A scenic mountain landscape with a group of hikers on a trail. The foreground shows a lush green valley with scattered rocks and small trees. A group of about ten hikers is walking along a dirt path on the left side of the image. In the background, there are steep, rocky mountain slopes leading up to jagged, snow-capped peaks under a blue sky with wispy clouds.

# Wilderness and Travel Medicine Update and Questions





# Question 1

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Which medicine has been approved by the Food and Drug Administration (FDA) in the United States for the treatment of giardiasis?

- A. Tinidazole
- B. Metronidazole
- C. Furazolidone
- D. Quinacrine
- E. Paromomycin
- F. Albendazole

# Question 1

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A-Tinidazole is the only medicine approved by the FDA for the treatment of Giardiasis. It is highly effective (>90%) and can be given as a single dose and is well tolerated



# Question 1

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A very common treatment for giardiasis is metronidazole (Flagyl). It has an efficacy rate of 75% to 100%, but it often causes gastrointestinal side effects, such as nausea and a metallic taste as well as dizziness and headaches.



## Question 2

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- Where do most lightning deaths occur?
  - A. Under trees
  - B. Open fields, on/in water
  - C. On beaches
  - D. Working on farm equipment

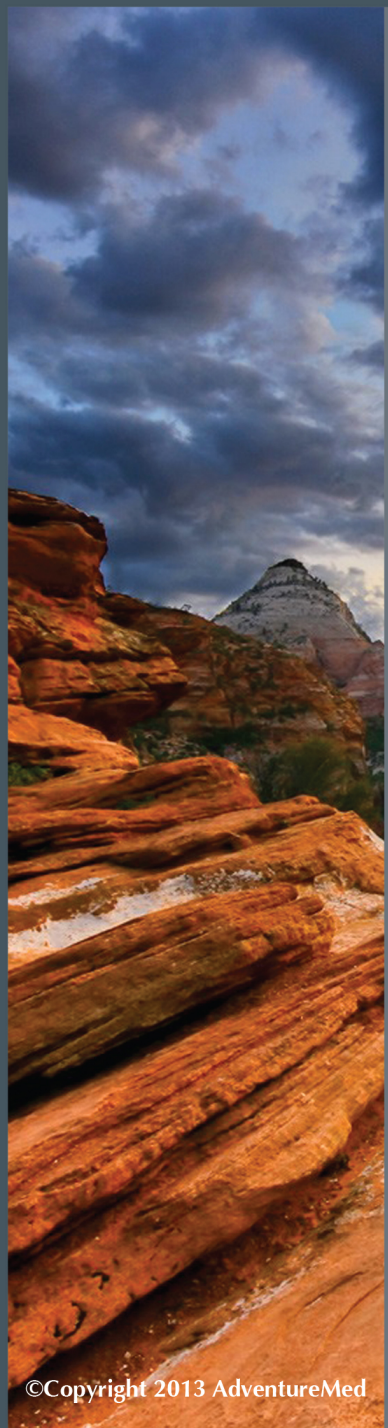




## Question 2

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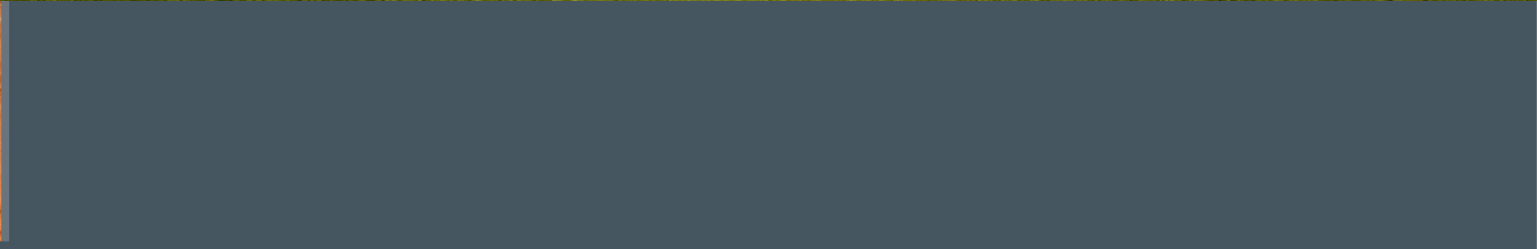
- Open fields/sports parks 54%
- Under trees 23%
- On beaches 12%
- Farm equipment 7%
- Other (open windows) 4%



## Question 2

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## Question 3

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- You are leading a hike with young people. A storm approaches and you begin to hear thunder. You are about 30 minutes from where you started your hike. You need to make a decision about what to do with the group.



## Question 3

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- Where is the safest place to be?
  - A. Get everyone in a crouched position
  - B. Set up your tents, and make sure that they do not have metal poles.
  - C. Move away from water
  - D. Move apart amongst the forest trees
  - E. There is no safe place outdoors, go back to the cars.

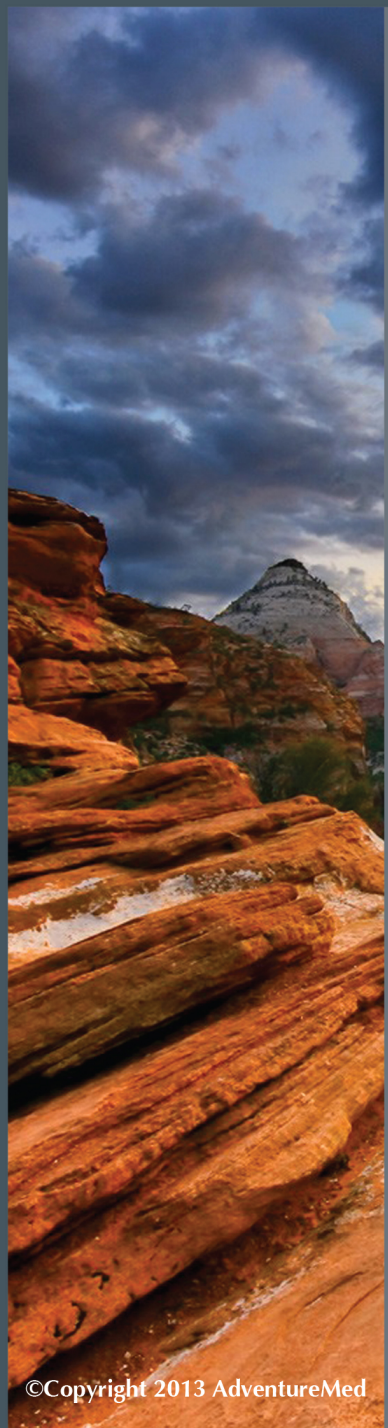




## Question 3

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- **E. There is no safe place outdoors.** There is little you can do to substantially reduce your risk if you are outside in a thunderstorm.
- The only completely safe action is to get inside a safe building or vehicle.
- If you absolutely cannot get to safety, you can *slightly* lessen the threat of being struck with the following tips. But don't be deceived--you are NOT safe outside.
- Know the weather patterns of the area you plan to visit.



## Question 3

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- Avoid open fields, the top of a hill or a ridge top.
- Crouched positions offer little protection
- Stay away from tall, isolated trees or other tall objects.
- If you are in a forest, stay near a lower stand of trees.
- If you are in a group, spread out to avoid the current traveling between group members.

