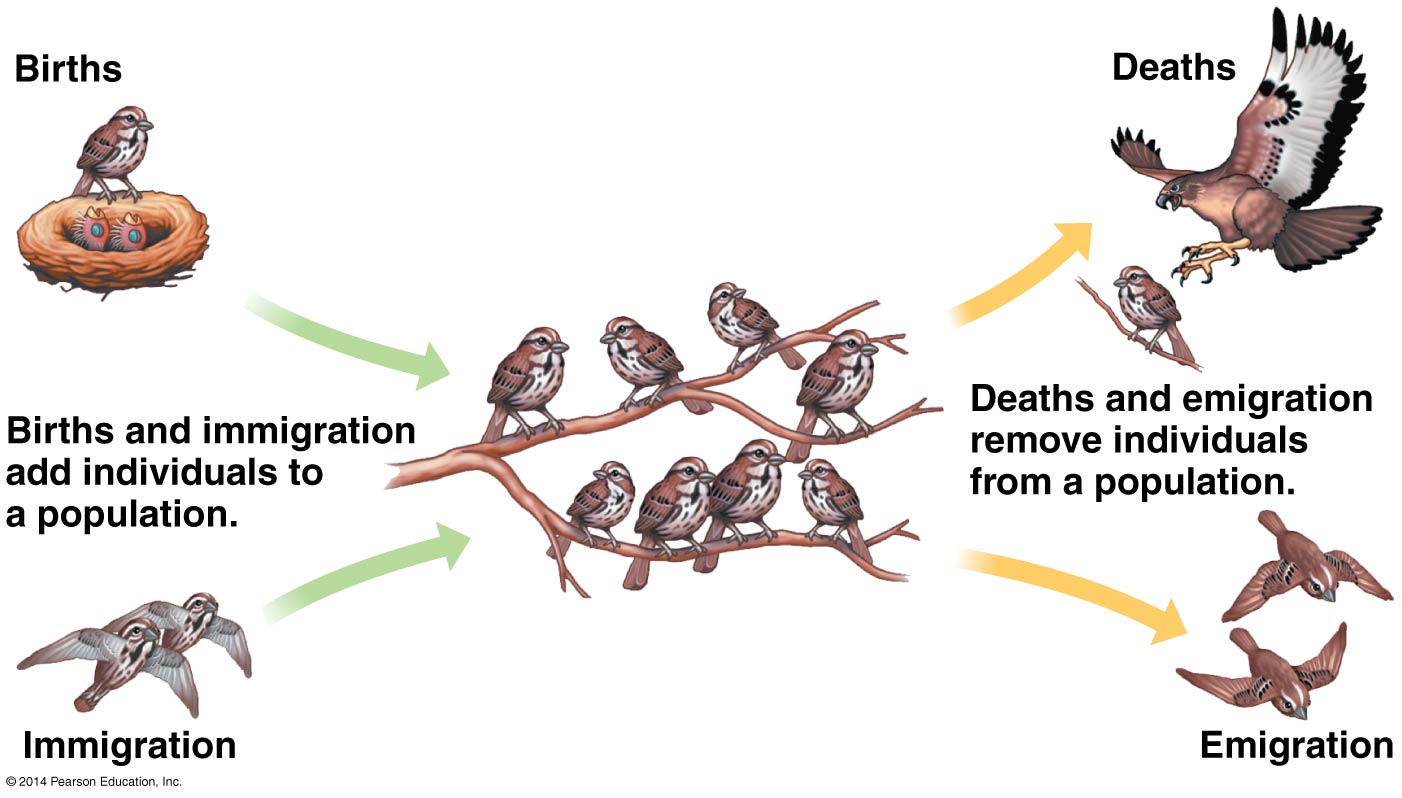
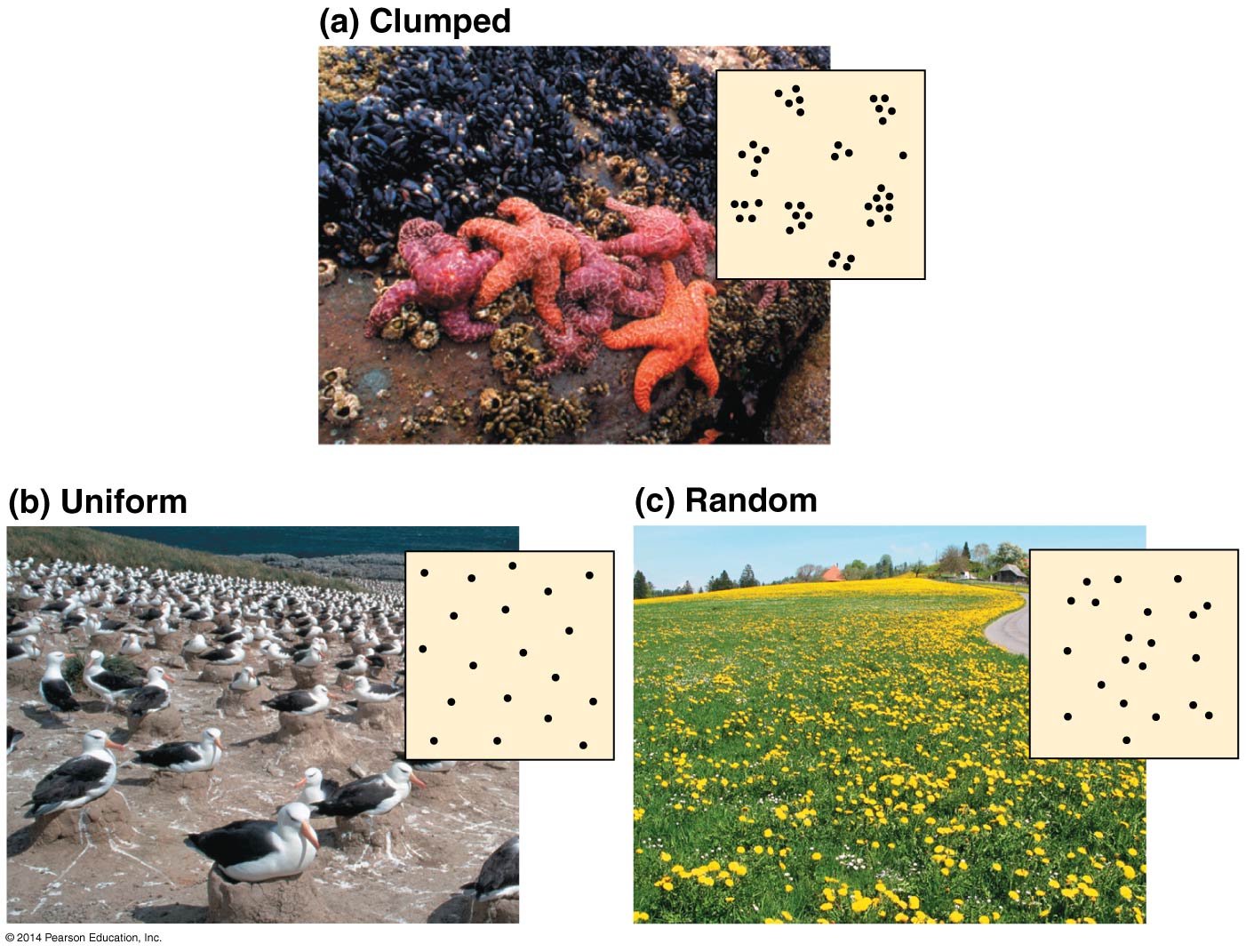
**C53 Population Ecology**

