



Directions:

print, complete, staple together & submit pages: 1,3,4,5,6,9,10,11

Spit for Silk

Preview

Activate Schema. Scan to see what you know about silk and silk worms.

Establish a Purpose for Reading. What do you need to learn?

Vocabulary: complete page 5 before reading the selection.

Read & Integrate Knowledge

Predict Picture Relate Monitor Fix

Silk scarves, silk dresses, silk ties all sell like hot cakes around the world. Silk has been a highly desired commodity since ancient times, traced back to 3500 B.C. in China. Due to its popularity in luxury clothing items, silk soon spread to all parts of Asia, and eventually, the world. You wouldn't think such a valued material originally comes from small, white worms.

The *Bombyx mori*, or mulberry silkworm, is famous for producing the treasured textile. Northern Thailand is known for its numerous silkworm farms where locals collect the silk from thousands of worms to weave into beautiful fabrics to sell all over the world. The entire process can be very tedious, but the selling price of silk can be very high, so the processing of silk is deemed worth the time.

As soon as silkworms hatch from their tiny eggs, they begin to rapidly feed on mulberry leaves to gain weight. Silkworms must multiply their size by 10,000 times in order to become silk-producing larvae. That means that if they were human, they would weigh 70,000 pounds each by the time they were a month old. After 40 full days and nights of eating these fresh, hand-picked leaves, they are ready to begin weaving a cocoon around themselves to mature into moths. In fact, each silk cocoon is made out of one long string of worm spit, spanning the length of almost half a mile, or nearly a kilometer. The worms need three to four days to fully finish forming the cocoon. Once this process is complete, the cocoons are collected and boiled for about five minutes in water—and yes, the worm is still inside the cocoon, which several animal activists disapprove of since the boiling kills the insect. After soaking, manufacturers

find strands with a small needle and spin several together to produce one thread of silk. Clearly, it's a very lengthy and tedious process.

Researchers have made attempts to extract silk strands from living silk worms in order to quell activists' complaints, but the worms resist and grip the strands even harder, causing them to break. Researchers have found that when a silkworm is injured, it enters a state of self-imposed paralysis, since the act of moving would make the injury worsen. At Oxford University in England, they have found the exact chemical that induces this paralysis in order to inject it into the worms to temporarily restrict the worms' movement. However, the paralysis does not mean that the insects are unconscious—scientists believe the worms are semi-conscious in this state, meaning they may be aware of their involuntary paralysis. Therefore, the two options for silk production are to boil the worms alive or temporarily paralyze them while producers extract the strands of their cocoon.

Despite the slight controversy over silk extraction, the silk industry continues to thrive. China produces 58,000 tons of silk each year. Yet one of the most popular silk companies in the world is Jim Thompson, a brand based in Thailand. Thompson, a Delaware native, trained to be an architect in the mid-1920s, but joined the United States army in the early 1940s in response to the rise of World War II. He was soon appointed to the Office of Strategic Services (which eventually became the CIA) and traveled around the world, including Thailand, where he fell in love with the people and their country. There were few hotels that accommodated international travelers in the capital of Bangkok, and Thompson thought that with the rise of leisure travel, the Far East would make an appealing destination for Westerners. Upon his discharge from the military in 1946, he returned to Thailand to start his own silk business.

At the time, silk was mainly being produced in the northeast of Thailand, but due to the tediousness of the collection process, silk production was on the decline. Thompson was determined to revive the business, so in 1947, he took a variety of silk threads back to New York City to see if the product would be marketable to foreign consumers. He received a positive response, so the Jim Thompson Silk Company was founded in 1948.

Jim Thompson is credited for reviving the silk industry. After the establishment of his company, silk costumes soon appeared in Broadway plays and popular films such as *Ben Hur*, and Thai royalty, such as Her Majesty Queen Sirikit, began wearing silk often. Many also attribute his work to greatly improving the Thai economy, since the silk industry continues to employ thousands of Thai citizens even today.

Jim Thompson's success is no mystery. However, his disappearance on March 26, 1967 certainly is one. Thompson made a trip to Malaysia to visit friends and one day, ventured into the jungle on an afternoon stroll. He was never seen again despite search parties sent out by the Royal Army Air Corps and British troops. Many have their own theories on his disappearance, but none have been completely confirmed.