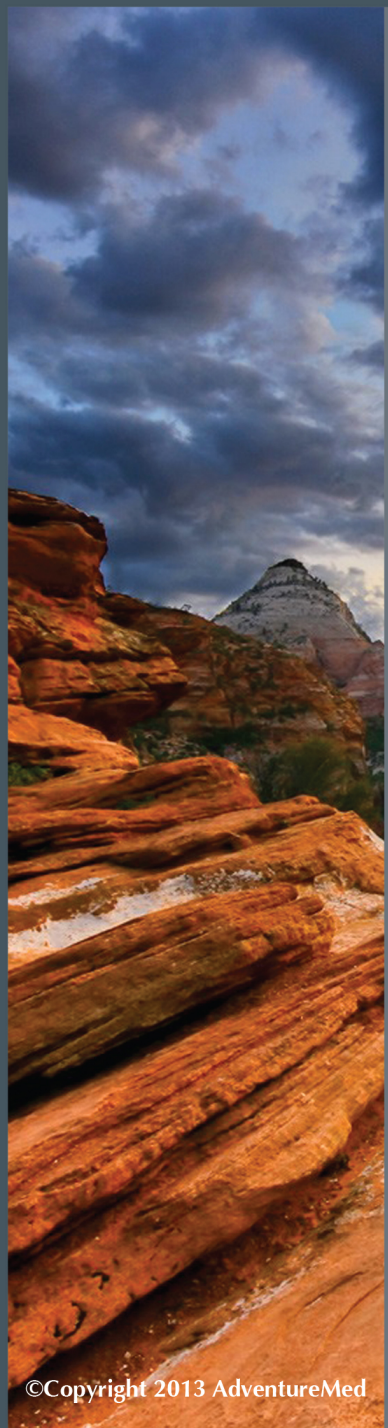




## Question 3

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- If you are camping in an open area, set up camp in a valley, ravine or other low area.
- Remember, a tent offers NO protection from lightning.
- Stay away from water, wet items, such as ropes, and metal objects, such as fences and poles. Water and metal do not attract lightning but they are excellent conductors of electricity.
- The current from a lightning flash will easily travel for long distances.



## Question 4

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- What type of lightning kills most people worldwide?
  - A. Ground current
  - B. Direct hit
  - C. Side splash
  - D. Upward streamer
  - E. Contact with an object struck with lightning





## Question 4

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- Ground current kills most people worldwide. A. is the correct one

Ground current      50-55%

Side splash                      30-35%

Upward streamer 10-15%

Direct strike              3-5%

Contact                      3-5%









## Question 4

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- When a lightning strike hits the ground, the electricity does not disappear into the earth.
- It spreads out in the ground
- These currents are lightning's biggest danger because they affect large areas in circles
- Current can travel up one leg, through the body- potentially stopping the heart and breathing- and then down the other leg.

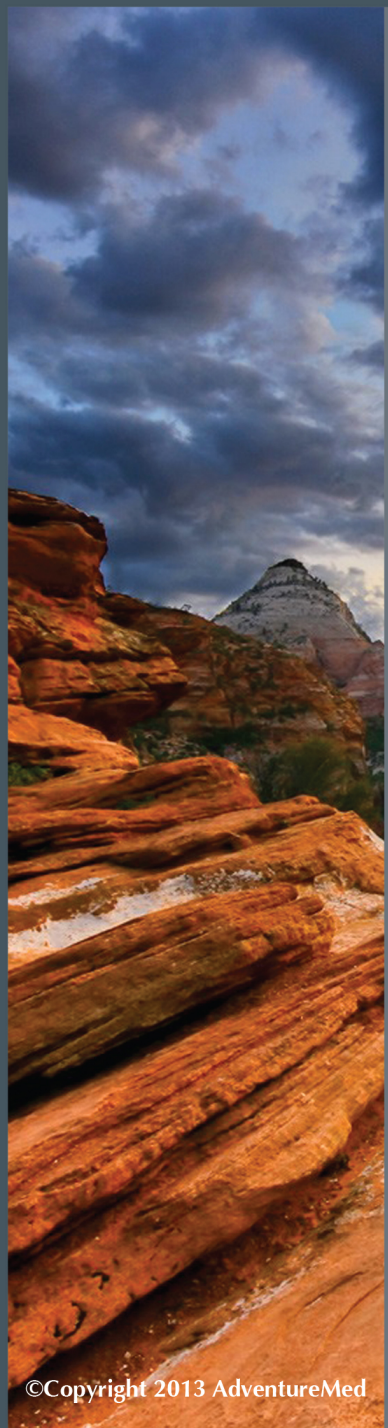




## Question 5

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- Where do the majority of lightning strikes occur in relation to the storm?
  - A. In the front of the storm
  - B. During the storm
  - C. After the storm



## Question 5

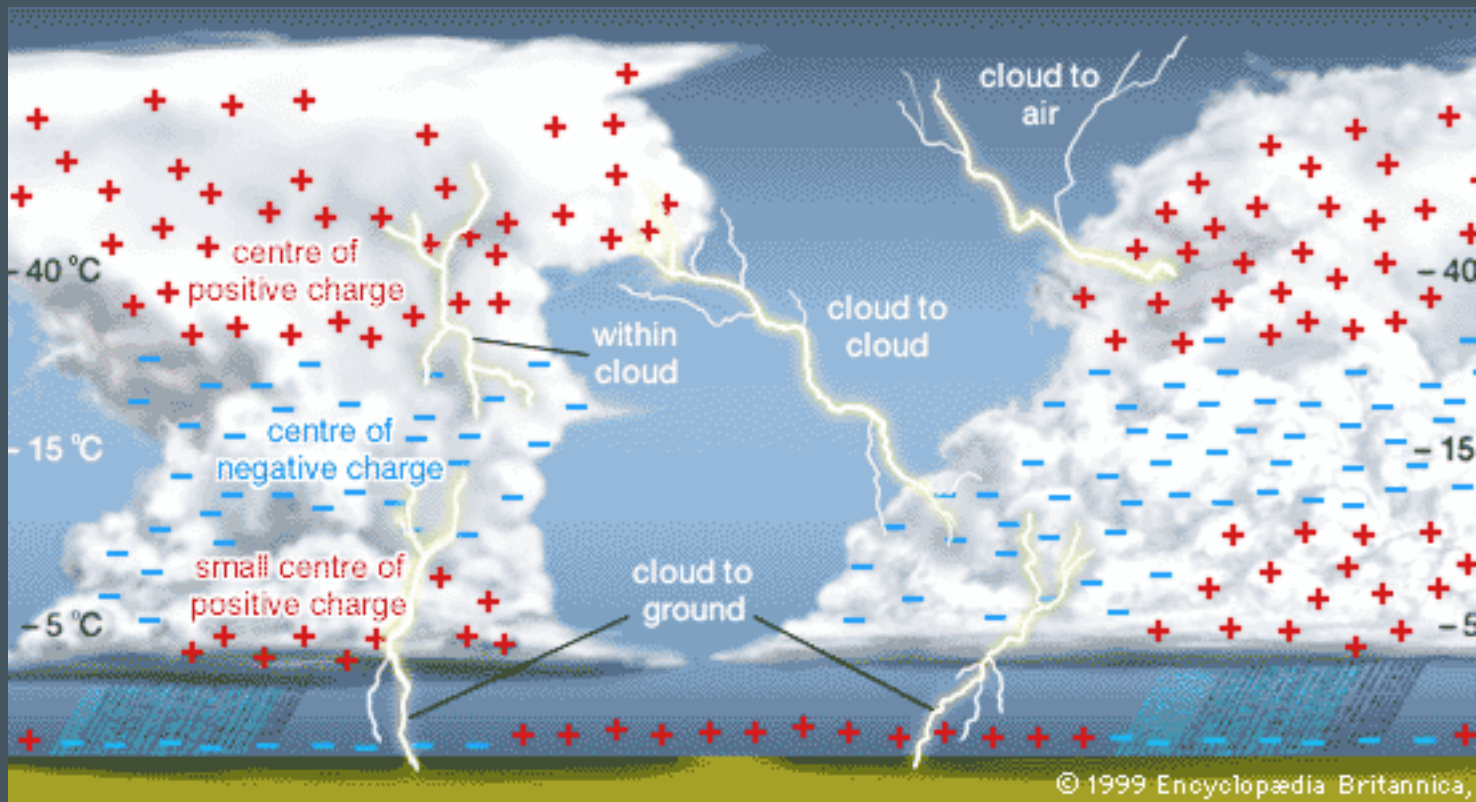
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- A. In front of the storm.
- Some lightning originates in the top of the thunderstorm, the area carrying a large positive charge.
- Positive lightning is particularly dangerous because it frequently strikes away from the rain.
- It can strike as far as 5 or 10 miles (8 or 16 kilometers) from the storm, in areas that most people do not consider to be a lightning-risk area.









