Chapter 48

Evolutionary Aside 48.1--Adaptive Evolution of Water Loss Rates

Although all reptiles are covered in scales, they are not equivalent in their ability to prevent dessication. Rather, the physiology of species varies—species that live in hot, dry environments, such as deserts, have evolved the ability to lose very little water through their skin, whereas species that occur in humid areas, such as tropical rainforests, have much higher levels of water loss, and would perish quickly were they to find themselves in a desert.

How this is accomplished is not altogether certain. Many desert reptiles have fewer and larger scales, which means that there is less skin exposed between scales (the fewer the scales, the less the amount of exposed skin), which may decrease rates of water loss. In addition, species in dry environments also appear to have substances in their skin that decrease the rate at which water can cross through and be lost by evaporation.

Although lacking scales, amphibians have also evolved means of minimizing water loss. Amphibians have two tactics for avoiding dehydration. The first is behavioral. In times of water shortage, frogs become less active and adopt postures that minimize the available surface area, thus decreasing water loss through dehydration. They also seek out the moistest area possible, which is often underground. In addition, some frogs apparently are able to decrease water loss by covering themselves with mucus, which dries and forms a protective cover that limits subsequent water loss. This is taken to an extreme in some species in the genus *Phyllomedusa*, which secretes a mixture of substances that form a waxy, water-impermeable surface over the body; they actively spread the substance to cover the entire body, after which they can sit in the very hot sun yet lose little water.