****

Essential knowledge: Communities are composed of populations of organisms that interact in complex ways.

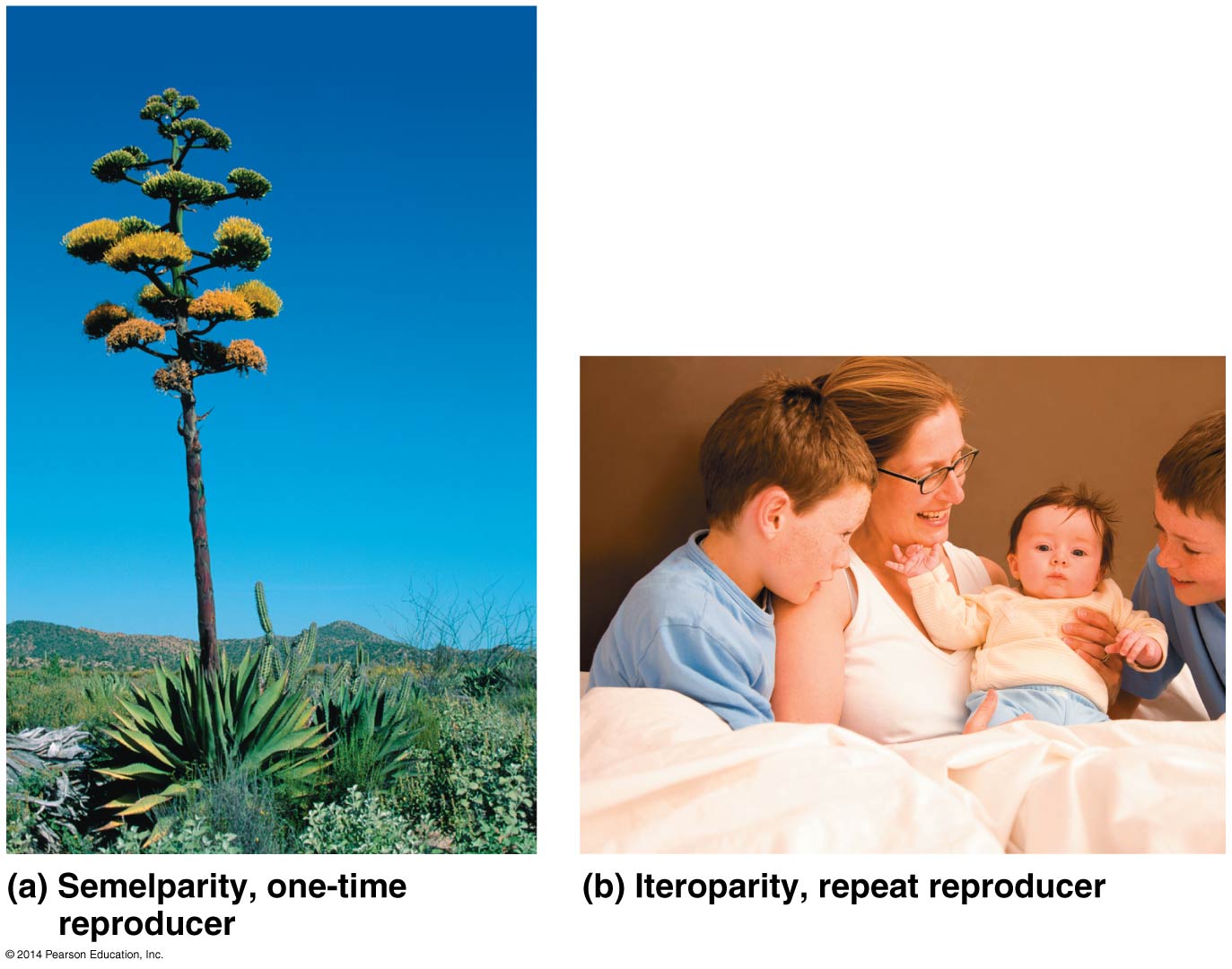
**Population characteristics:**

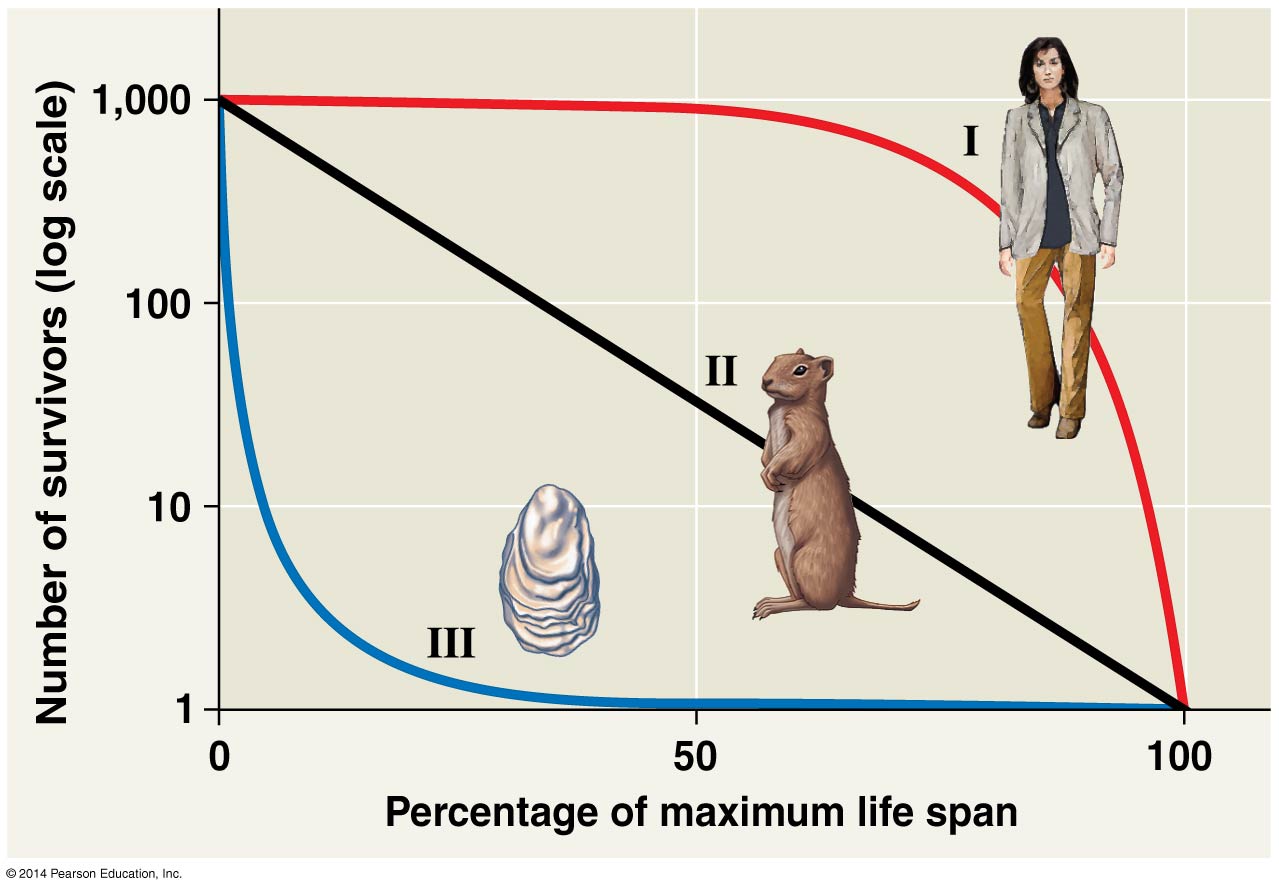
* **Density** – number of individuals per unit area or volume. (Mark-recapture method used to determine this sometimes).
* **Dispersion** – the pattern of spacing among individuals within the boundaries of the population. (clumped, uniform, or random)
* **Demographics** – vital statistics and how they change, such as birth and death rates.

