



FIGURE 9.3.

The modern West African lungfish adapts to the changing water level in the pond.

The mudskipper manages to stay out of water for brief periods by holding water in its mouth. By swilling the water around on the roof it is able to extract oxygen. It is also able to absorb oxygen from the air through its moist skin. However, after a few minutes on land or in the trees, it must return to the sea to wet its skin and gulp a new mouthful of water. While a highly interesting curiosity, the mudskipper does not really breathe air.

A normal fish extracts oxygen from the water by passing it through its gills. However, there are a number of fish alive today that actually breathe air from the atmosphere. One such fish is known as a lungfish and exists in various forms in Africa, Australia, and South America. When the floodplains of rivers dry into sun-baked mud, the lungfish burrows into the mud and hibernates until the next rainy season, perhaps a year away. During this waterless period the lungfish draws air through its burrow hole into its mouth. The air passes into a pair of pouches located in its gut. These function as simple lungs. Thus, by adapting to air breathing, the lungfish is able to exist until the next rains again flood the area.

The lungfish and the lobe-finned fish illustrate ways in which fish might have adapted to land. The lungfish has the capability to breathe air, and lobe-finned fish have a possible potential to crawl on land. Both are found as primitive fossils in the ancient sedimentary record of 350 million years ago. Yet neither is regarded as the direct ancestor of descendants that explored the land. The lungfish could breathe air. The lobe-finned fish could possibly have crawled, but that is not enough. Both capabilities are required to colonize the land. Further, the bones of their skulls are not similar to those of the early