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CHAPTER 6

Genetic Changes

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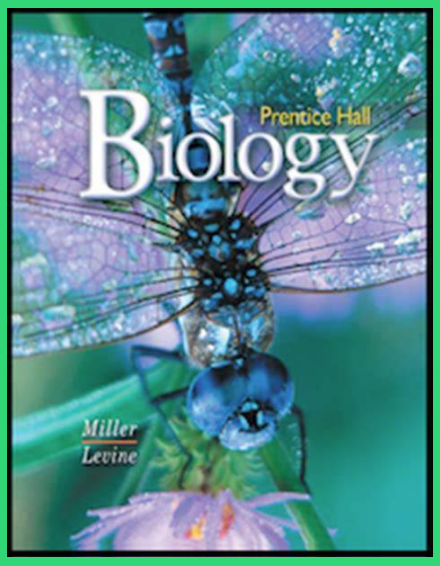
What Does the Textbook Teach?



The textbook will teach that small changes over long periods of time is what it takes to change from one type of organism to another. The textbook will define this as evolution. (Section 1, Section 2, and Section 4)

It will teach you that two major pieces of evidences for evolution are microbes gaining immunity to disease and mutations in humans. (Section 3 & Section 5)

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Section 1
DARWIN'S FINCHES:

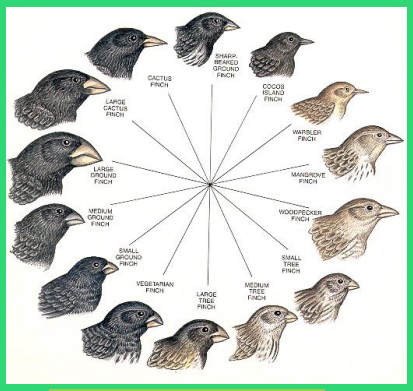

Fig. 6.1.1 Variations of finches

When Charles Darwin* went to the Galapagos Islands, he found a number of species of finches (Figure 6.1.1). He noticed that each of their beaks were slightly different depending on their diet.

Fig. 6.1.2 A human and a pine tree

Because of this, Darwin concluded that humans and pine trees shared a common ancestor. In his book, *Origin of Species*, he describes the similarities amongst different birds as proof that all living organisms on the face of the Earth share a single common ancestor (Figure 6.1.2).

Recall from Chapter 3 that Darwin* also insisted that all life evolved from non-living materials.

*Review Chapter 1 for more information on Darwin's qualifications and research. To remain consistent with current textbook teachings, we will treat Darwin's research as a scientific analysis.

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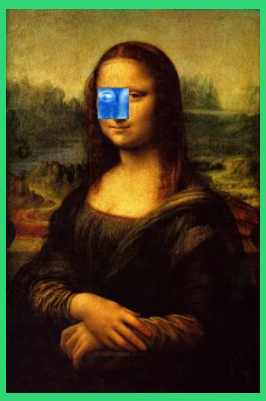
Section 6.2

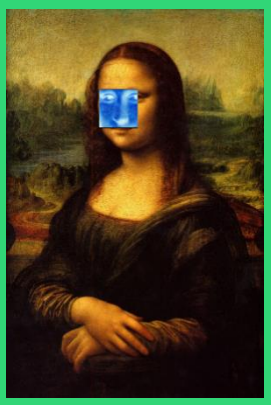
GENETIC VARIABILITY:

Scientists once believed that 1% of our DNA was different from apes. However, scientists now believe the difference may be as much as 5%. A variation of 1.6% of the genetic code is 48,000,000 (48 million) nucleotides. This is more than enough to be fatal. Since even 1.6% is enough to be deadly, a difference of 5% is inconceivable (Figure 6.2.1).

The original Mona Lisa



Mona Lisa with 1% variation.



Mona Lisa with 1.6% variation.

Mona Lisa with 5% variation.

Fig. 6.2.1 The Mona Lisa with slight variations.

Although we do share many traits with apes and other simians, we also possess a different number of chromosomes.