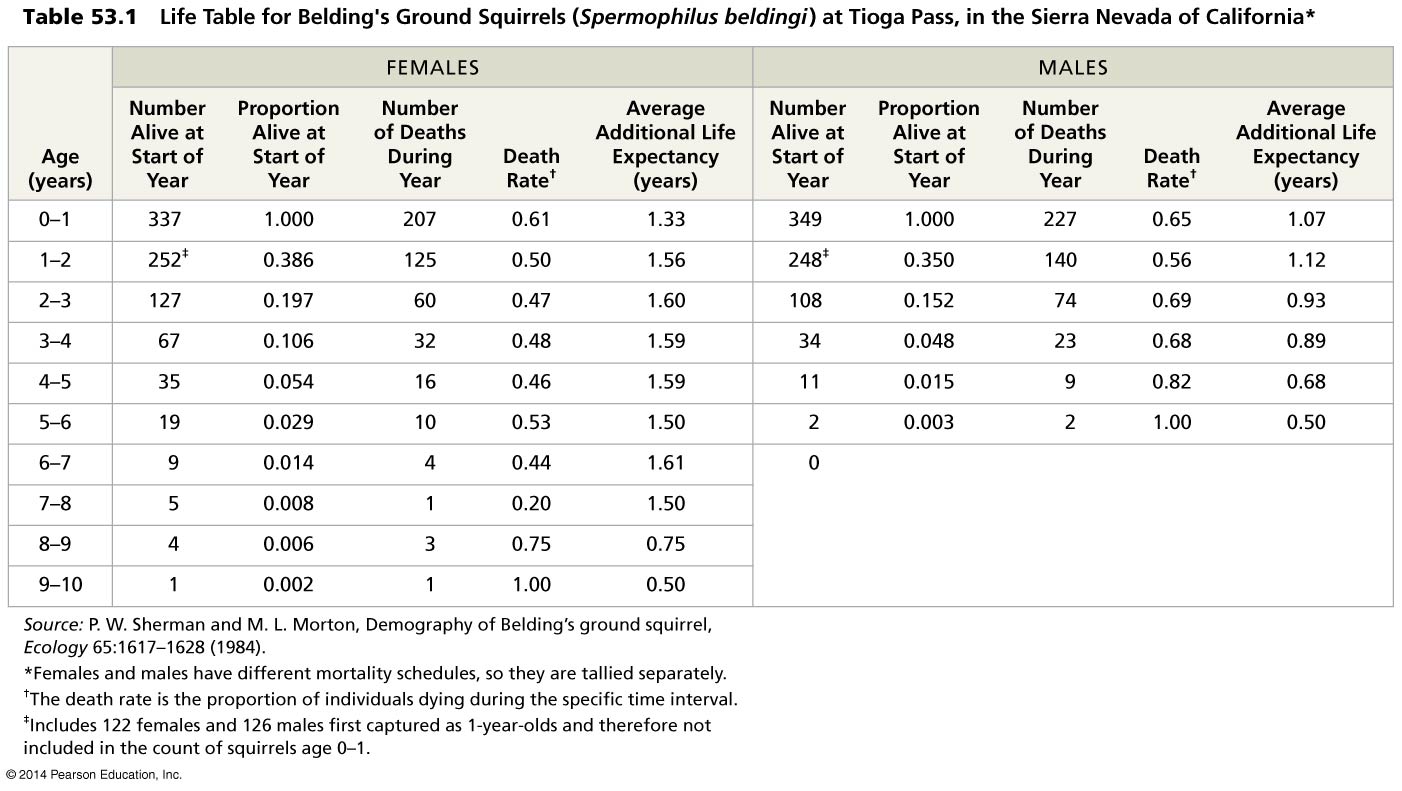


**Life history** – traits that affect an organism’s schedule of reproduction and survival. Two common patterns (although some fall in between): depend on survival rate of offspring and if adult will survive to reproduce again.

