

Exponential Growth



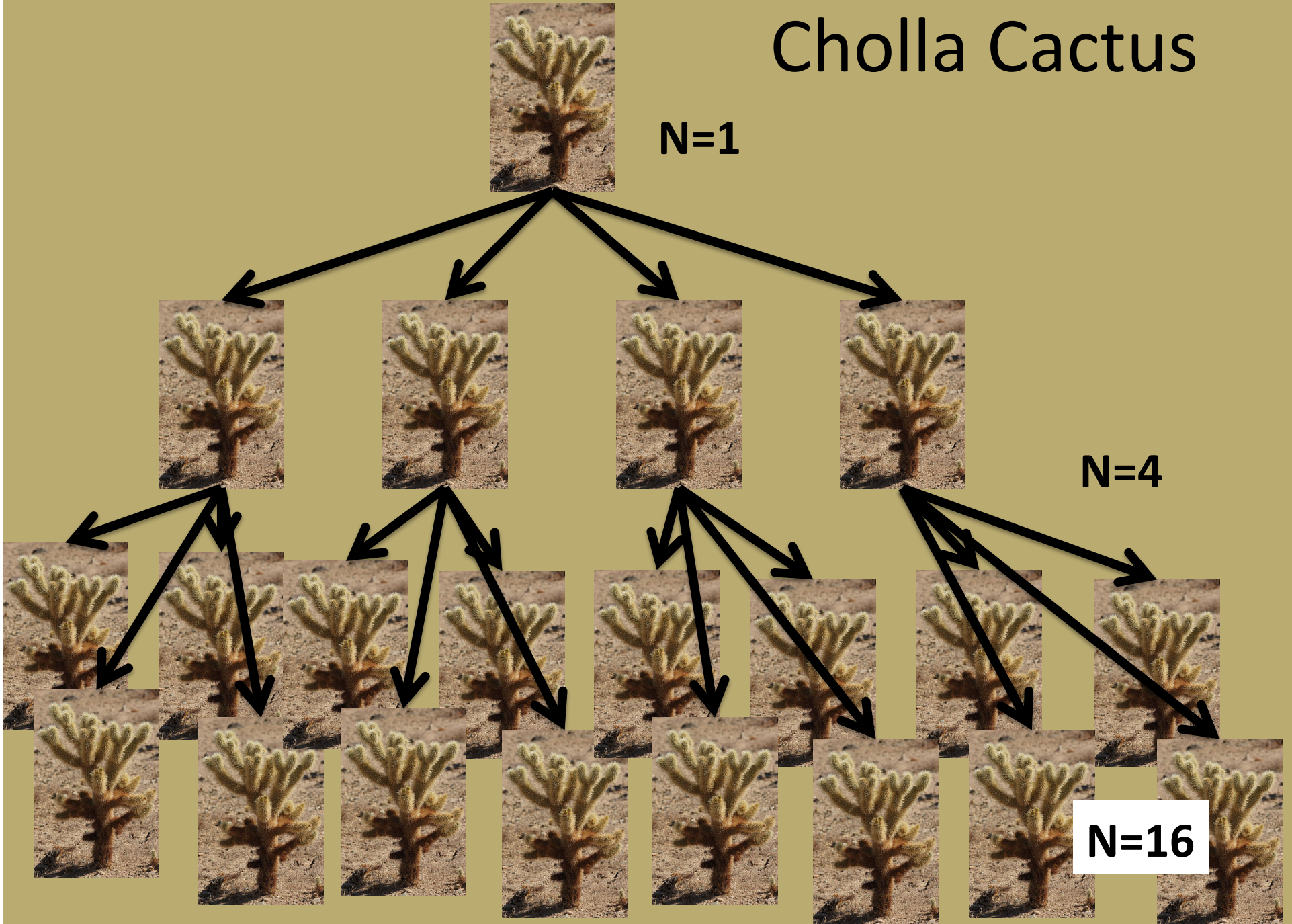
Photos by: Matthew Field, www.wikipedia.com
and Tom Brennan, www.reptilezofaz.com