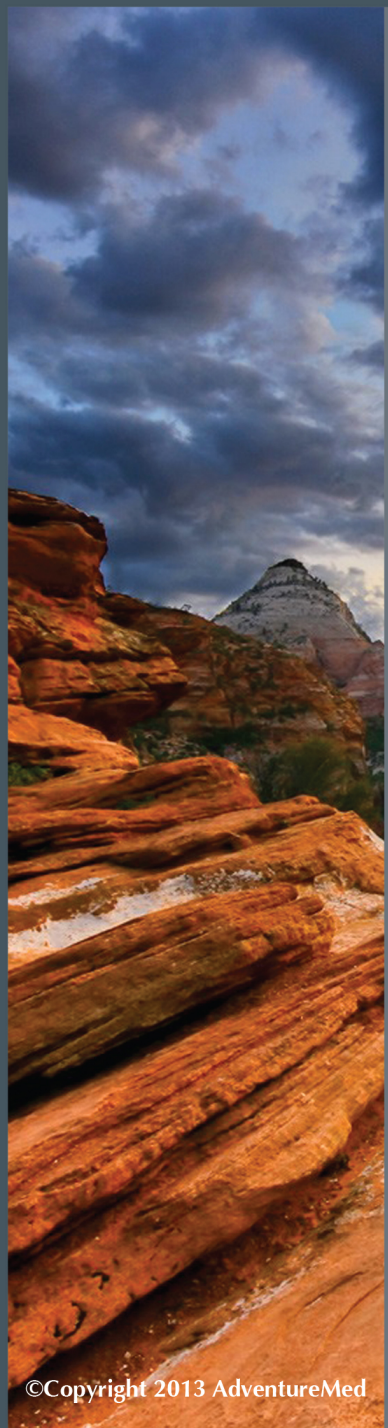
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## Question 6

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- Worldwide, where does lightning strike the most?
  - A. Tropical central Africa
  - B. Florida and the Gulf Coast in the USA
  - C. North and South poles
  - D. Mountains of the Himalaya
  - E. Pretty even worldwide distribution



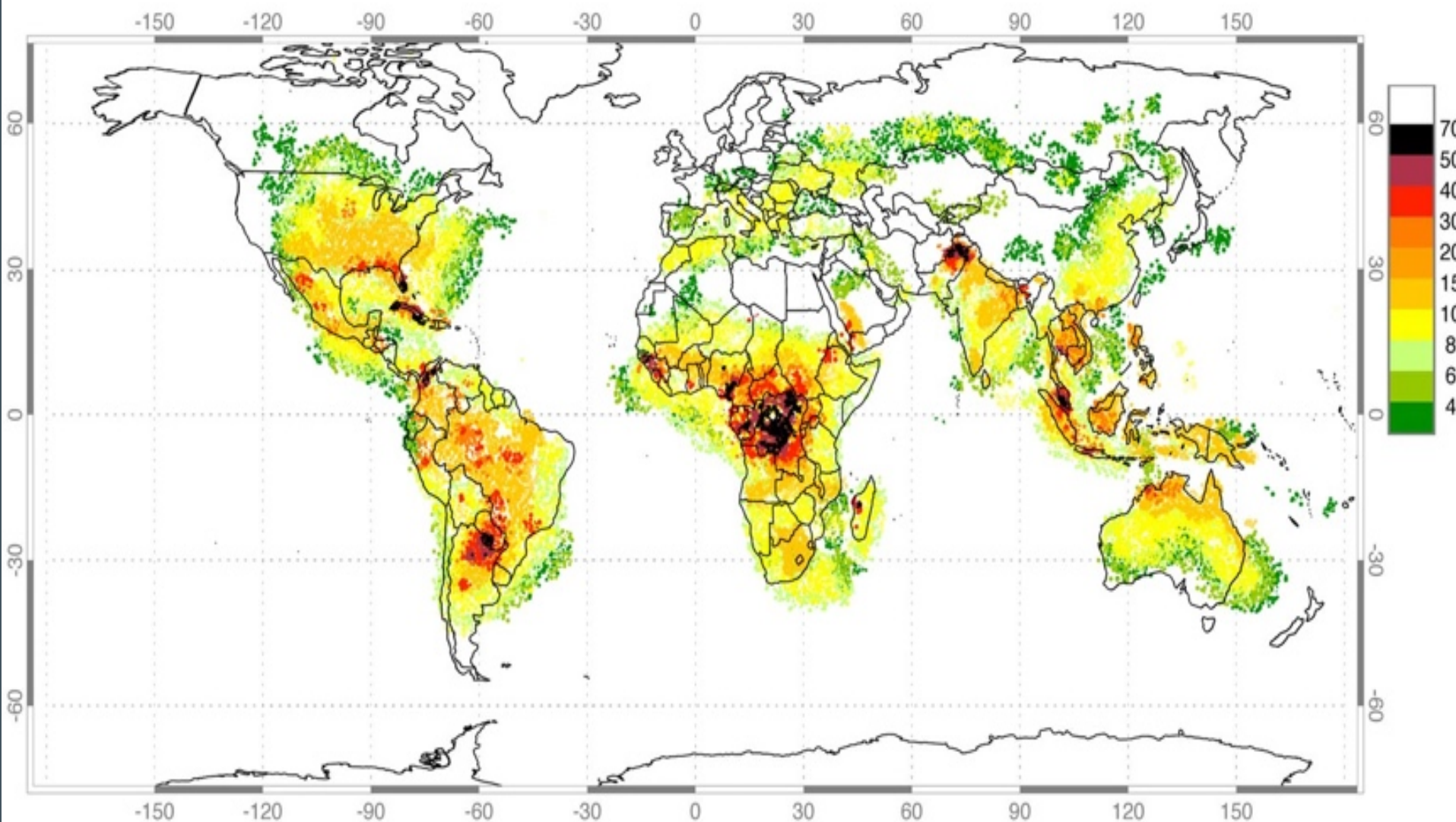
## Question 6

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- A is correct. Thunderbolts rain down with the greatest fervor on **tropical, central Africa**,
- The weather patterns in Africa bring in warm air from the Atlantic Ocean which collides with mountains, producing many thunderstorms and lightning year-round.