* Big-bang reproduction – one time (usually at end of life), ex. Agave desert plant or salmon.
* Repeated reproduction – throughout adulthood.



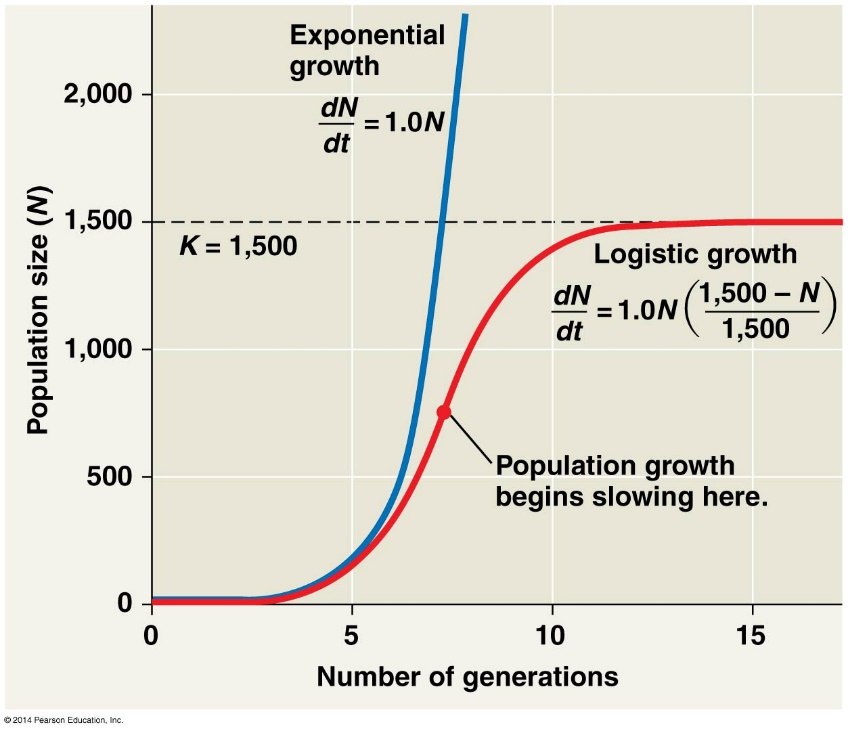




**Exponential growth** – J curve, rapid growth, no limiting factors expressed by *dN/dt = rmaxN* where *d* is the per capita death rate, *t* is time, *rmax* is the maximum per capita and *N* is the number of individuals in the population.

**Logistic growth** model – S curve as a result of limiting factors, *dN/dt = rmaxN(K-N)/K* where *K* iscarrying capacity.

