

Chapter 56

Evolutionary Aside 56.2--Predator-Prey Coevolution in a Metapopulation

Species exhibit variation throughout their geographic ranges, as discussed in chapter 22. When coevolving species occur together over large geographic areas, they can exhibit concordant patterns of geographic variation. One example involves the rough-skinned newt, *Taricha granulosa*, and its predator, the common garter snake, *Thamnophis sirtalis*. In its skin, the newt contains a deadly poison, tetrodotoxin, the same chemical that makes the Japanese fugu fish so deadly. Most predators that eat a toxin-laden newt die very quickly, and as a result, the newt has few predators. But the common garter snake is an exception. It has evolved a biochemical change that renders it immune to tetrodotoxin, and as a result, it feasts on newts.

The surprising aspect of this coevolutionary story is that newt populations vary in how toxic they are—newts in some populations are extremely deadly, whereas those in others are only slightly toxic. And, it turns out, the immunity in the snake has evolved in parallel. In those populations co-occurring with highly toxic newts, the snakes can tolerate enormous amounts of tetrodotoxin. But snakes that occur with less toxic newts have much lower resistance; if they ingest or are injected with tetrodotoxin that the highly resistant populations can withstand, they quickly succumb.

Scientists currently do not understand what drives this geographic variation—producing what has been termed a “geographic mosaic of coevolution”—and it is currently the subject of active research.