Recall

Comprehension Questions

(circle the best answer)

1. What material does the mulberry silkworm produce?
 - A cotton
 - B satin
 - C silk
 - D velvet

2. In the process of silk production, what happens after the silkworm finishes its cocoon?
 - A The cocoon is collected and boiled.
 - B The silkworm multiplies its size by 10,000.
 - C The silkworm becomes a silk-producing larva.
 - D The silkworm eats leaves for 40 days.

3. The process of extracting silk from silkworm cocoons has caused controversy. What evidence from the passage best supports this conclusion?
 - A Researchers have attempted to extract silk from living silkworms, but this has been less successful.
 - B Researchers have found that when a silkworm is injured, it enters a state of self-imposed paralysis.
 - C The two options for silk extraction are to boil the worms alive or temporarily paralyze them.
 - D Animal activists disapprove of the boiling method of extraction, because it kills the silkworm.

4. What conclusion can you make about silk since the Jim Thompson Silk Company's establishment?
 - A Silk has only been worn by royalty.
 - B Silk has become harder to get.
 - C Silk has become a more popular fabric.
 - D Silk has become more expensive.

5. What is this passage mostly about?
 - A silk production and the revival of the silk industry
 - B how the silk industry improved the Thai economy
 - C the mysterious disappearance of Jim Thompson
 - D the argument of animal activists against silk production

6. Read the following sentences: "After soaking, manufacturers find strands with a small needle and weave several together to produce one thread of silk. Clearly, it's a very lengthy and tedious process. Researchers have made attempts to **extract** silk strands from living silk worms in order to quell activists' complaints, but the worms resist and grip the strands even harder, causing them to break."

As used in this sentence, what does the word "**extract**" most nearly mean?

- A put something into a container
- B break or destroy something
- C pull out or remove something
- D soak something in water

7. Choose the answer that best completes the sentence below.

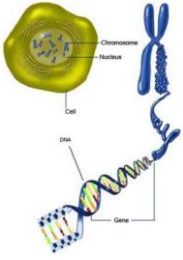
_____ a silkworm can begin to produce silk, it must eat leaves for 40 days to increase its body weight.

- A Otherwise
- B Before
- C Namely
- D Thus

8. Why was silk production in Thailand on the decline after World War II?

9. Explain how a thread of silk is made from silkworm spit

10. Based on the passage, why might silk be considered such a desirable and valuable commodity? Support your answer using information from the passage.



Variation of Traits

Preview

Activate Schema. Scan to see what you know about human traits, family resemblances, heredity, and what makes all humans different.

Establish a Purpose for Reading. What do you need to learn?

Vocabulary: complete page 11 before reading the selection.

Read & Integrate Knowledge

Predict Picture Relate Monitor Fix

When two organisms create a third organism through reproduction, a number of variables come into play. It's a sort of complex lottery in which the third organism—the offspring of the first two—inherits a combination of the parent organisms' genetic material. The possible variations inherent in recombining the parents' DNA are very, very broad and infinitely larger than the pool of entries in the state lotto jackpot! That's why we get so much variation even within the population of a particular sexually reproducing species.

Each new organism receives two of each chromosome, and within those chromosomes, two versions of each parents' set of genes. These genes contain instructions for protein production within the body of the offspring, and the way those proteins are prescribed determines the traits of the offspring. So, although your unique collection of traits, the combination of characteristics, physical and otherwise, that make you uniquely yourself are originally the product of chance, there are machinations going on behind the scenes to which every freckle, hair and character trait can be traced.

Personality traits are another story altogether. When we think about how our personalities are formed, we can certainly think about genes we acquired from our parents—but we also have to think about other complexly intertwined factors like environment and upbringing. For now, we'll simplify things by just focusing on the physical aspect of inherited traits. For example, if both parents exhibit the trait of red hair, their offspring have a greater chance of acquiring the genes that code for red hair. Certain traits are characteristically dominant or recessive, depending on the makeup of their alleles. This can make predicting traits tricky, but it is still very possible to estimate the likelihood, even the mathematic probability, that certain traits will manifest in the offspring of partners who exhibit those traits.

Red hair happens to be a kind of gene called incomplete dominant, which means it will blend with other genes, rather than dominate or be dominated. Since this is the case, the likeliest candidate to be coded for red hair is offspring with two red-headed parents.

