Variation in Organisms

Coloration in Jaguars	Resistance to Insecticide in Mosquitoes	Geese Living at High Altitude
		
The jaguar is the largest cat of the Americas and a formidable predator. Its common name comes from the native Indian name 'yaguara', meaning 'a beast that kills its prey with one bound.' Jaguars were once found across the Americas. In recent years they have been seen and photographed in southern Arizona, but otherwise survive only in Central and South America, ranging from Mexico to northern Argentina. Their populations are small and highly fragmented in Mexico. The highest population densities are found in the lowland rainforests of the Amazon Basin (from www.Arkive.org). Most jaguars are orange with dark spots. There are also jaguars that are completely black, though. The difference is caused by the amount of melanin in their fur. Melanin is a brown or black pigment. The more melanin that is present in skin, fur, or feathers, the darker these structures appear. Some jaguars have a moderate amount of melanin. These jaguars appear orange with spots. Black jaguars have higher amounts of melanin which does not allow the spots to be seen.	Malaria is a disease that is common in many tropical locations in the world, such as Africa, Asia, and South America. Malaria is caused by a parasite that is transferred to humans when they are bitten by an infected mosquito. It is a serious disease that can cause a flu-like illness with fevers, chills, vomiting, and joint pain. Sometimes malaria can be serious enough to cause death. In the 1950s, an effort started across the globe to kill the mosquitoes that carried malaria. This was done using insecticides such as DDT. In some places, such as the southeastern United States and in Europe, the effort was successful in wiping out malaria by the late 1970s. In other parts of the world, there was not as much success. Some of the mosquitoes were resistant to insecticides. These mosquitoes survived when exposed to insecticides and had offspring that were also resistant. The resistant mosquitos were still able to carry the malaria parasite. They continued to infect people. The difference between resistant and non-resistant mosquitos is due to an enzyme called acetylcholinesterase or AChE. In non-resistant	Mount Everest rises above the country of Nepal, its peak soaring to 8,848 m (29,028 ft). Temperatures are so cold that flesh will freeze instantly if it is exposed. Of the few climbers who attempt to reach the top, almost all require bottled oxygen as they climb. The amount of oxygen available at that altitude is only about a third of the amount available at sea level. Despite the harsh conditions, bar-headed geese fly over the top of Mount Everest as they migrate from their feeding grounds in India to their nesting grounds in Nepal. The key to this type of goose being able to fly at such high altitudes is a special type of hemoglobin. In these geese, the hemoglobin in their red blood cells can bind oxygen very quickly compared with the hemoglobin found in most geese. When a bar-headed goose breathes in, the oxygen binds to the hemoglobin in red blood cells, even at extreme elevations where the oxygen pressure is low. The oxygen then moves to all parts of the body, carried by the red blood cells. This gives the important systems, such as the gas exchange system and the muscular system, the power to fly at such high altitudes.

	mosquitos, insecticides prevent this enzyme from working properly. Then, toxins in pesticides build up and kill the mosquitos. In resistant mosquitos, there is a change in AChE that allows it to still work to remove toxins, even when the mosquitoes are sprayed with pesticide.	Other geese, however, do not have this special type of hemoglobin and cannot fly at these extreme altitudes.

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black jaguar: Ron Singer, US Fish and Wildlife Service
mosquito: James Gathany, CDC
bar-headed goose: David Iliff