Passage 24

Pre-reading

Answer the following questions.

1. What do you mean by "emotion"?

_____

2. How much do you know about emotion theory?

_____

3. How are physical and emotional changes associated?

_____

4. Skim the passage and list theories of emotion.

_____

_____

5. List names of researchers mentioned in the passage.

_____

PSYCHOLOGY: THEORIES OF EMOTION*

Why do we feel on top of the world one minute and down in the dumps the next? What causes emotional experiences?

In the 1880s, William James formulated the first modern theory of emotion, and at almost the same time a Danish psychologist, Carl Lange, reached the same conclusions. According to the **James-Lange theory**, stimuli cause physiological changes in our bodies, and emotions are the result of those physiological changes. If you come face-to-face with a grizzly bear, the perception of the stimulus (the bear) causes your muscles, skin, and viscera (internal organs) to undergo changes: faster heart rate, enlarged pupils, deeper or shallower breathing, flushed face, increased perspiration, butterflies in the stomach, and a gooseflesh sensation as the body's hairs stand on end. The emotion of fear is simply your awareness of these changes. All of this, of course, happens almost instantaneously and in a reflexive, automatic way.

If peripheral body changes alone *cause* specific emotions, then we should be able to pinpoint different body changes for each emotion. Perhaps butterflies in the stomach make us afraid and blushing causes shame or guilt. There is some evidence that the physiological changes associated with fear and anxiety are

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*Jeanne Shay Schumm and Shawn A. Post, *Executive Learning: Successful Strategies for College Reading and Studying* (New Jersey: Prentice Hall, Inc., 1997), pp. 180-185.

somewhat different from those associated with anger and aggressiveness (Funkenstein, King, & Drolette, 1953; McGreer & Mcgreer, 1980). But beyond this, psychologists have not found distinct bodily states that could cause all of our various emotions. Moreover, sensory information about bodily changes flows to the brain through the spinal cord. If bodily changes are the source of emotions, then people with severe spinal cord injuries should experience fewer and less intense emotions. However, this is not the case. Chwalisz and her colleagues at the University of Illinois studied the emotional experiences of 18 people with spinal cord injuries (Chwalisz, Diener, & Gallagher, 1988). They found that compared to other wheelchair-bound and nonhandicapped people, those with spinal cord injuries did not report less intense emotions generally; moreover, in a variety of specific hypothetical situations the subjects with injuries to their spinal cords reported that they would feel joy, love, sentimentality, anger, sadness, and fear just as intensely as people without spinal cord injuries. In fact, more than half of the people with spinal cord injuries reported an *increase* in the intensity of joy, love, sentimentality, fear, and sadness since the time of their injury! Thus, it appears that bodily changes not only do not cause specific emotions but also that they may not even be necessary for emotional experience.

How, then, can we explain the differences among emotions? Nearly 70 years ago, an alternative theory of emotions, the **Cannon-Bard theory**, proposed that emotions and bodily responses occur simultaneously, not one after the other. Thus, when you see the bear, you run and are afraid—with neither reaction preceding the other. This model makes an important point: What you see (or hear or otherwise perceive) plays an important role in determining the emotional experience that you have. Recently, cognitive psychologists have developed and

extended this idea by suggesting that our perception or judgment of situations (cognition) is absolutely essential to our emotional experience (Lazarus, 1982, 1991a, 1991b, 1991c). All emotional states consist of a diffuse and general arousal of the nervous system. According to the **cognitive theory of emotion**, the situation that we are in when we are aroused--the environment—gives us clues as to what we should call this general state of arousal. Thus, our cognitions tell us how to label our diffuse feelings in a way suitable to our current thoughts and ideas about our surroundings.

A fascinating test of the cognitive theory of emotion was undertaken by Spiesman (1965). People were shown a gory film that aroused strong emotional responses, as measured by autonomic responses like heart rate and electrical conductivity of the skin, and as reported in interviews. Spiesman decided to explore how different kinds of soundtracks would affect the level of emotional response in this stress-reducing film, as measured by skin conductivity. He compared the arousal effects of the original silent film with three different soundtracks. Th first he called the *trauma* track; this track simply narrated what was happening in the film. The second track was *intellectual*; its description was detached bad clinical, allowing the viewer to maintain emotional distance from the events on the screen. The third soundtrack was the *denial* track; it tended to gloss over, deny, or speak in glowing terms about what was depicted.

The subjects were selected from two groups: university students and business executives. Each person saw the film alone, seated in a comfortable chair, with the device to measure skin conductivity attached throughout the showing. The results clearly showed that the different verbal setting provided by each soundtrack affected the subjects' emotional responses. Those who heard the

trauma track were much emotional than those who had seen the film with no accompanying narration. Those who heard the intellectual and denial tracks were much less emotional. These results show quite clearly that our emotional responses are directly and sharply affected by how we interpret a situation.

However, some more recent attempts to repeat these experiments have failed to yield the same results (Hogan & Schroder, 1981). In an effort to explain these different findings, Pennebaker and Skeleton (1981) suggested that a tow-part process is involved in interpreting emotional states. People, they suggest, respond to emotional arousal with a quick appraisal of their feelings, and then they search for environmental cues to back up their assessment; in the process, more attention is paid to internal cues that agree with external cues. Support for this viewpoint comes from an experiment in which subjects were asked to report their reactions to a harmless white noise. One group was told that their skin temperatures would increase during exposure to the noise. A second group was told that their skin temperatures would decrease during noise exposure. A third group was given no expectations. Actual skin temperatures in all three groups fluctuated both up and down during the course of the experiment, with more frequent fluctuations occurring in the two groups that expected some kind of change. But subjects *reported* experiencing predominantly the kind of change that they had been led to expect. Thus, it appears that subjects were biased toward paying attention to the internal sensations that they expected.

