Evolution of Fish

第1题

What is the main purpose of the lecture?

A To explain how biologists learned that not all mutations to a species are beneficial to the species

B To explain why biologists' views about evolutionary adaptations have recently changed

C To explore the advantages and disadvantages of toxins as a defense against predators

D To discuss efforts to find ways to counteract a powerful toxin

第2题

How is tetrodotoxin different from other animal toxins?

A It is equally toxic to all animals that come into contact with it.

B When heated, it can be safely consumed by people.

C It is poisonous only when combined with sodium.

D It is found in several different species of animal.

第3题

What evidence suggests that puffer fish do not make tetrodotoxin themselves?

A They die if their nerve cells are exposed to tetrodotoxin for long periods of time. .

B They do not contain tetrodotoxin if they are raised in a controlled environment

C The steps that are necessary to produce tetrodotoxin are biologically complex.

D The chemicals required to synthesize tetrodotoxin are not found in ocean water

第4题

What type of genetic mutations occurred in the evolution of certain animals that enabled them to become immune to tetrodotoxin?

A Mutations that prevent the toxin from blocking sodium ion transmissions

B Mutations that help the respiratory system fight off invasion by bacteria

C Mutations that prevent the animals from producing excessive amounts of the toxin

D Mutations that allow the animals to exist in bacteria-free environments

第5题

What is the main point the professor makes when she mentions garter snakes?

A Garter snakes contain venom that is similar to the venom of scorpions.

B Tetrodotoxin can be synthesized by a wide variety of species.

C Resistance to tetrodofoxin has evolved in some animals that feed on animals containing the toxin.

D Tetrodotoxin may have spread to newts in North America as a newts to fend off certain predators.

第6题

What is the professor's opinion about the replication of evolutionary changes where the same changes occur in distinct species?

A She is convinced it is more frequent than Darwin thought possible.

B She doubts it will ever be conclusively found in the animal kingdom.

C She thinks examples that have been put forth could simply be random occurrences

D She wishes ther biologists were more open to the idea that it may occur.

Listen to part of a lecture in a biology class.

As I said, Darwin described evolution as a random process, one that's triggered by accidental variations. Now based on this, biologists had assumed two things. First, that evolution is unpredictable, we can’t predict how any particular species will evolve. And second, the replication of evolution changes doesn't happen, that any particular mutation that occurs in one species is unlikely to be repeated in another. Well, some recent research suggests that that second assumption is wrong.

Em…the type of animal you probably heard about, the puffer fish. Okay. The puffer fish, as you may have actually considered a delicacy in many parts of the world. But you need to be careful. This fish contains deadly poison called tetrodotoxin. Now tetrodotoxin is a hundred times more deadly than pc- cyanide and is not destroyed by cooking. So if a puffer fish isn't prepared exactly right, well, let's just say a risky undertaking.

Anyway the puffer fish isn't unique in containing tetrodotoxin. Tetrodotoxinis also found in other animals, like in certain newts in North America and Japan. And in kinds of frogs in Central and South America and in Bangladesh, and also in a certain type of snail. So it's actually pretty widespread both geographically and across animal species.

And that some intriguing questions, because you see except for these animals, animal toxins in general are, they're specific to a particular group of animals. For example, we know that there are lots of poisonous snakes, right? And there are also lots of poisonous scorpions. But snake venoms are very different from scorpion venoms. There're very different types of poisons. And that's the typical case. But with tetrodotoxin we have a whole disparate group of animals, from fish to frogs to snails, all of whose bodies contain identical toxin.

So how can such a wide variety of species contain the same poison?

Well, notice those animals whose bodies contain tetrodotoxin. I didn't say their bodies produced tetrodotoxin. I would be very sure if they did, if they each synthesized or produced this poison. It’s a pretty complex molecule that involves several steps, chemical steps to create. But in fact, there's evidence that they don't produce it, 'cause puffer fish or Japanese newts or condominium frogs are raised on special diets or in baeteria-free : they're non-toxic. They don't end up containing any tetrodotoxin at all. So this means it's their environment— that makes them toxic. They must either obtain the toxin from their natural food chain or from the environment. Okay. So one mystery solved. We have an idea about how they come to contain toxin.

But another mystery takes its place. If the toxin is in their bodies, why doesn't it kill them? If we want to understand this, we have to examine how tetrodotoxin works. Okay. So all animals have membranes surrounding their nerves and muscle cells, right? And normally, ions of sodium can travel through. There’re channels across these membranes and sodium ions travel across these channels. Well, what tetrodotoxin does is it blocks the normal movement of sodium ions. And when sodium ions don't reach nerves and muscles, these nerves and muscles become paralyzed, which leads to respiratory failure and in some cases, death. But in Japanese newts and condominium frogs, ion movement isn't blocked by tetrodotoxin. It says that in some point in the evolution of these animals, certain generic mutations occurred that blocked tetrodotoxin from interfering with sodium ion channels. And individuals in these different species which inherited these mutations were favored and reproduced. As a result, different groups of animals independently acquire the same mutations, making them immune to tetrodotoxin.

And certain predators may have evolved resistance in the same way. So there are snakes in the western United States, garter snakes that feed on our highly toxic newts. And at least three species of garter snakes who prey on the newts have independently evolved immunity to tetrodotoxin. And these snakes underwent the same genetic mutations that contain resistance to tetrodotoxin as puffer fish did, namely, mutations that prevent tetrodotoxin from blocking the movement of sodium ions, so we’ve got parallel mutations across differnt species, indicating that evolutionary processes are more replicable, more likely to repeat themselves than previously thought.

{"1": ["B"], "2": ["D"], "3": ["B"], "4": ["A"], "5": ["C"], "6": ["D"]}