**Carrying capacity** – maximum population size a particular environment can sustain.

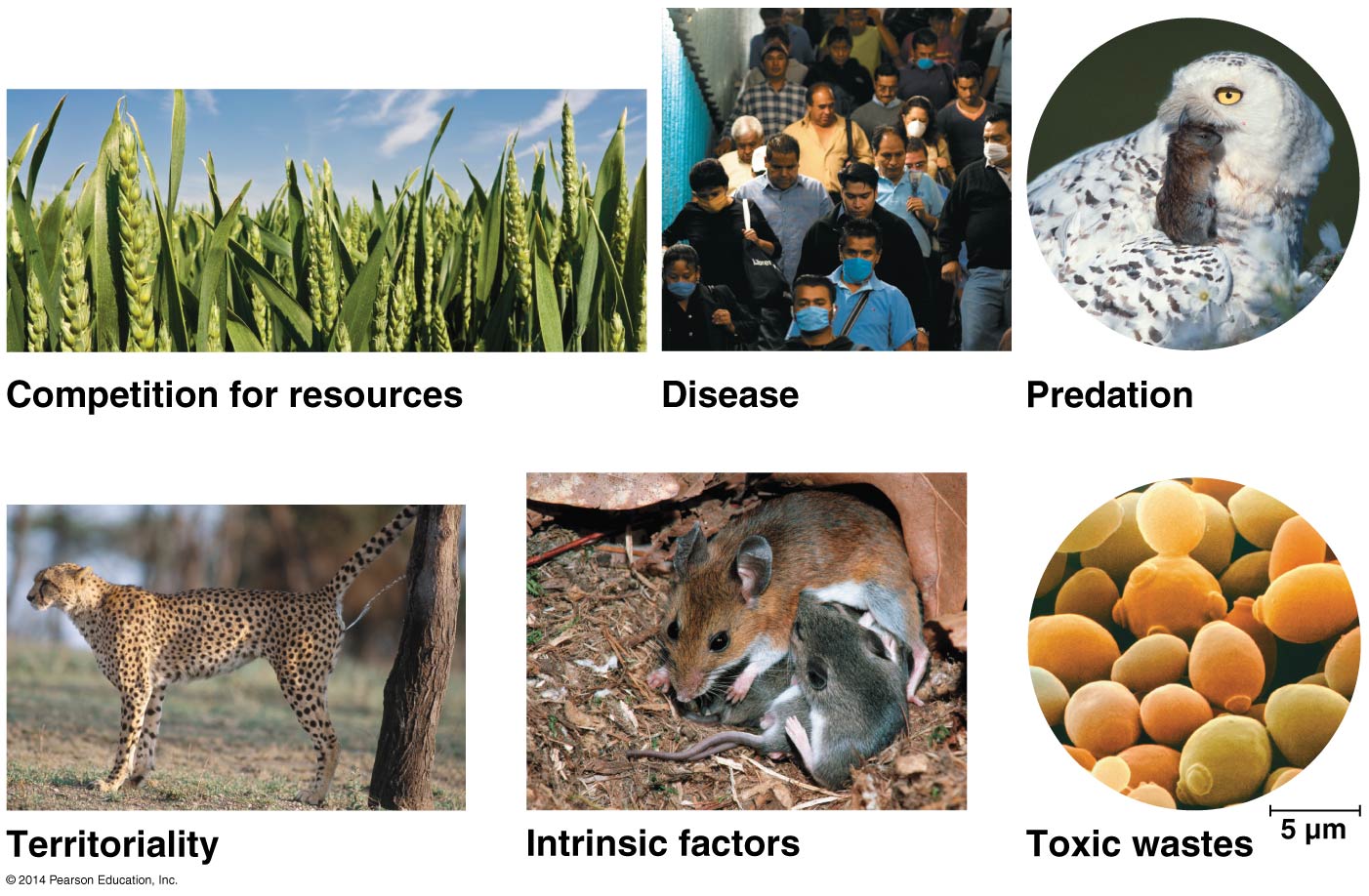


**K-selection** – (stable environments) selects for life history traits sensitive to population density, ex. Mature trees