**Global distribution of lightning April 1995 - February 2003**

Sources: NASA OTD (4/95-3/00) and LIS (1/98-2/03) instruments

## Question 6

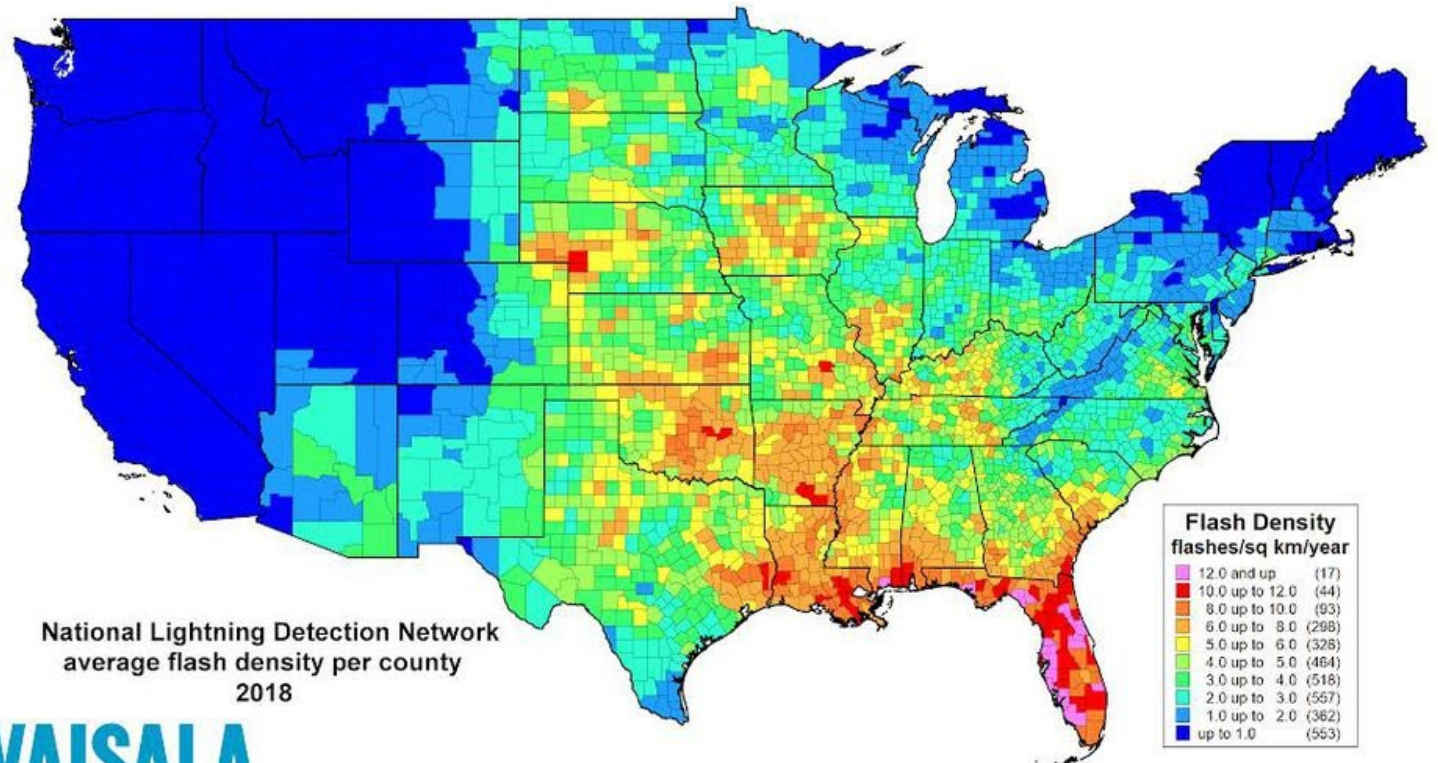
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- Another lightning hotspot is the Himalaya, where the mountainous topography forces the convergence of air masses from the Indian Ocean
- The North and South Poles, however, rarely experience thunderstorms.
- In the United States, the most lightning prone region is Florida, on the Gulf Coast, which has, on average, 12 flashes of lighting per square kilometer per year. But even that is less than central Africa.





# Question 6



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## Question 6

### Lightning Fatalities by State (1959-2013)



## Question 7

- What has been approved for use as mosquito repellent by the US Center for Disease Control?
  - A. DEET, picaridin, oil of lemon eucalyptus
  - B. DEET, IR3535, picaridin
  - C. DEET, oil of lemon eucalyptus, citronella



## Question 7

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- **A. DEET, Picaridin and oil of lemon eucalyptus** are the three repellents that the U.S. Centers for Disease Control recommend as being safe and effective for use in repelling mosquitoes.
- DEET works because mosquitoes don't like the smell of it
- Picaridin works as a receptor blocker, preventing mosquitoes from locating their prey.
- Oil of lemon eucalyptus works by blocking mosquitoes' chemical receptors.





# Question 7



## Question 7

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- IR3535 is marketed as “Skin-So-Soft Bug Guard Plus.”
- It has a half-life of 20 min to 6 hours. Overall it is less effective than 12.5% DEET.
- Citronella oil is a natural extract that when rubbed on the skin is effective for approximately 40 minutes.
- It is much less effective than DEET.







- Anopheles



- Culex



- 
- *Aedes aegypti* (Tiger)





## Question 8

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- Which pathogen is most difficult for ultraviolet radiation to treat?
  - A. Protozoa/cysts
  - B. Viruses
  - C. Cysts

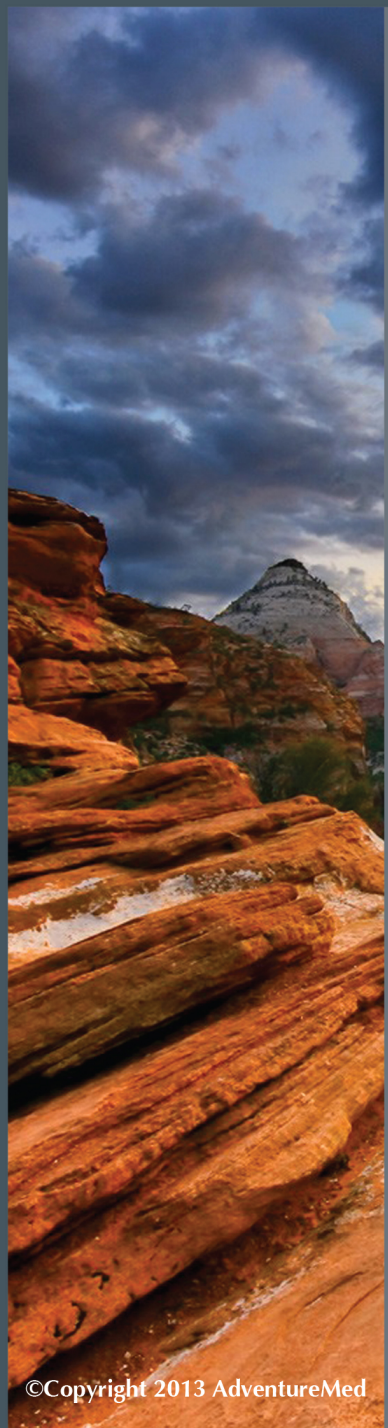




## Question 8

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- B is correct. Recent studies show that it is viruses that are the limiting factor of UV treatment, requiring a 10-30 times greater dose of UV light than cysts.
- A concern with UV portable water purification is that some pathogens are hundreds of times less sensitive to UV light than others.
- Protozoan cysts were once believed to be among the least sensitive.
- Cysts such as *Cryptosporidium* and *Giardia* are deactivated by low dose UV light.



## Question 9

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- Which is a risk of water that has been treated with UV irradiation?
  - A. Reactivation of pathogens
  - B. No residual treatment
  - C. Both of these are risks



## Question 9

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- C. is correct. Both of these are long term problems
- Water treated with UV radiation still contains the microbes with their means for reproduction turned "off".
- If exposed to visible light for any significant period of time, a process known as photo reactivation takes place.
- UV treated water must not be exposed to visible light for any significant period of time.

