save Mark?
3. Why isn't he sweating?

4. Assuming that Mark lost around 4 liters of water, what percentage of his body water did he lose? Would you expect his urinary volume to decrease or increase during his trek? Please explain your answer.

5. Why was Mark's blood pressure so low? Would his pulse rate decrease or increase? Please explain. Why was Mark dizzy and disoriented?

Part II: July 13th, PM

Henry started oral rehydration with an isotonic solution containing **electrolytes**, **glucose**, and water. Why didn't the paramedic give Mark distilled water rather than an electrolyte/glucose solution?

As Mark recovered in the hospital, he related what happened to him earlier in the day. Since he was a newcomer to desert areas, he saw no need to bring UV A/B sunblock or extra water on his trip from Yuma to Blythe. Mark recalled seeing a coyote dart out between two bushes and he seemed to recollect hitting the animal. The area was so isolated that his cell phone was useless. He waited by the car for a while but then, about 10 AM, as the sun climbed, he saw a large body of water in the distance, possibly, he thought, the Colorado River. The "river" was, in reality, a mirage, as he realized later after he had walked some distance. He then started to become confused and could not find his way back to the highway. Eventually he became very hot and threw away his shirt and hat.

6. Why did Mark become disoriented? How would you test your ideas to see if you are right? What does your group think based on the information in the text?

7. What vitamin would Mark have in greater amounts in his body after that day?

Part III: Subsequent Months

After he left the hospital, Mark saw extensive new **melanin** formation in his skin. Much later Mark noticed some new moles on his shoulders. The moles grew, changed color, and bled.

8. What should Mark be concerned with regarding these moles? He talked to dermatologist Dr. Charles Culp about the moles.

9. What did Mark do that increased his chance of burns?