growing in an old-growth forest, humans, elephants.

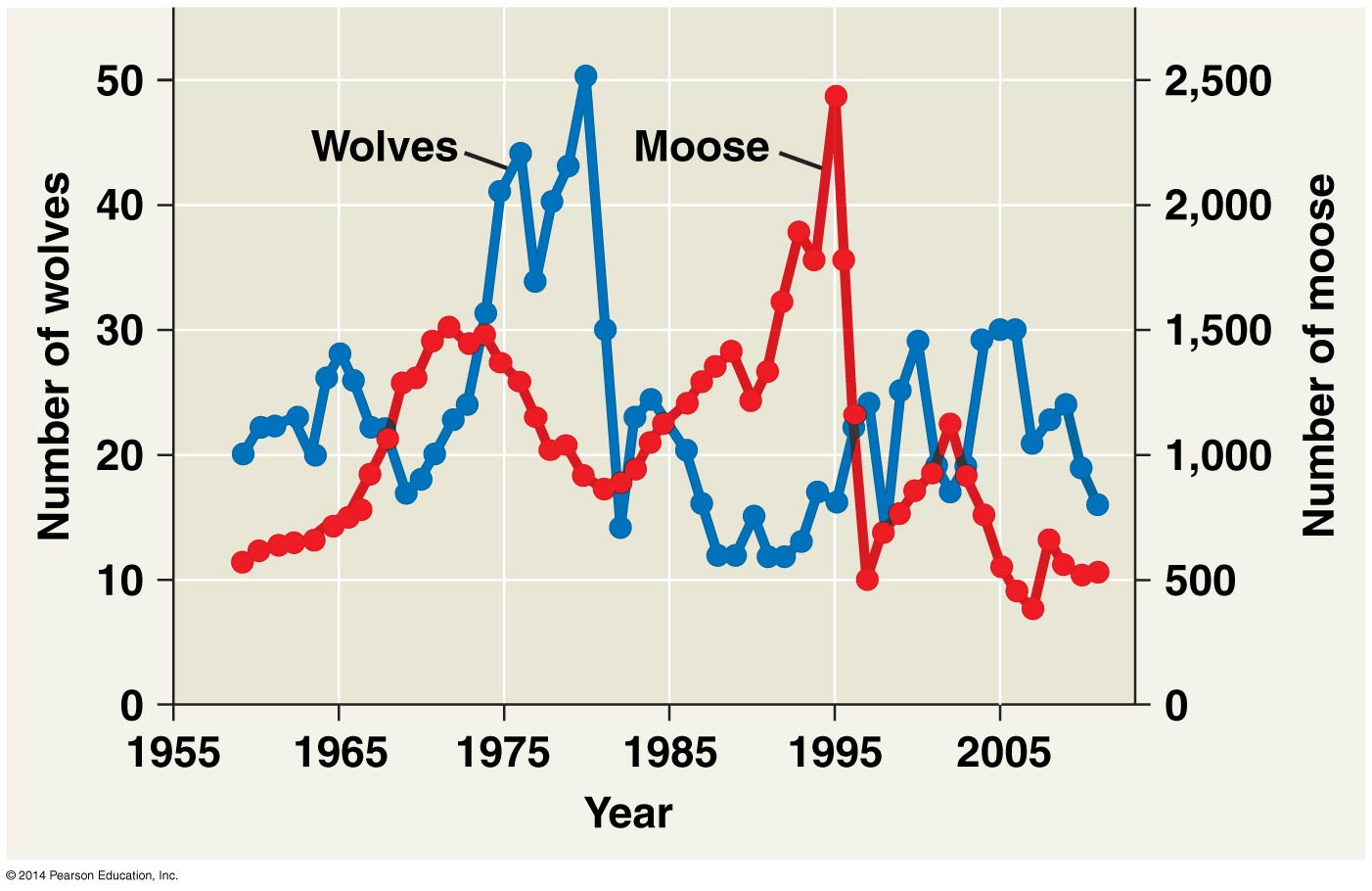
**r-selection** – (unstable environments) selects for life history traits that maximize success in low densities, ex. Bacteria, insects, weeds, rodents.

