

Freak tadpoles and salamanders discovered in pond in Aptos

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Endangered Species
Something strange is happening in a small pond in Aptos.

The scientist who first noticed it calls the phenomenon a "neat puzzle."

To the layman, however, the fact that tadpoles are growing up to eight extra hind legs is downright freakish.

Stephen Ruth stumbled on the poly-legged polliwogs while studying the Santa Cruz Long-toed Salamander, an endangered species that breeds in the lush pond in the Aptos Seascape uplands.

Fascinated, he took a

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closer look at the young, developing salamanders. He found that some of the rare creatures were not only long-toed, but multi-legged, as well.

Later, Ruth learned that there's been only one other report of multi-legged frogs in the entire world.

Ruth, who has a Ph.D. in herpetology from UC-Berkeley, discovered the mystery while looking for answers to a completely different set of questions. Having spent seven years studying the Western fence lizard, Ruth was hired by the developers of Seascape to learn if salamanders and people could co-exist on the 192 acres of coastal bluffs. The company would like to build hundreds of condominiums, townhouses and houses on the property. First it must wait for the results of Ruth's study to make sure the development wouldn't wipe out the endangered salamanders who depend on the pond.

Last July, while scooping critters from the pond, Ruth noticed that the transforming tadpoles of the small, bright-green Pacific tree frogs were growing multiple rear legs.

He sampled more animals

and found that 60 to 70 percent of the tadpoles had extra hind limbs.

Immediately, Ruth suspected heavy metals had polluted the water and were causing the abnormality. That hypothesis was ruled out, however, when tests showed that, except for some algae and bacteria, the water was pure enough to drink, Ruth said.

Baffled by a problem outside his area of expertise, Ruth sent some of the multi-legged animals to Stan Sessions, a specialist in developmental biology at UC-Irvine.

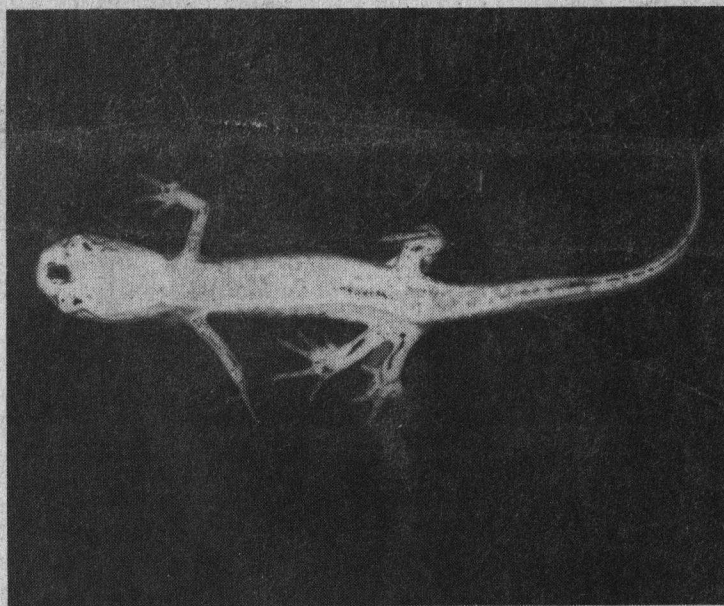
Sessions discovered that the tadpoles were filled with tiny, parasitic worms. The new information, plus observations at the Seascape pond, as well as at a neighboring salamander pond, enabled Ruth to form a hypothesis explaining the abnormal event.

Ruth had also found extra legs on the transforming tadpoles at Valencia Lagoon, near the Rio del Mar freeway exit. At the second pond, however, the percentage of abnormal animals was much lower. Only 15 to 20 percent of the tadpoles at Valencia had sprouted an unusual number of limbs.

The main difference between the two seasonal ponds, which serve as the amphibians' breeding grounds, is the ratio of salamanders to frogs. In the Valencia pond, there are many fewer developing salamanders for each tadpole.

Ruth theorized that in late spring and early summer food grew scarce for the voracious developing salamanders, whose scientific name comes from Greek and Latin words for "stuff-in-mouth." In the absence of their preferred food, insect larvae, the salamanders began chomping on the legs of the transforming tadpoles. The wounds provided the perfect entree for the tiny worms, or nematodes, which, according to Ruth's theory, caused the transforming tadpoles to regenerate four, six and sometimes eight legs instead of the normal two.

He speculates that the



Multi-legged frog, top, and salamander with extra leg, were both found in Seascape pond.

multi-leggedness began appearing in the salamanders, when the cannibalistic animals turned on their own kind for food.

The hypothesis has yet to be tested. Ruth said it would be the perfect subject for a graduate thesis.

Ruth has not ruled out other explanations for the numerous legs, such as exposure to high levels of radiation, genetic factors or some other unknown environmental factor. He said he feels, however, that these other explanations are not very likely to be true.

The only other incidence of "supra-normal" limbs was

reported in France. In that case, a virus explained the regeneration of multiple limbs.

Right how, however, the matter is one of pure speculation. The seasonal ponds have dried, and the transformed tadpoles have scattered to their terrestrial habitat.

It won't be until the animals begin returning to the pond to breed during the rainy season that Ruth will know whether the multi-legged animals have survived. It won't be until the young begin developing next spring, that the scientist will discover whether the phenomenon repeats itself.