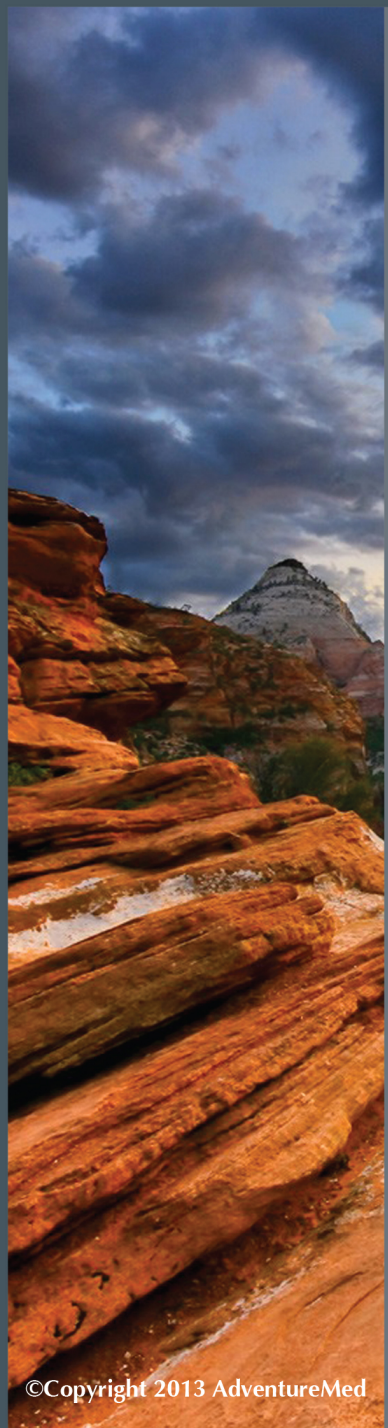




## Question 9

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- Unlike chlorine, which maintains a presence in the water after the treatment, continuing to disinfect the water, ultraviolet radiation does not stay in the water.



## Question10

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- In what habitats do ticks (particularly Ixoides) usually live and feed?
  - A. Trees, bushes and tall grasses
  - B. Ground level, short grasses, shady moist areas, and near the edge of wooded land
  - C. In rotting carcass of animals



## Question10

---

- B is correct. Ticks (particularly Ixoides) prefer to live at **ground level, short grasses, shady moist areas, and near the edge of wooded land.**
- They will cling to grass and short shrubs usually no more than 18-24 inches (45 to 60 cm) off the ground.
- They also live in lawns and gardens, especially at the edges of woods and around old stone walls.

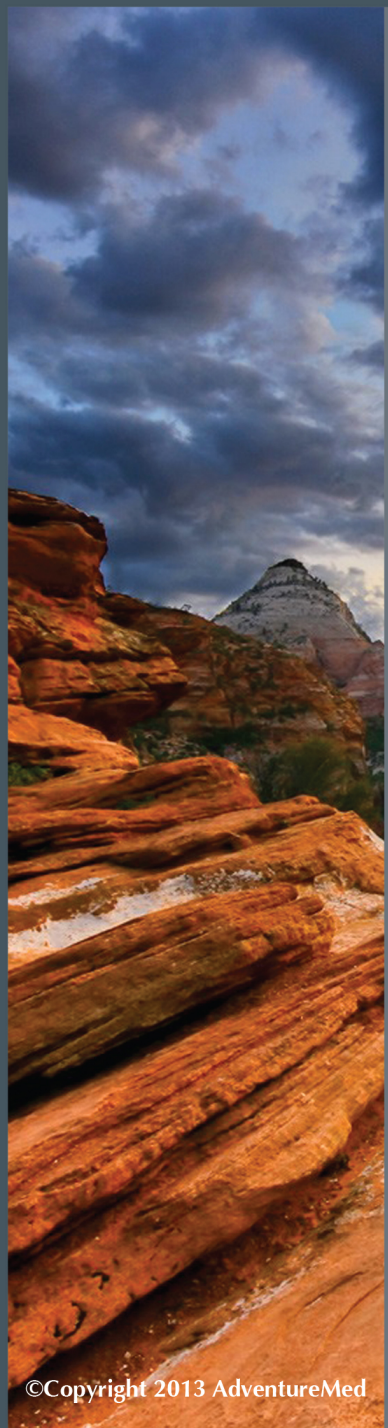




# Question 11

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- What is the appropriate technique to remove a tick?
  - A. Touch the tick with a burnt out hot match
  - B. Using tweezers or forceps, gently grasp the tick as near to the skin as possible, then pull smoothly and directly out.
  - C. Apply tape to the tick, then briskly (or quickly) pull to remove it.
  - D. Cover the tick with Vaseline and wait for it to back its way out.
  - E. Scrape the skin around the tick with a credit card or something similar.



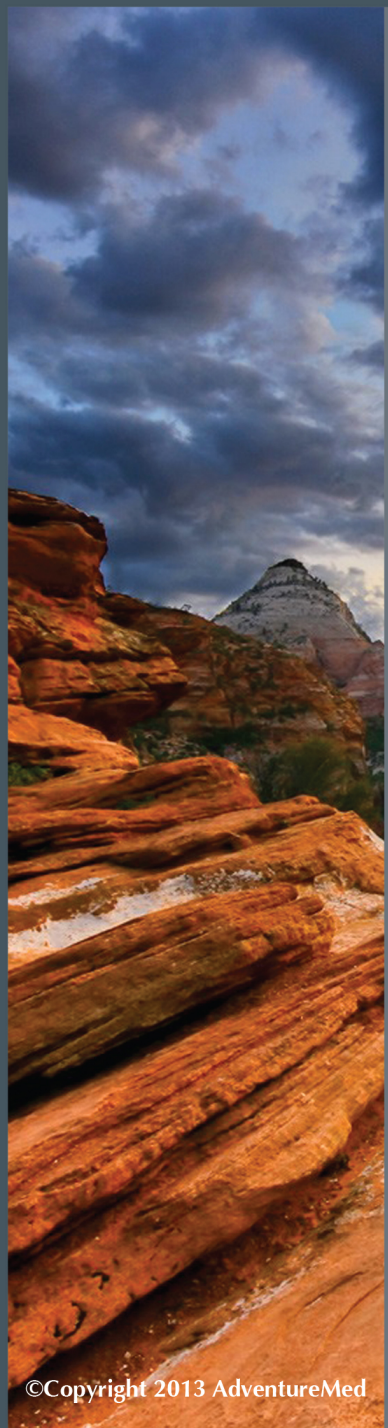




# Question 11

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- B is correct. Using tweezers or forceps, gently grasp the tick as near to the skin as possible, then pull smoothly and directly out.
- A tick has no 'head' but rather a proboscis called a hypostome that pokes straight into the skin. So a tick is easily removed in this way.
- If a small part of the hypostome remains, it is of little or no consequence.

