THE ORIGIN OF BELL PEPPERS

The small, hot peppers that Columbus took to Europe probably looked something like this:
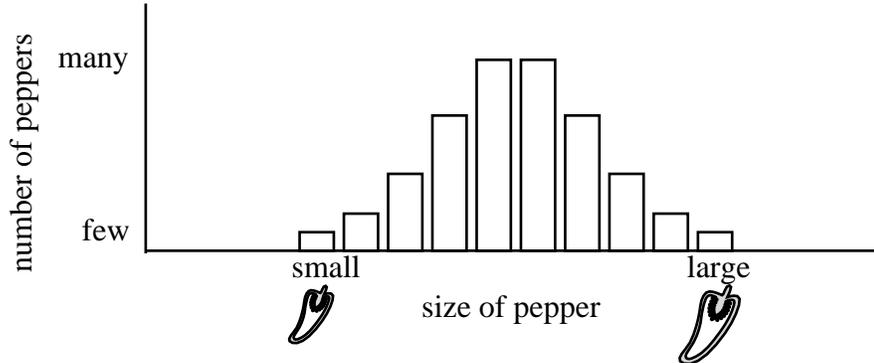
The large sweet bell peppers we have now look something like this:
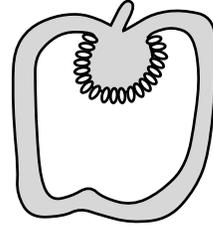
Our bell peppers are bigger, differently shaped, and have thicker flesh than Columbus' original peppers. How did this come about?

Columbus' peppers were genetically diverse. Some were larger, some were smaller. There was a distribution of sizes--if you weighed and counted 100 of them, you'd see this:

From Columbus' peppers, Europeans chose only the very largest peppers to supply the seeds for the next season's crop. This should eliminate the small peppers, and leave just the largest ones. If you weighed and counted up 100 of the peppers you have after several seasons, what would you find? Draw in the distribution you expect if you eliminate the small peppers:
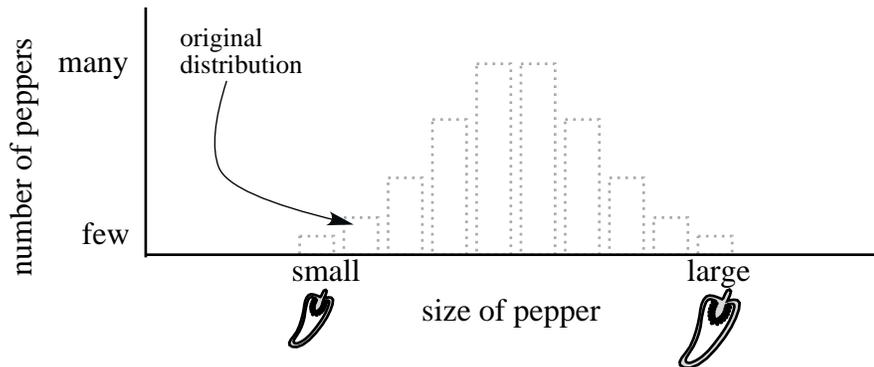
How do these peppers compare to the original ones that Columbus brought back?

BUT these peppers are merely *a subset of Columbus' peppers*. They are as large as the largest were originally—but it's hard to see how they could they be *bigger*, if they simply carry the genes of Columbus' original peppers. SO...
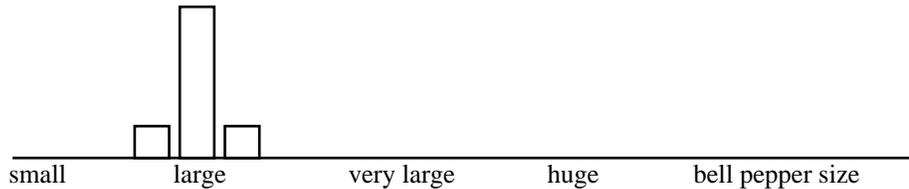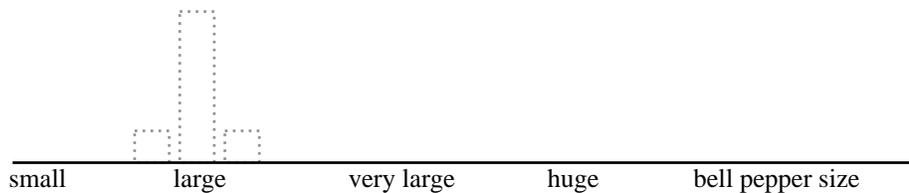
HOW DO WE GET FROM HERE TO BELL PEPPERS?

