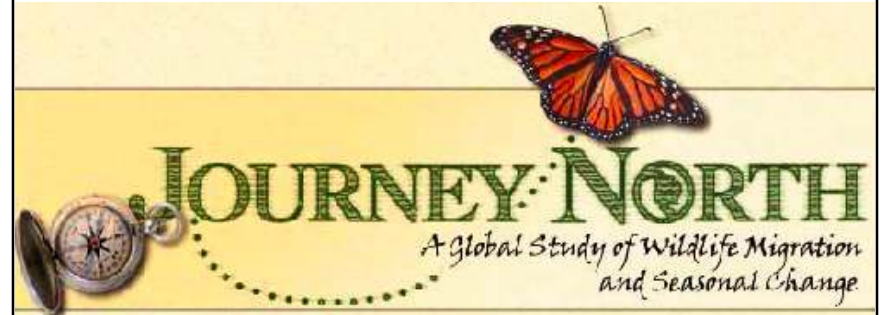




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Layout by Margaret Black



Why Don't We Have a Billion Butterflies?



by Elizabeth Howard

A single monarch butterfly can lay hundreds of eggs. For example, in Dr. Edson's lab one monarch laid 326 eggs in 2007 and another monarch laid 758 eggs in 2006. That was a record!

What would happen if every egg survived? Let's see how many monarch generations it would take to reach a billion butterflies.



To start, you need to know that a "generation" is one complete life cycle. A monarch can complete its life cycle in only one month. That's how long it takes for an egg to become an adult butterfly. A monarch butterfly generation is very short!

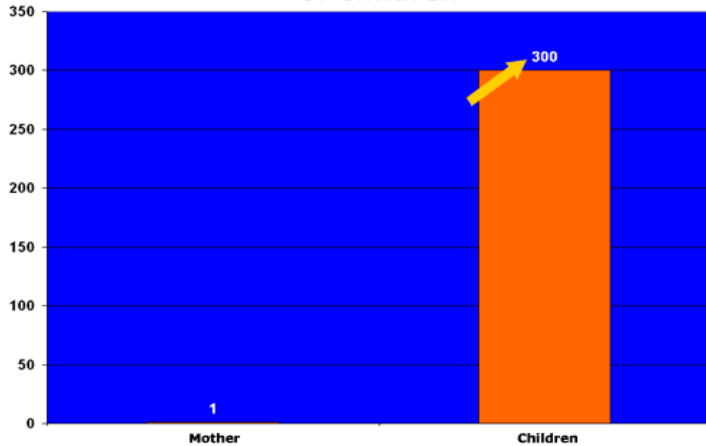
Let's count monarch generations and see how long it takes to reach a billion butterflies. To start, we'll assume that one mother butterfly lays 300 eggs. If they all survive how many **children** would the mother have?



There are four human generations in this picture. Can you find the child, parent, grandparent and great-grandparent? If each person became a parent at age 25, each human generation would be 25 years.

If every female monarch laid 300 eggs and all survived, the original mother monarch would have...

Hundreds of Children



If one butterfly lays 300 eggs and they all survive, she would have 300 children! Here is the math:

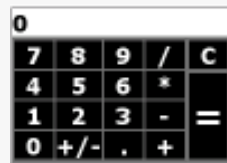
1 female x 300 eggs = 300 children

Now let's find out how many **grandchildren** the original mother would have. Half of the 300 children would be females. This means that 150 females would lay 300 eggs each.

How many grandchildren would there be in the 2nd generation?

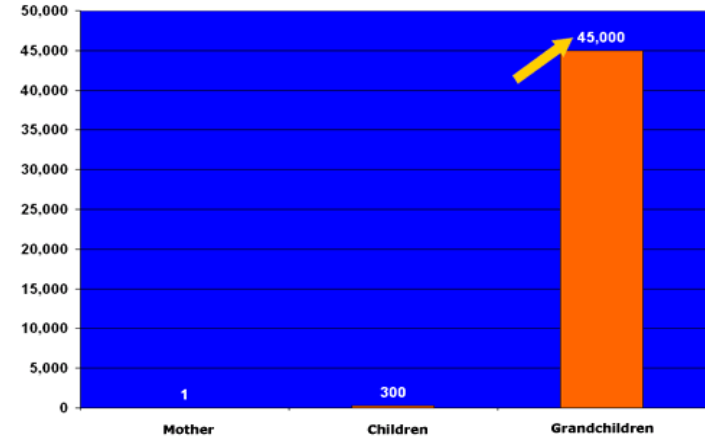
- **Try the math yourself!**

Then read on...



If every female monarch laid 300 eggs and all survived, the original mother monarch would have...

Thousands of Grandchildren



The mother would have 45,000 grandchildren! Here is the math:

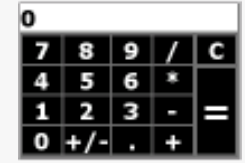
150 females x 300 eggs = 45,000 grandchildren

Next let's find out how many *great-grandchildren* the original mother monarch would have. Half of her 45,000 grandchildren would be females. This means 22,500 females would lay 300 eggs each.