Cholla Cactus

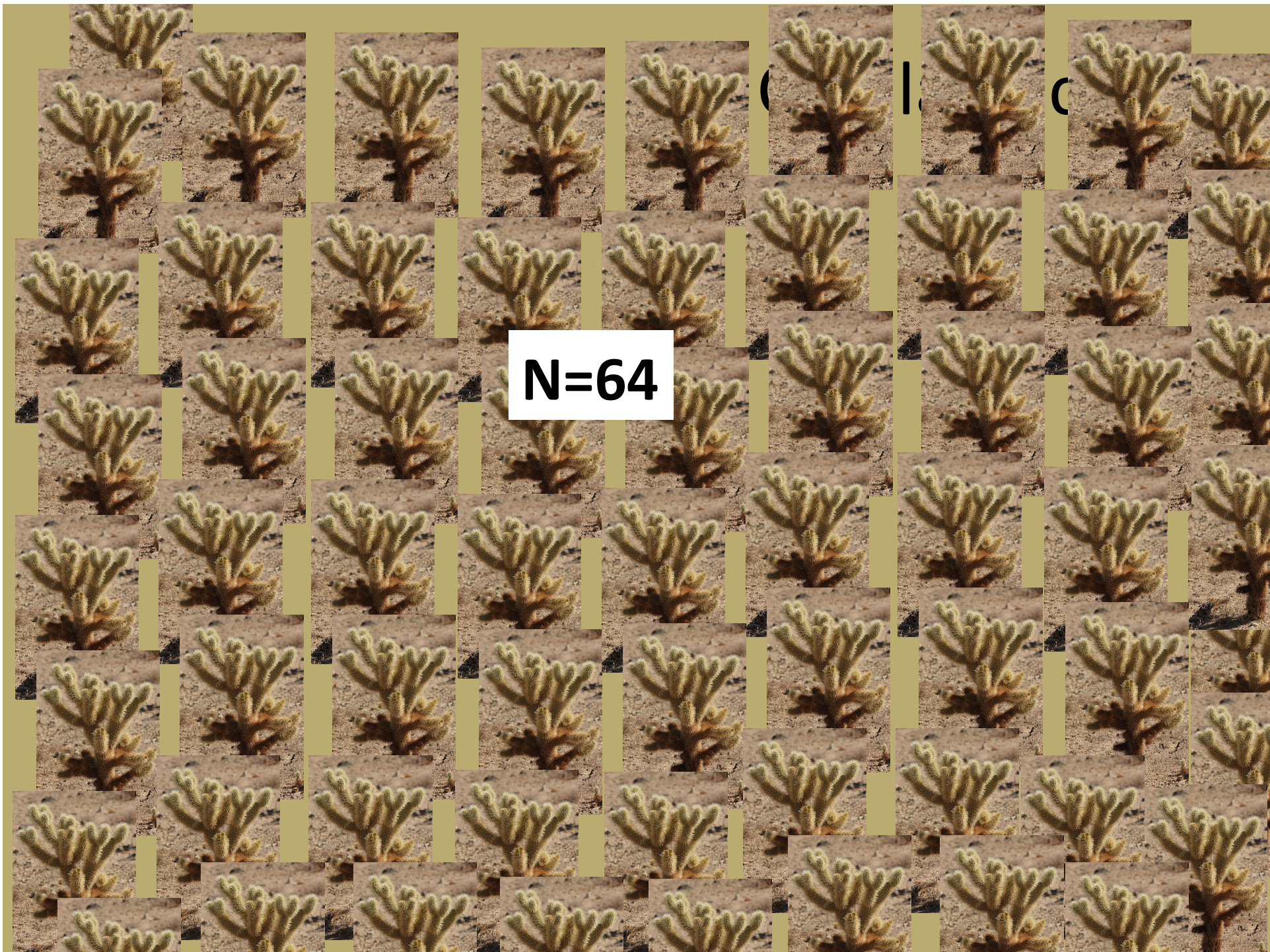
N=1

N=4

N=16



N=64



Number of cactus



<u>Year</u>	<u># of Cactus</u>
0	1
1	4
2	16
3	64
4	?
5	?
6	?
7	?
8	?

Is there a way to calculate this without drawing trees?

Can you figure out the number of trees on year 8, without calculating all of the other years?

Cholla populations



- In year 8, there will be...
65,536 cholla!
- Does this seem realistic? Why or why not?
- Carrying Capacity- The maximum number of plants or animals that can live in a place.

Lizards



Western Banded Gecko (*Coleonyx variegatus*)

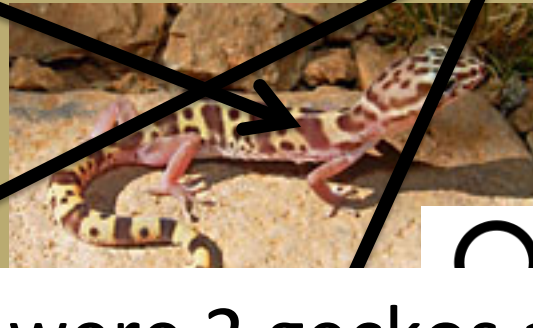
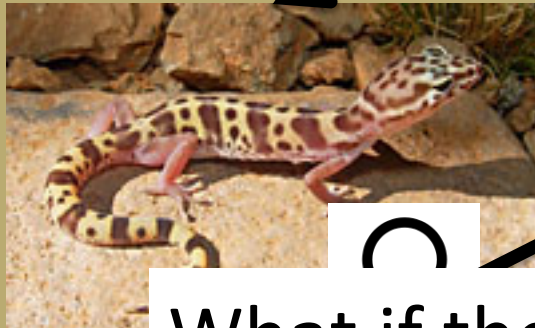
3 female offspring per year



How many geckos will there be in 5 years?

$$3^5 = 243$$

Lizards



What if there were 2 geckos at the start?



3 female offspring per year

Western Banded Gecko (*Coleonyx variegatus*)

Growth Rate Equation

$$N = S * \lambda^t$$

New population

Starting population

Growth rate

Time



Growth Rate Equation

$$N = S * \lambda^t$$

New population

Starting population

Growth rate

Time

$$N = (2) * 3^5$$

$$N = 486 \text{ geckos}$$





Growth Rate Equation



$$N = S * \lambda^t$$

New population

Starting population

Growth rate

Time

Two important points:

- 1) λ does not need to be a whole number.
- 2) $\lambda > 1$ means the population is increasing, and $\lambda < 1$ means the population is decreasing.



Growth Rate Equation



$$N = S * \lambda^t$$

New population

Starting population

Growth rate

Time

Example:

What if there were 500 geckos, and each year there were only 95% as many geckos as before. How many would there be in 8 years?

Answer: $500 * (0.95)^8 = \text{About } 332$