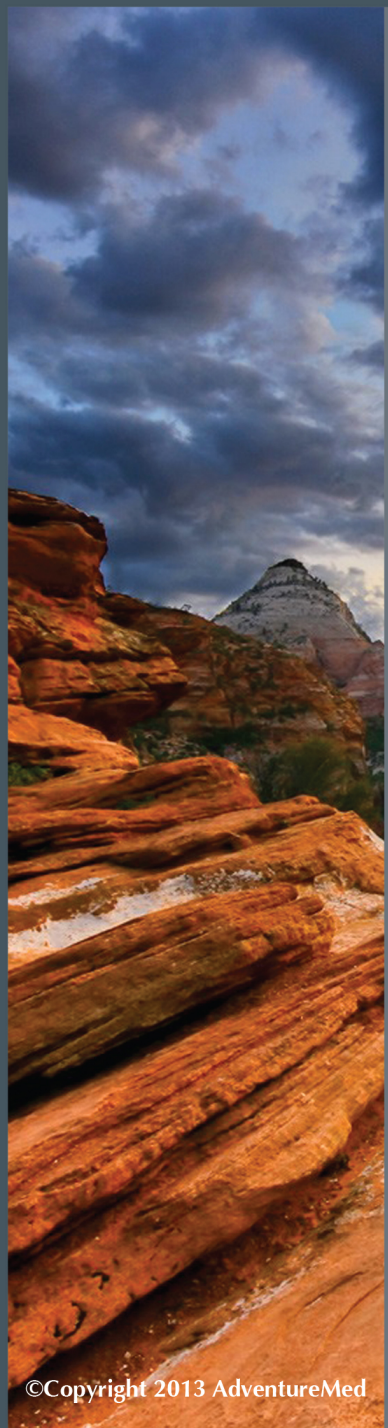




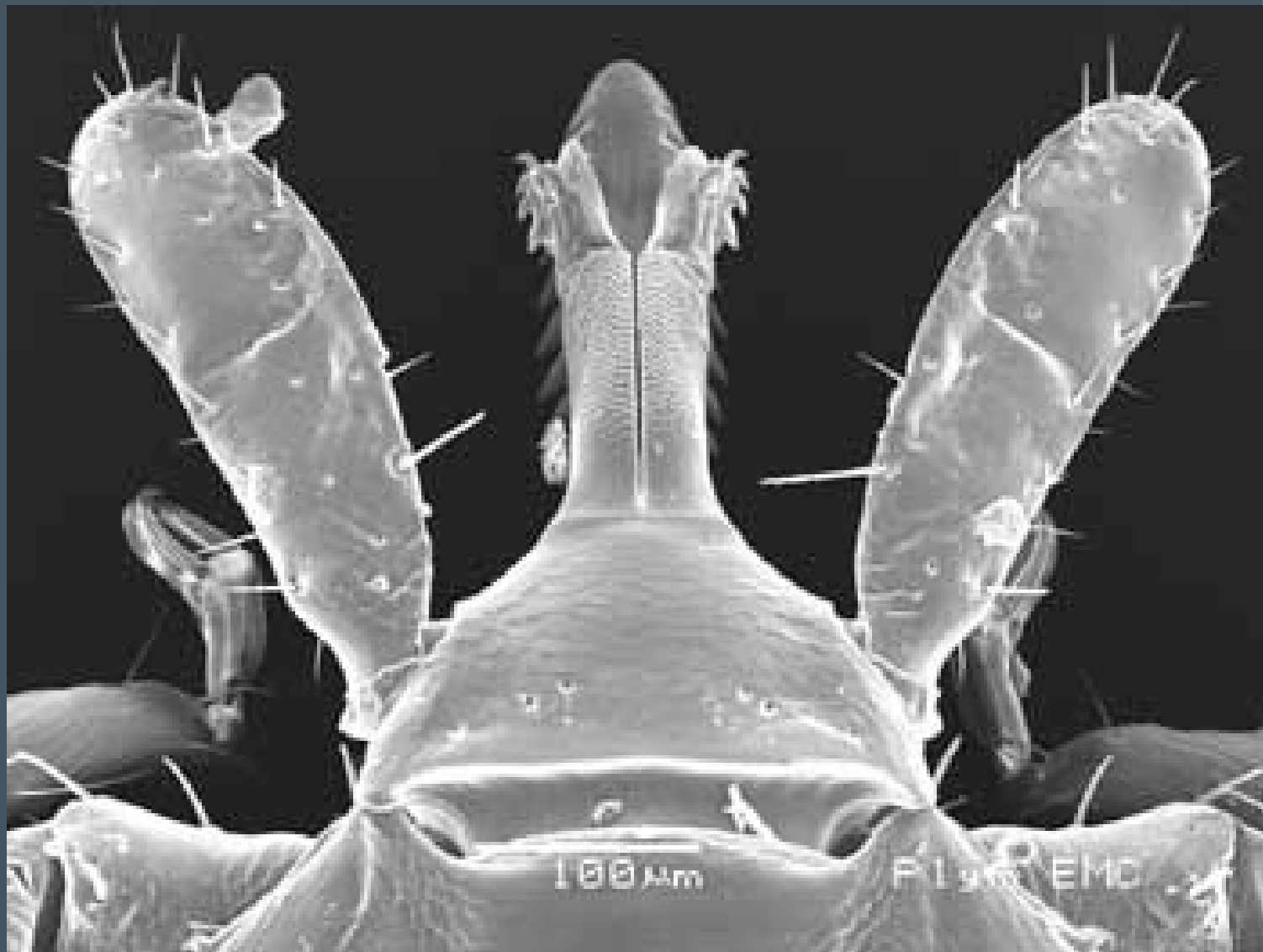
## Question 11

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- Techniques such as taping or scraping with a credit card on the skin are only suitable to remove larval ticks. Vaseline does not ease, or speed, the removal of ticks.
- Freezing a tick using liquid nitrogen is appropriate but few people carry liquid nitrogen into the wilderness.





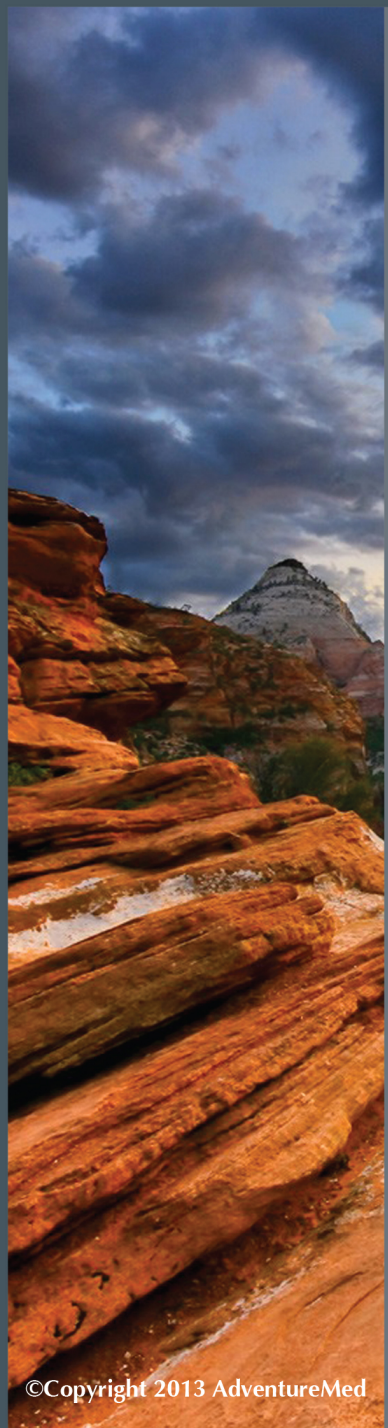




## Question 12

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- Where is Rocky Mountain Spotted Fever most likely to be seen?
  - A. Tennessee, North Carolina
  - B. The Rocky Mountain Western United States
  - C. The Alps near Chamonix