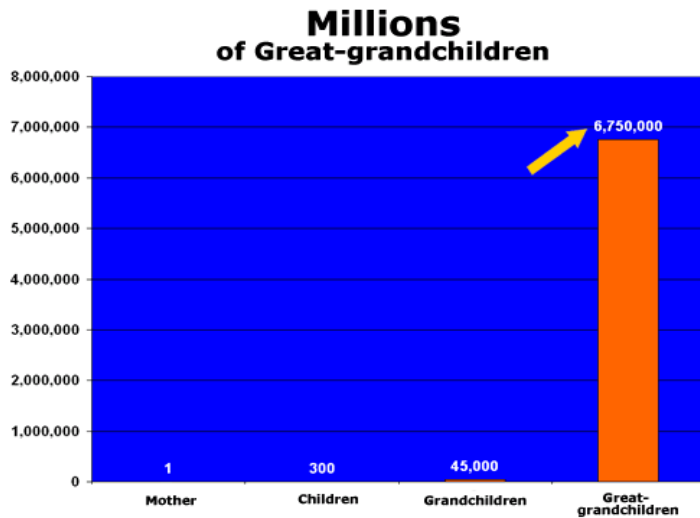
How many *great-grandchildren* would there be in the 3rd generation?

- **Try the math yourself!**

Then read on...



If every female monarch laid 300 eggs and all survived, the original mother monarch would have...



The mother would have 6,750,000 great-grandchildren! Here is the math:

$$22,500 \text{ females} \times 300 \text{ eggs} = 6,750,000 \text{ great-grandchildren}$$

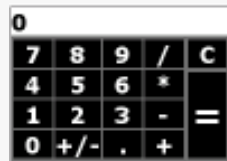
How many more generations do you think it will take to reach a billion butterflies?

Let's find out how many *great-great-grandchildren* the original mother monarch would have. Half of her 6,750,000 great-grandchildren would be females. Each female would lay 300 eggs each.

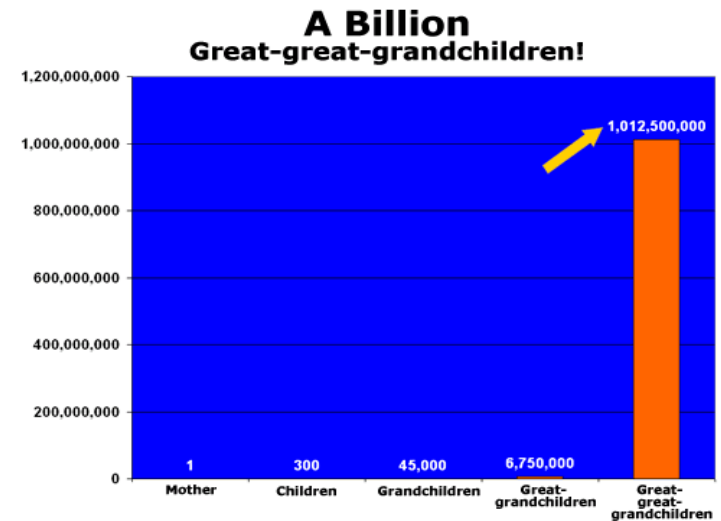
How many *great-great-grandchildren* would there be in the 4th generation?

- **Try the math yourself!**

Then read on...



If every female monarch laid 300 eggs and all survived, the original mother monarch would have...



The mother would have 1,012,500,000 great-great-grandchildren! Here is the math:

$$3,375,000 \text{ females} \times 300 \text{ eggs} = 1,012,500,000 \text{ great-great-grandchildren}$$

It took only 4 generations to reach a billion butterflies! You may like monarchs, but the world would be *swarming* with monarchs if all of their eggs survived. You might have to drag them off this page so you could finish reading!

Factors that keep the monarch population from growing so fast are called "limiting factors." How many limiting factors can you imagine? Make your own list and then read on.

Monarch numbers can rise and fall for countless reasons. Here are a few examples:

- Temperatures can be too hot or too cold;
- The weather can be too wet or too dry;
- Milkweed can be scarce or abundant;
- Predators can be many or few;
- Diseases can be deadly or mild.



The Tachinid fly is a major monarch parasite. Notice the fly larva coming out of this chrysalis. The adult fly lays eggs on the monarch larva and the fly develops inside.

Without doubt, the most dangerous time to be a monarch is when it is young. According to a study by Dr. Karen Oberhauser, 90% of the eggs monarchs lay never make it to the chrysalis stage.

Try This!

You can help scientists learn more about monarch populations. Volunteers are needed to observe monarchs for these projects:

- Monarch Larvae Monitoring Project
<http://www.mlmp.org>
- MonarchHealth
<http://www.monarchparasites.org>