Humans have 23 pairs of chromosomes and apes have 24 pairs. That may not seem like much until you realize exactly how much information is stored in just one chromosome. The average human chromosome has about 20-25,000 genes. This means that there are at least 40,000 genes that just appeared and switched themselves across different chromosomes between different species of simians.

To further complicate things, the analogous traits of humans are rarely found on the same chromosome as they are in other simians.

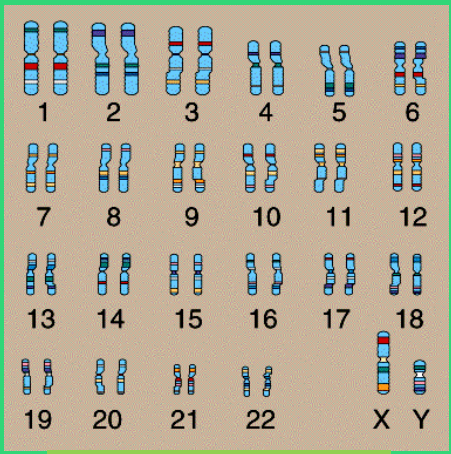


Fig. 6.2.2 The 23 pairs of human chromosomes.

If we were to compare the DNA code to the text of a book, each pair of chromosomes would be a different chapter. Thus, we would have 23 chapters (Figure 6.2.2) and the apes would have 24 chapters.

In this analogy, the genetic code that makes up the organism would be the sentences found in each chapter.

We should look for similar sentences in both the human book and the ape book. However, the sentences that are found together in the human book are found in different chapters in the ape book.

This would mean that over 900,000 genes would have had to switch back and forth across many chromosomes when the transition was made from apes to humans.

We actually see the same pattern when we look at virtually any other species. For example, fruit flies have eight pairs of chromosomes and house flies have twelve. If we assume an average of 10,000 genes per fly chromosome, the house fly has about 80,000 more genes than the fruit fly. That large number of genes and switching across chromosomes would be fatal to the fly or any organism.

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Section 3

ANTIBIOTIC RESISTANCE:

The textbook will say that one of the best pieces of evidence for evolution is immunity to drugs in bacterial populations. If you do not use the drug until all the bacteria are dead, those that are still alive will gain immunity to the drug (Figure 6.3.1).

Fig. 6.3.1 Bacteria "gaining" immunity

In order to become immune to anything, a bacteria loses the portion of the genetic code that the anti-biotic effects. This means that it loses some part of what makes it work (Figure 6.3.2).

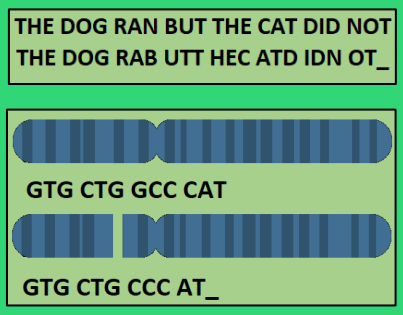

Fig. 6.3.2 Deleted segments of a gene.

Therefore, the bacteria are not actually gaining any information, but are actually losing information.

Losing information is the very opposite of what is needed for evolution because this requires an increase in genetic information, which is not observed. Evolution requires new DNA, but with microbial immunity, all we see is a decrease in genetic diversity.

Another method of developing resistance is gene shuffling between bacteria. Bacteria can trade genes between one another. However, this is still just a variation within what was already present.

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Section 4

VARIATIONS AND HYBRIDS:

Fig. 6.4.1 A polar bear and a grizzly bear.

There are Asiatic Bears Grizzly Bears, Brown Bears, Black Bears, Polar Bears, Panda Bears, Sloth Bears, and Sun Bears (Figure 6.4.1). All of them are just a reshuffling of already present DNA.

Pizzly Bears and Grolar Bears are the offspring of Grizzly Bears and Polar Bears (Figure 6.4.2). That is because both are variations of a bear.

Fig. 6.4.2 A Grolar Bear

There are all sorts of dogs in the world. We have big dogs and little dogs, but they are all dogs. There are animals as big as elephants and as small as fleas, but there are still limits as to how far a species can diversify.