## Question 12

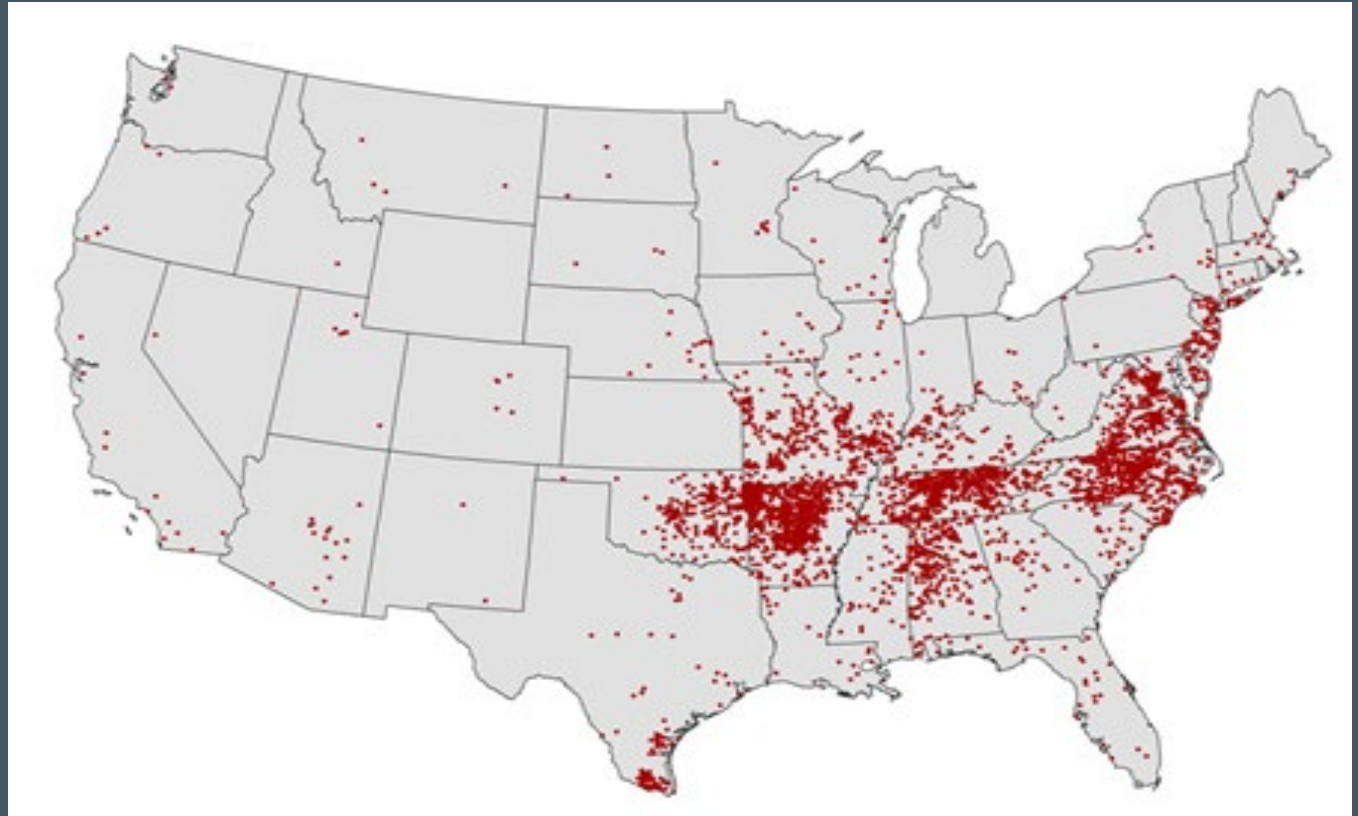
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- A is correct. As an endemic tick-borne disease, Rocky Mountain Spotted Fever most likely to be seen in **South-Central States and Mid-Atlantic states in the**
- However, due to the ease of interstate and international travel, it really could be seen anywhere in the United States
- Recently this disease has been reported throughout Mexico, Canada, Central America, and South America but it is not endemic in these areas. It is not found in Europe.



# Question 11

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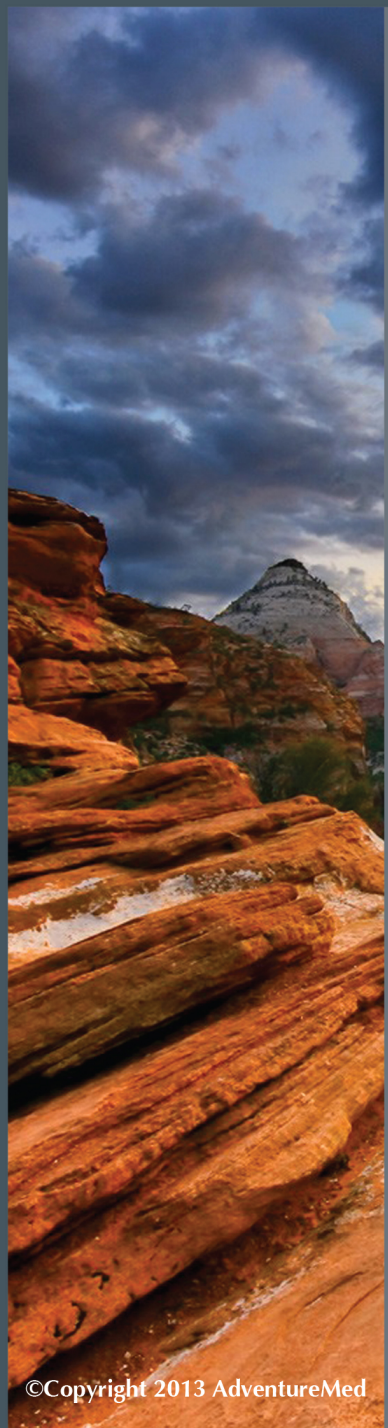




## Question 13

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- What is the timeframe to transmit disease from a tick to a human?
  - A. It's a very short timeframe-seconds.
  - B. It's generally a very long timeframe, 2-3 days.



## Question 13

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- B is correct. It typically is days for transmission to occur.
- The tick carrying Lyme disease must feed for >36 hours before transmission of the spirochete
- The risk of acquiring Lyme disease is only 1.2 to 1.4 percent, even in an area where the disease is common.



## Question 13

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- The organism that causes Lyme disease, *Borrelia burgdorferi*, lies dormant in the inner aspect of the tick's midgut.
- The organism becomes active only after exposure to the warm blood meal entering the tick's gut. Once active, the organism enters the tick's salivary glands.
- As the tick feeds, it must get rid of excess water through the salivary glands.
- Thus, the tick will literally salivate organisms into the wound, thereby passing the infection to the host.

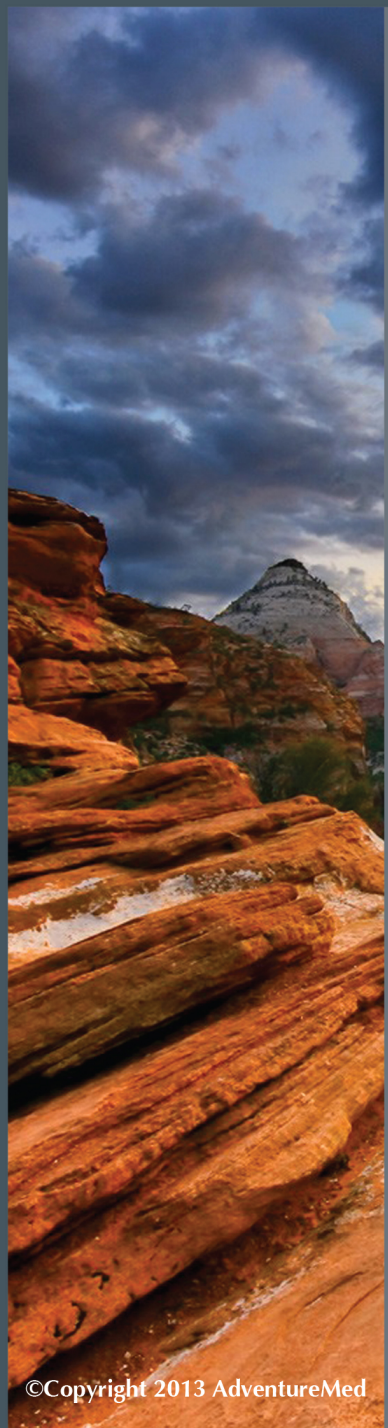




## Question 14

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- About how many diseases are transmitted from ticks to humans?
  - A. 7
  - B. 20
  - C. 34
  - D. 62



