

Chapter 55

Evolutionary Aside 55.2--Phenotypic Plasticity

The ability of organisms to alter their morphology in response to environmental conditions is quite widespread. Plants, for example, will grow more extensive roots when water is limited and larger leaves in shaded environments. Animals, too, can alter their physique. In the presence of predators (usually detected by smell), snails grow thicker shells, daphnia develop spines, and tadpoles produce thicker tails (the better to swim quickly).

The ability to produce multiple phenotypes from a single genotype is termed a *norm of reaction*. The existence of norms of reaction has several important consequences. Such flexibility is obviously useful to a species that may find itself in different environments, particularly sedentary species that cannot just get up and move. However, it is important to remember that such differences in phenotype among individuals do not reflect genetic differences—rather, individuals may be genetically identical, but still have grown up in different environments. Of course, a further consequence of this is that such nongenetic differences are not transmitted to the next generation because they are not genetically inherited.

If such flexibility is useful, why aren't all traits so plastic? The presumed answer is that such flexibility has a cost such that individuals that are genetically programmed to only produce a single phenotype have an advantage that offsets the advantages of a large norm of reaction. This is an area of current research.