

Populations

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16.3 Life History

How a population grows depends in part on its *life history*—that is, on its schedule of survival and reproduction. This information can be seen in a population's *survivorship curve*, which shows the proportion of individuals in a population that survive to a given age. Let's look at three different kinds of survivorship curves, shown in Figure 16.5.

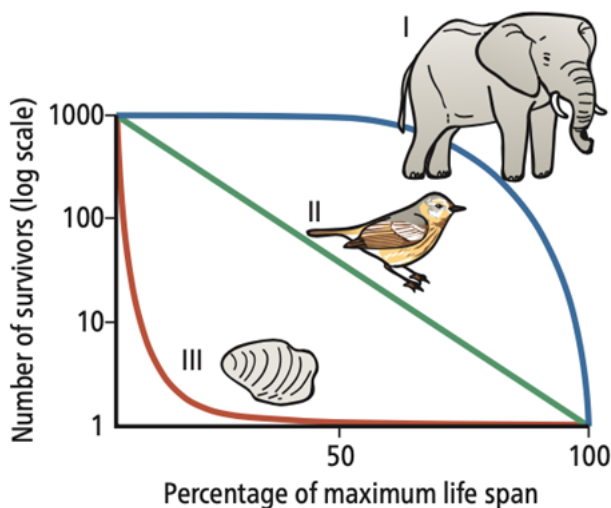


FIGURE 16.5

This figure shows three different survivorship curves. Type I organisms have low death rates early in life—most individuals live to an advanced age. Type II organisms have steady mortality throughout life. Type III organisms have high death rates early in life—few survive to adulthood.

Type I organisms have low death rates early in life, with most individuals surviving until fairly late in life. Elephants have Type I survivorship—most elephant calves survive to adulthood. Type I organisms typically have large bodies and reach sexual maturity late. They produce a small number of offspring and devote significant resources to each offspring. For example, a female elephant takes about 10 years to reach sexual maturity, gives birth to a calf only every 5 years or so, and provides significant parental care.

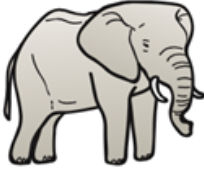

Type III organisms have high death rates early in life, with few individuals surviving until late in life. Razor clams have Type III survivorship—most razor clams die early in life, and few survive to adulthood. Type III organisms typically reach sexual maturity early, produce large numbers of offspring, and devote few resources to each. For example, a female razor clam may reach sexual maturity in the first year of life and then produce 100 million eggs, releasing them into the water with no further attention or care. So, whereas elephants produce a small number of “expensive” offspring (expensive in the sense that the parents devote a lot of resources to each offspring), razor clams make many “inexpensive” offspring.



Type II organisms fall between Type I and Type III. Type II organisms experience a steady death rate throughout life—individuals are as likely to die early in life as late in life. Many songbirds show Type II survivorship.

How is life history related to population growth? The production of many “inexpensive” offspring is associated with exponential growth. In the unstable environments of exponential growth, life and death are often chance events. Producing many offspring is adaptive because it becomes more likely that at least some of the offspring will survive if conditions are poor. Also, when conditions are good, there will be many offspring to take advantage of plentiful resources. On the other hand, producing a few “expensive” offspring is associated with logistic population growth. In the stable environments of logistic growth, many populations are at or near carrying capacity. Consequently, an offspring that receives a lot of parental investment is more likely to be able to compete with other members of the population and successfully survive and reproduce. Table 16.1 summarizes some typical characteristics of Type I and Type III populations.

TABLE 16.1 type I versus type III populations.

 Type I Populations	 Type III Populations
Large bodies	Small bodies
Reach sexual maturity late	Reach sexual maturity early
Few “expensive” offspring	Many “inexpensive” offspring
Long life expectancy	Short life expectancy
Live in stable environments	Live in unstable environments
Logistic population growth	Exponential population growth

READING CHECK

What type of life history (I, II, or III) characterizes humans?

CHECK YOUR ANSWER

Humans have a Type I survivorship curve. Most humans survive until late in life. Humans also have most of the other characteristics of Type I populations. For example, we have large bodies, reach sexual maturity late, and produce a small number of “expensive” offspring.

You can read more about survivorship, as well as Type I, Type II, and Type III survivorship here:
<https://www.nature.com/scitable/knowledge/library/survivorship-curves-16349555/>