It would be very, very unlikely for two parents with identically coded chromosomes to sexually reproduce. Even in the case of intrafamilial (or consanguine) pairings, which are discouraged in our society, the chromosome pairings would never be perfectly identical—that's a good thing for us as a civilization! As you will see, the absolute worst thing for our survival is for like to be paired with likes. It's in the best interests of our population that lots of different genes get mixed together in an evolutionary soup, so that many new variations on living organisms can be exposed to the environment, develop new adaptations to changing conditions, and promote the survival of the species.

Another variable that lets organism populations adapt to changing environments is mutation in genes. Sometimes, unpredictable changes in genetic code will appear within a new generation, not traceable back to a parental source.

Creators of superheroes like the X-Men and Teenage Mutant Ninja Turtles have used the idea of extreme mutation as a narrative device to invent colorful characters, bizarre scenarios, and literary metaphors. Mutant and mutation have exciting, exotic connotations to us, but actually, mutation is simply a necessary part of a species' evolution. Mutation can be something as mundane as two parents with brown eyes giving birth to a child with hazel eyes; or a type of moth whose wings are a different color from all the other moths in that species. Mutations are where new adaptations to existing or dynamic conditions are field tested in competition to whatever has worked for a population in the past. If a mutation pops up that happens to be advantageous for a particular organism within a population, that organism is more likely to survive, and therefore, more likely to procreate. Eventually, that chance mutation is reflected

more widely in the community, and is passed on further to later generations. Once new challenges appear in the environment, new adaptations are likely to crop up for a fortunate few.

This is not to say that mutations are always helpful. Sometimes they are simply inconvenient, odd or unsupportable. They can even be indicative of a disruption in the environment.

Human interference in genetic coding is a pretty common practice these days. By deliberately engineering mutations in plants, most often food crops, humans can create larger, more resilient food sources. Since these “superfoods” are synthetically equipped with attributes that make them disproportionately competitive in the ecosystem they share with naturally grown food crops, they pose a threat to those populations. This is a controversial practice many food activists are working to curb.

Whether the mutation occurs naturally or is forced upon a population by biogenetic scientists, mutations are essential to the system by which ecosystems change and grow.

Recall**Comprehension Questions**

(circle the best answer)

1. What determines the traits of offspring?
 - A food sources that have been genetically engineered
 - B literary metaphors and exciting connotations
 - C the pool of entries in the state lotto jackpot
 - D genes received from the offspring's parents

2. Mutation in the genes of an organism is a cause. What is a possible effect?
 - A The organism is less likely to be studied by scientists.
 - B The organism is more likely to find a sexual partner identical to it.
 - C The organism is more likely to resemble its parents.
 - D The organism is more likely to survive and procreate.

3. Reproduction is "a sort of complex lottery in which the third organism—the offspring of the first two—inherits a combination of the parent organisms' genetic material."

What evidence from the passage supports this statement?

- A "The likeliest candidate to be coded for red hair is offspring with two red-headed parents."
- B "It would be very, very unlikely for two parents with identically coded chromosomes to sexually reproduce."
- C "*Mutant* and *mutation* have exciting, exotic connotations to us, but actually, mutation is simply a necessary part of a species' evolution."
- D "Human interference in genetic coding is a pretty common practice these days."

4. What is a difference between physical traits and personality traits?
 - A Physical traits are mainly determined by a person's environment; personality traits are determined by both a person's genes and environment.
 - B Physical traits are mainly determined by a person's genes; personality traits are determined by both a person's genes and environment.
 - C Physical traits are mainly determined by a person's genes and environment; personality traits not determined by either a person's genes or environment.
 - D Physical traits are mainly determined by a person's genes; personality traits are determined by genetically engineered food that a person eats.

5. What is this passage mostly about?

- A genes
- B ecosystems
- C the lottery
- D personality traits

6. Read these sentences: "Red hair happens to be a kind of gene called incomplete dominant, which means it will blend with other genes, rather than **dominate** or be dominated. Since this is the case, the likeliest candidate to be coded for red hair is offspring with two red-headed parents."

What does the word "**dominate**" mean?

- A protect or defend something from attack
- B consume or eat a large amount
- C overpower or be in control
- D give up or be in the control of another

7. Choose the answer that best completes the sentence below.

A mutation may be passed down from one generation to the next, _____ when the mutation is advantageous.

- A before
- B never
- C particularly
- D on the contrary

8. Define "mutation."

9. What can people create by engineering mutations in food crops?

10. Why might genetically engineered "superfoods" be a threat to naturally grown food? Support your answer with information from the passage.