## Question 14

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- B is correct. About 20 diseases are known to be transmitted from tics to humans.
- Three of these were discovered within the last four years



# Question 14

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- Bacteria
  - Lyme disease
  - Relapsing fever
  - Rocky Mountain Spotted Fever
  - Helvetica Spotted fever
  - Ehrlichiosis
  - Bartonella
  - Tularemia

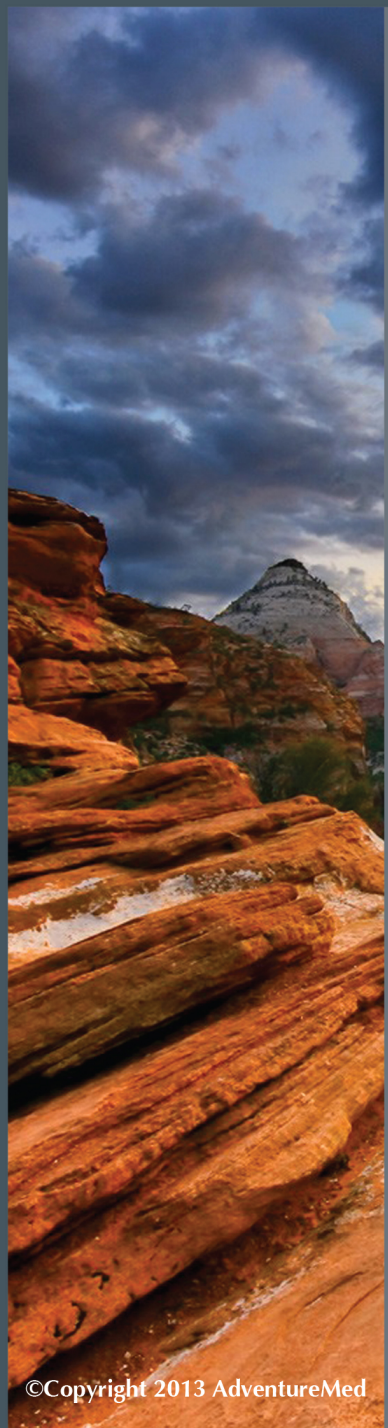




# Question 14

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- Viruses
  - Tick-borne meningoencephalitis
  - Colorado tick fever
  - Crimean-Congo hemorrhagic fever
- Protozoa
  - Babesiosis
  - Cytauxzoonosis
- Toxin
  - Tick paralysis



## Question 15

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- A 45-year old man was backpacking in the Sierra Nevada mountains. He drank a small amount of untreated lake water. He contracted diarrhea about 4 days after returning home.
- He was diagnosed with *Campylobacter* infection and was treated.
- He then developed weakness in his legs to where he could not walk. He was hospitalized and recovered.
- Why did he get weakness in his legs?



## Question 15

---

- A. The patient developed severe dehydration and subsequent leg weakness.
- B. He developed Guillain-Barré Syndrome.
- C. He had an autoimmune reaction to the antibiotic.
- D. Campylobacter is known to inhibit muscle function





## Question 15

---

- B is the correct answer. The patient developed Guillain-Barré Syndrome. This syndrome is known to follow infections from campylobacter.
- After infection from campylobacter, the innate system responds with an acute inflammatory reaction with the creation of granulocytes.
- These particular antibodies cross-react with myelin components this can lead to the development of Guillain-Barré syndrome.



## Question 15

---

- Evidence of *Campylobacter jejuni* infection has been found in approximately one out of every four cases of Guillain-Barré syndrome
- The risk of developing Guillain-Barré syndrome during the months following a symptomatic episode of *C. jejuni* infection is approximately 100 times higher than the risk in the general population.



# Question 16

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- How many types of plasmodium malaria are now known to infect humans?
  - A. 3
  - B. 4
  - C. 5
  - D. 6





## Question 16

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C is correct. There are now five type of plasmodium known to infect humans- with two subspecies

- *P. falciparum*
- *P. vivax*
- *P. ovale*
  - *curtisi*
  - *wallikeri*
- *P. malariae*
- *P. knowlesi*



# Question 16

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- Recently *Plasmodium ovale* species has been shown to be two morphologically identical forms – *Plasmodium ovale curtisi* and *Plasmodium ovale wallikeri* – which can be differentiated only by genetic means.
- Both species have been identified in Ghana, Myanmar, Nigeria, Sierra Leone, Uganda and São Tomé,
- Diagnosis, symptoms and treatment are the same



# Question 16

---

- *Plasmodium knowlesi* is the sixth major human malaria parasite
- It will cause severe malaria in bout 24 hours with an associated fever.
- This is an emerging infection that was reported for the first time in humans in 1965.
- It accounts for up to 70% of malaria cases in certain areas in South East Asia where it is mostly found.
- It is a true zoonotic infection coming from Machaca primates

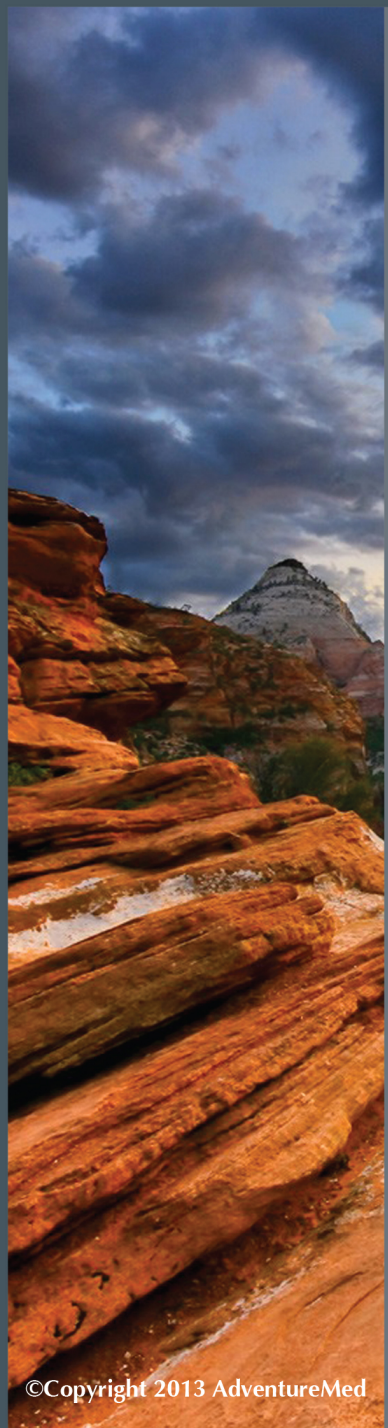




## Question 16

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- Humans can be infected with this “monkey malaria” parasite while staying in rainforests and/or their fringe areas in south-east Asia.
- Symptoms may be atypical
- *P. knowlesi* has no persistent liver forms and relapses do not occur.





# Questions?

**Advanced Wilderness Life Support**



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