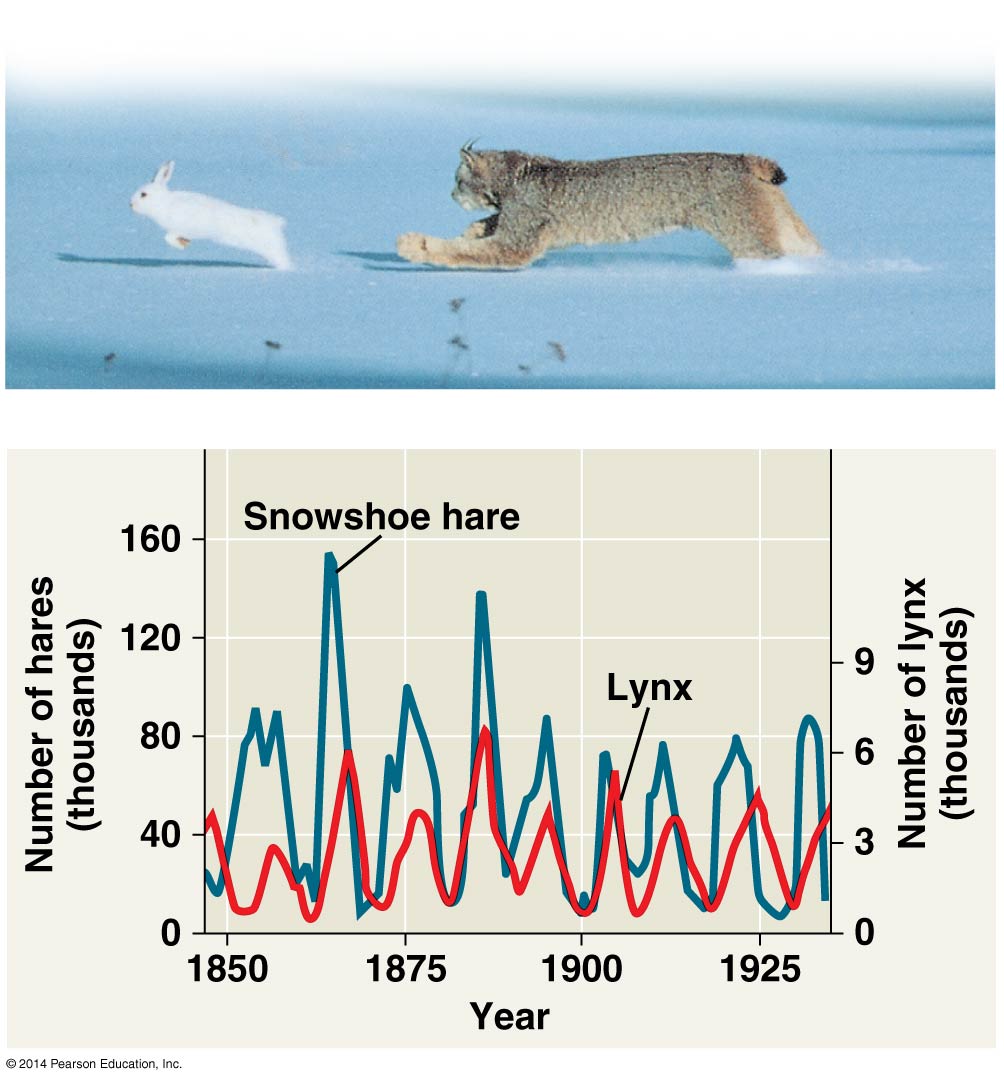
**Density independent** – birth rate or death rate does not change with population density. Ex. Floods, earth quakes.

**Density dependent** – death rate rises as population density increases. Examples of factors: Competition for resources, territoriality, disease, predation, accumulation of toxic wastes, intrinsic factors like stress.