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Section 5
VARIATIONS IN HUMANS:

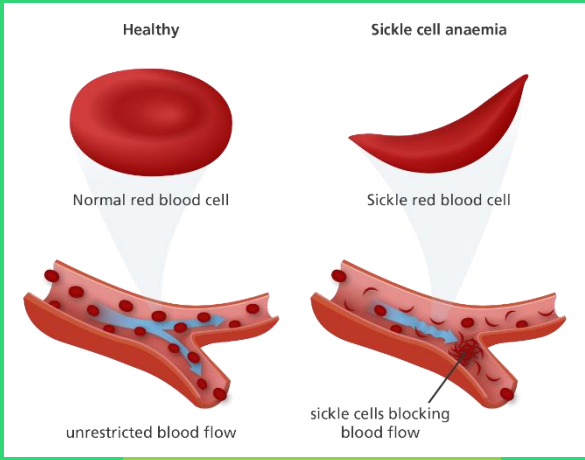

Fig. 6.5.1 Sickle Cell Anemia and its effects.

Scientists will posit that one of the most common examples of evolution in humans is Sickle Cell Anemia (Figure 6.5.1). This mutation is caused by a single letter of variation in the DNA. This causes the red blood cells to take on a new appearance that keeps them from carrying oxygen as efficiently (Figure 6.5.2). The textbook will say that this is an adaption in order to help those in mosquito-infested areas of Africa.

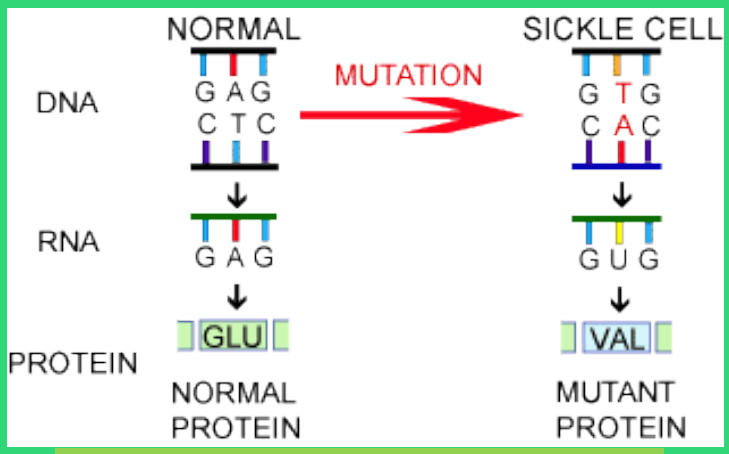

Fig. 6.5.2 The mutation of Sickle Cell Anemia.

This is far from evolution since this is nothing more than a variation of already existing DNA.

To take this train of thought to its only logical conclusion: If you cut off your foot, you would never get athlete's foot. Therefore, a person was born without feet would have an evolutionary advantage.

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IN CONCLUSION:

Darwin concluded that humans and pine trees were related because there were birds with slightly different beaks. (Section 1)

We do not see new information appearing on the DNA code. If we compare where the information is on the analogous chromosomes, it is illogical to assume common ancestry. (Section 2)

There are limits to how far genetic variation can go. These limits keep all creatures from having a single common ancestor. (Section 3 & Section 4)

All that has ever been observed is a variation of already existing genetic material. Sometimes the genes are varied or deleted, but this is not the formation of new genes. (Section 4 & Section 5)

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Questions for Further Discussion:

1. **Why would Darwin conclude that humans and pine trees are related? (Section 1)**
2. **Why would scientists say that species that are directly related to one another when they have different chromosome counts and thus a large variation in genetic diversity? (Section 2)**
3. **Why would scientists say that these mutations (such Sickle Cell Anemia and antibiotic resistance) are evidence for evolution, when it is simply an example of deleted or reshuffled information? (Section 3 & Section 5)**
4. **Is it really evolution if you are just losing that which makes you vulnerable to disease? (Section 3 & Section 4)**
5. **If just one amino acid in the code for a red blood cell can create Sickle Cell Anemia, how much more chaos would be caused by changing hundreds of genes simultaneously? (Section 5)**
6. **Is there another hypothesis that will explain these phenomena?**