MUTATIONS HAPPEN

Genes mutate. This is true for genes that determine size and shape, just as it is true for every other gene. Mutations in the "pepper size and shape" genes can lead to smaller peppers or larger peppers.
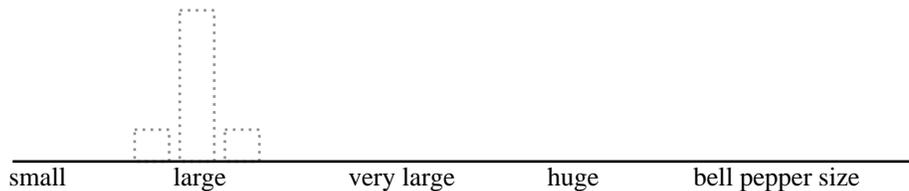
Here is our distribution of peppers, after selecting the largest ones (from the front sheet)

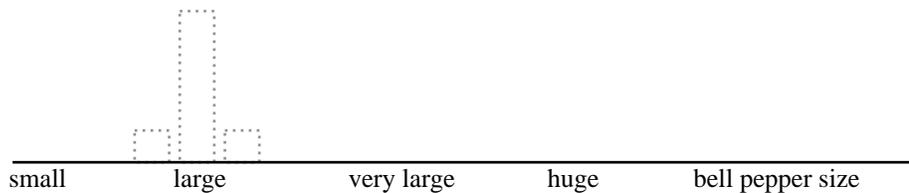| small | large | very large | huge | bell pepper size |

What will you see after many decades—many generations of pepper plants—and the accumulation of mutations that lead to slightly smaller and slightly larger peppers?
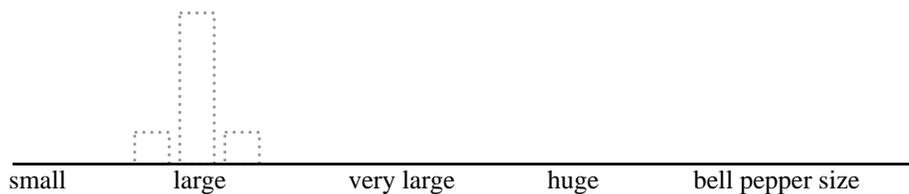
| small | large | very large | huge | bell pepper size |

...and what will you see if you select only the very largest of these?

| small | large | very large | huge | bell pepper size |

...and after many generations of pepper plants, with the occurrence of mutations?

| small | large | very large | huge | bell pepper size |

...and after selection of the largest of these?

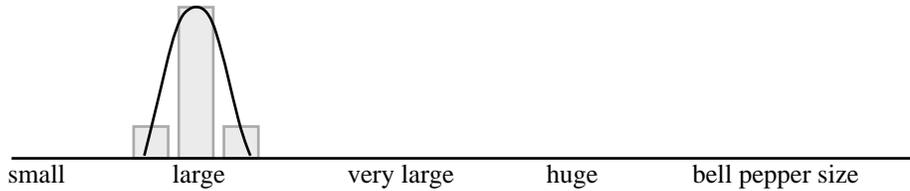| small | large | very large | huge | bell pepper size |

An increase in size of only 2% per decade (barely detectable) can lead to how much total change over 500 years? 50 decades, 2% per decade = 264% of original size.

Economics majors will note that this is the same calculation as you would use to determine how much money you would have in the bank after 50 years if your account has 2% interest compounded annually. 5% interest would be better, since it would give 1092%, but we're working with peppers which are a slower investment...
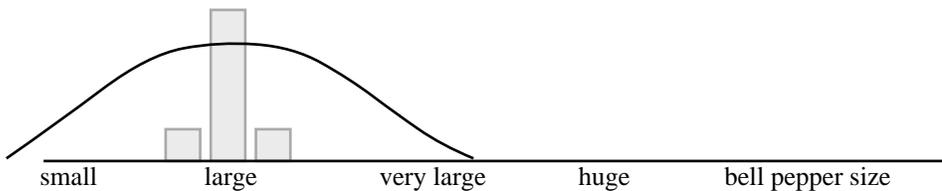
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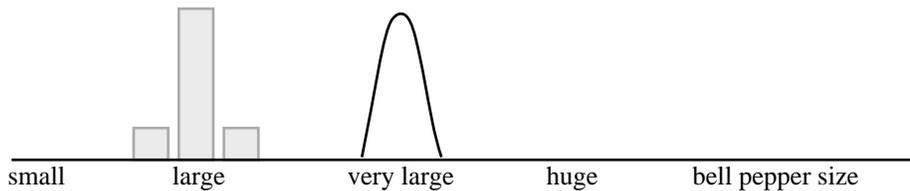
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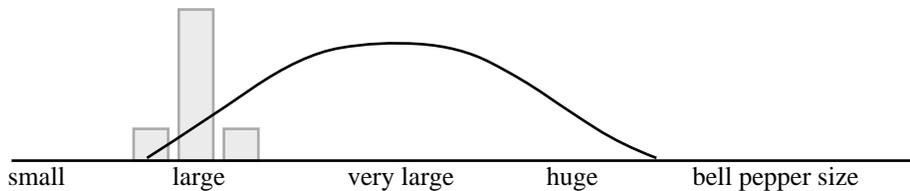| small | large | very large | huge | bell pepper size |

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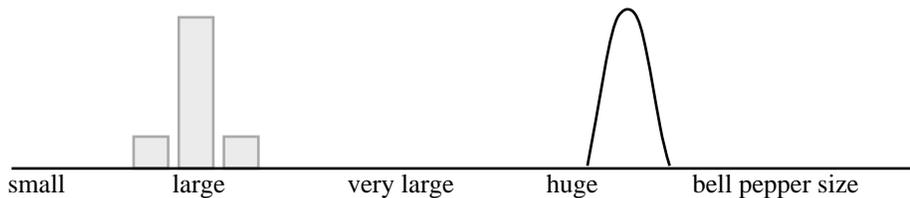

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...and after many generations of pepper plants, with the occurrence of mutations?

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...and after selection of the largest of these?

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