Narrator
Listen to part of a lecture in a biology class.

Professor
Almost all animals have some way of regulating their body temperature; otherwise, they wouldn't survive extreme hot or cold conditions. Sweating, panting, swimming to cooler or warmer water, ducking into somewhere cool like a burrow or a hole under a rock ... these are just a few. And that spot is colder or warmer than the surrounding environment because it's a microclimate.

A microclimate is a group of climate conditions that affect a localized area—weather features like temperature, wind, moisture, and so on ... And when I say localized, I mean really localized, because microclimates can be, as the name suggests, pretty small, even less than a square meter. And microclimates are affected by a huge number of other variables ... obviously weather conditions in the surrounding area are a factor. But other aspects of the location, like, uh, the elevation of the land, uh, the plant life nearby, and so on, have a substantial effect on microclimates. And, of course, the human development in the area ... um, a road'll affect a nearby microclimate. It's also interesting to note that microclimates that are near each other can have very different conditions ... in the forest, for example, there can be a number of very different microclimates close to each other because of all the variables I just mentioned.

Student
So how does a hole in the ground, a burrow, stay cool in a hot climate?

Professor
Well, since cold air sinks, and these spots are shaded, they're usually much cooler than the surrounding area. And these spots are so important because many animals rely on microclimates to regulate their body temperature. Um ... for instance, there is a species of squirrel in the western part of the United States that can get really hot when they're out foraging for food, so they need a way to cool down. So what do they do? They go back to their own burrow. Once they get there, their body temperatures decrease very, very quickly. The trip to the burrow prevents the squirrel from getting too hot.

Student
But squirrels are mammals, right? I thought mammals regulated their temperature internally ...
**Professor**

Mammals *do* have the ability to regulate their body temperature ... but not all can do it to the same degree. Or even the same way. Like when you walk outside on a hot day you perspire and your body cools itself down—a classic example of how a mammal regulates its own body temperature. But one challenge that squirrels face, well, many small mammals do, is that because of their size, sweating would make them lose too much moisture. They’d dehydrate. But on the other hand, their small size allows them to fit into very tiny spaces. So for small mammals, microclimates can make a big difference—they rely on microclimates for survival.

**Student**

So cold-blooded animals, like reptiles—they can’t control their own body temperature, so I can imagine the effect a microclimate would have on *them* ...

**Professor**

Yes. Many reptiles and insects rely on microclimates to control their body temperature. A lot of reptiles use burrows ... or stay under rocks to cool down. Of course, with reptiles, it’s a balancing act. Staying in the heat for too long can lead to problems, but staying in the cold can do the same. So reptiles hafta be really precise about where they spend their time, even how they position their bodies. And when I say they’re precise I mean it—some snakes will search out a place under rocks of a specific thickness, because too thin a rock doesn’t keep them cool enough and too thick a rock will cause them to get too cold. That level of precision is critical to the snake for maintaining its body temperature.

And even microscopic organisms rely on microclimates for survival. Think about this: decomposing leaves create heat that warms the soil; the warm soil in turn affects the growth, the conditions of organisms there, and those organisms then affect the rate of decomposition of the leaves ... So a microclimate can be something so small and so easily disturbed that even a tiny change can have a big impact. If someone on a hike knocks a couple of rocks over, they could be unwittingly destroying a microclimate that an animal or organism relies on.