

TwoOldGuys™ Study Guides

BI114 Biological Concepts for Teachers

Chapter 4. History of Life

4.2. Invasion of Land, part 2

Based on Indiana's Academic Standards, Science, as adopted by the Indiana State Board of Education, Nov 2000.

Numbers refer to the age-appropriate grade-level for the content.

Review

In the last section (4.1. Invasion of the Land, part 1), we learned about two hypotheses to explain how plants were able to leave the aquatic environment, and survive on land where the air tends to dry out living things. Specific mutations were described which could have allowed the plants to avoid dehydration. Now we turn our attention to the animals, who it turns out, have the same problem.

the Invasion of Land, Part 2

grades secondary: to college:

Hypothesis:

Among the fishes are two rather 'interesting' beasts: the lobe-finned fish and the lung-fish. The lobe-finned fish are interesting because they have thick, muscular fins, with leg-like bones in them. The lobe-fins allow the beast to crawl short distances across mud, as long as the beast can hold its breath. The lung-fish are interesting because they have lung-like structures into which they can store air, allowing them to

breathe out of the water. Since the discovery of these beasts, biologists have been accusing them of being the ancestors of land dwelling animals. The predominant hypothesis suggests that there was a Devonian fish with both traits – lobe-finned with lungs. The hypothetical lobe-finned lungfish could have crawled out onto the mud beach to eat the newly arrived whisk ferns. The lobe-fins would evolve to real legs to support the weight of the fish without the buoyancy of water to help support it. The lung-like structure would have evolved to a true lung, to permit actual breathing of air.

These new animals are Amphibians, class Amphibia, division Chordata, the oldest known fossils of which are found in the Devonian [400-350 Myr BP].

Or ... maybe they migrated onto land to eat the insects that were already there

2nd Hypothesis:

Remember our Silurian [440 – 400 Myr BP] Beach, a mud flat covered by the whisk fern plants, *Rhynia* and *Cooksonia*? Imagine a crayfish-like creature crawling out to eat the plants. This makes more sense, since crayfish-like creatures do eat plant material, although lobe-finned or lung fish in the real world eat minnows and insects. The most likely candidate for the first land visitor among the invertebrates would have looked a lot like the modern pill-bugs, or sow bugs – the ones that look like miniature armadillos, and roll up into a ball when threatened. After a few generations of running out to eat, then back to the water, we suspect that they would eventually have remained on land except to reproduce. As land-dwelling invertebrates, they would have soon evolved into a more insect-like beast. Fossil insects resembling silverfish have been found in Silurian rocks, and cockroach-like insects have been

found in the late Silurian. Hence the fossil record suggest insects arrived on land nearly 20 million years before the first vertebrates. It even makes sense to suggest that the earliest vertebrates (amphibian-like) ran up on the beach to eat the insects that were already there! Larry Gonick, in the *Cartoon History of the Universe* suggests that the vertebrates got credit for conquering land because they wrote the textbooks.

Works Cited

Gonick, L. *Cartoon History of the Universe*. New York: Doubleday, 1990.