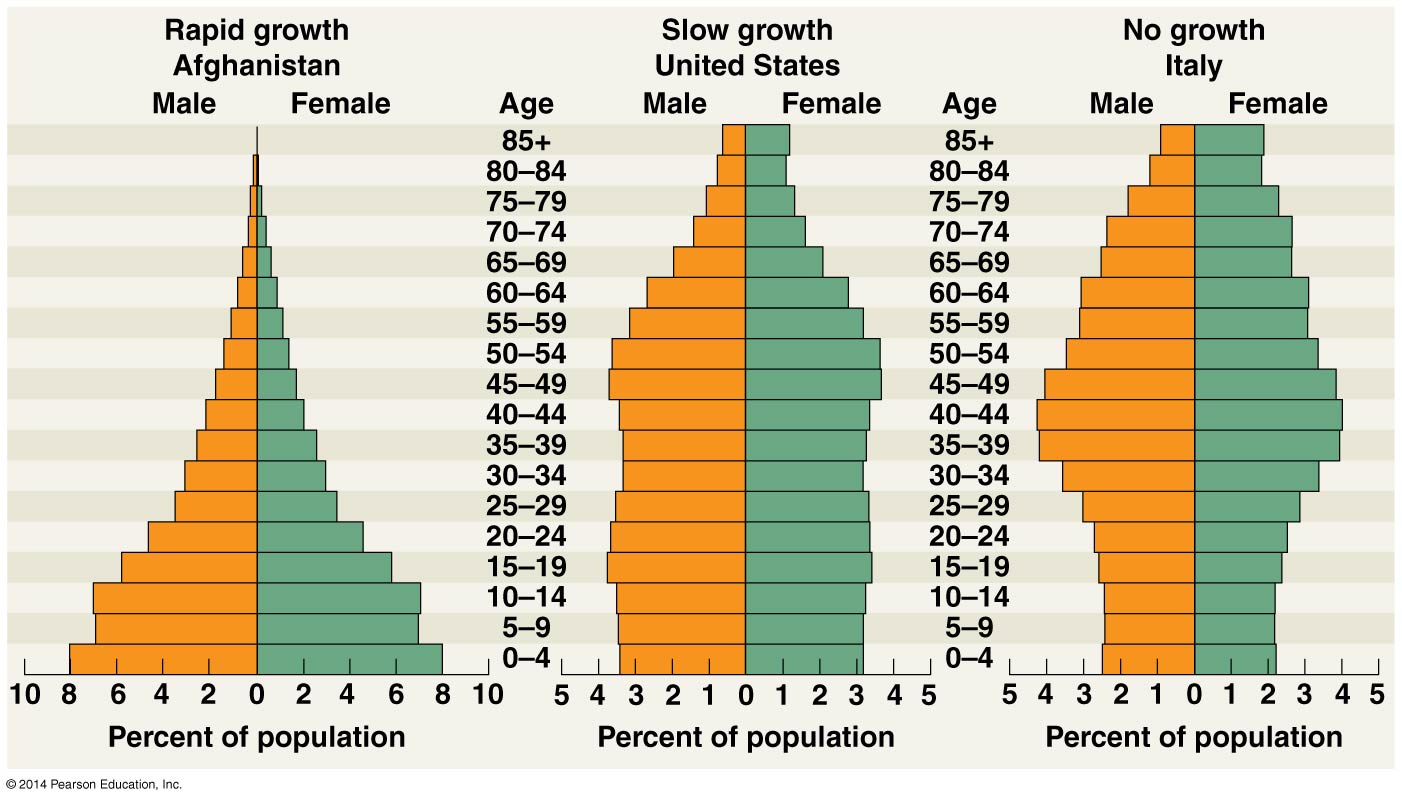
[**Predator/prey**](http://rpdp.net/sciencetips_v2/images/l12c2/lynx-hare_cycle.gif) **relationships** – dependency on each other, Ex. [Wolves and moose](http://isleroyalewolf.org/sites/default/files/annual-report-pdf/Annual%20Report%202012%20color_0.pdf)





**Human population:**

* [**Demographic transition**](http://www.newgeography.com/content/002591-looking-new-demography) – a shift from rapid population growth in which birth rate outpaces death rate to zero population growth characterized by low birth and death rates.
* [**Age structure pyramids**](http://www.census.gov/population/international/data/idb/region.php)– age groups with gender. Be able to recognize shapes: rapid growth, stable, and declining.



* **Infant mortality** – number of infant deaths per 1,000 live births.
* **Life expectancy at birth** – predicted average length of life at birth. Varies widely, ex. In Angola in 2005 life expectancy was 39 years, about half that in Japan, Sweden, Italy, and Spain.
* **Global carrying capacity?** Human population is no longer growing exponentially but is still increasing rapidly. (Change thought due to diseases, including AIDS, and to voluntary population control).