This same process may help to explain the so-called **placebo effect** that occurs commonly in tests of new medications. Frequently, a group of subjects who receive an inactive pill or injection (a placebo) will nonetheless report measurable improvement in their health or well-being. This effect make sense if

we assume that people who are told that the pill will make them feel better pay more attention to internal cues that suggest that they are in fact getting better.

The cognitive theory of emotion seems to make a great deal of sense, but it is not without critics, who reject the idea that feelings must always be the result of cognitions. Quoting the poet e.e. cummings, Zajonc argues that "feeling comes first." Human infants, he points out, can imitate emotional expressions at 12 days of age, well before they acquire language. Animals rely in their sense of danger to survive: A rabbit does not evaluate the possibilities that might account for a rustle in the bushes before it runs away (Zajonc, 1980).

Zajonc suggests instead that the effective (or emotional) system responds instantaneously to the situations in which we find ourselves, But the affective reaction is likely to be fairly diffuse and difficult to explain. Therefore, we invent explanations for our feelings: Cognition comes *after* emotion. Think for a moment about the way in which you form opinions of people whom you meet. According to Zajonc, you have an immediate emotional reaction of some sort (perhaps attraction or repulsion) toward your new acquaintance, and you begin sizing up how the person feels about you. Then you invent ways to make the emotional reaction seem rational (Zajonc, 1984).

C. E. Izard (1971) is another researcher whose theory challenges head-on some of the assumptions of the cognitive theory of emotions. Cognitive theorists tend to believe that infants do not experience distinct emotions because infants have not yet learned to interpret the physiological arousal that accompanies all emotion. Izard, however, thinks that babies are born with 10 basic, distinct emotions that are quite similar to Plutchik's 8 fundamental emotions. The ability to experience these basic emotion is innate and has evolved over thousands of

generations, because emotion helps both infants and adults survive. Disgust, for instance, promotes removal of possibly dangerous things from the mouth.

Also contrary to cognitive theory, Izard claims that emotions can be experienced without the intervention of cognition. In his view, a situation such as separation or pain provokes a unique pattern of facial movements and body postures. These responsive patterns are unlearned and are the result of activity in the nervous system that may be completely independent of conscious thought (Trotter, 1983). When information about our facial expressions and posture reaches the brain, we automatically experience the corresponding emotion. We experience surprise, for instance, once a complex pattern of muscular—and especially facial—activities has "told" the brain that we are feeling surprise rather than anger or shame. According to Izard, then, the James-Lange theory was essentially right in suggesting that emotional experience comes from bodily reactions. But Izard's theory stresses the face and body posture as crucial to the experience of emotion, while the James-Lange theory emphasizes visceral reactions.

In fact, there is considerable evidence that facial expressions can influence emotions (Adelmann & Zajonc, 1989). In one study, subjects supported that facial expressions such as those associated with words containing the sounds *ah* or *ee* (as in *about* or *cheese*) gave them a pleasant feeling. Facial expressions such as those produced when pronouncing words containing the sound *ooh* (as in *loose*) made them feel more negative. One explanation is that facial expressions that open the sinus cavity cause a warmer flow of blood to the brain and create a more pleasant emotional experience than do those that constrict sinus cavity and

produce a cooler flow (Zajonc, Murphy, & Inglehart, 1989). This process may not apply to all emotions, however.

If Izard is right, then an important element in determining our emotional
145 experience is our own expressive behavior.

A. In the spaces provided, indicate by selecting option A, B, C, or D the phrase that completes the following items most accurately.

_____ 1. The central thought of this selection is related to:

A. an explanation of how emotions are tied to bodily functions.

B. the development of three major theories of emotion.

C. how William James and Carl Lange formulated the first theory of emotion.

D. which theory of emotion works best in explaining how we feel.

_____ 2. According to the James-Lange theory, the emotion of fear is:

A. a cognitive analysis of environmental stimuli.

B. a combination of several emotional responses.

C. an awareness of bodily changes in response to stimuli.

D. an intellectualization of a situation.

_____ 3. The Cannon-Bard theory of emotion suggests that:

A. we can pinpoint different body changes for each emotion .

B. physiological changes cause specific emotions.

C. the response to the stimulus and the emotional response are dependent upon each other.

D. your perceptions are critical in producing emotional reactions.

_____ 4. Environmental cues play a major role in which theory of emotions?

A. Cognitive theory B. Cannon-Bard theory

C. James-Lange theory D. All of the above

_____ 5. The finding that more attention is paid to internal cues than to external cues in interpreting emotional states may help to explain:

A. the placebo effect.

B. the responses of the "trauma track" subjects in Spiesman's study.

C. Izard's research.

D. the concept of emotional intensity

B. Write T beside the true statements and F beside the false statements.

_____ 6. The James-Lange theory of emotion proposed that emotions and bodily responses occur simultaneously.

_____ 7. Subjects who viewed the denial track in Spiesman's study were reported to be more emotional than other subjects.

_____ 8. There is evidence that the physiological changes associated with anger are different from those associated with fear.

_____ 9. Recent research has shown that bodily changes do not cause specific emotions.

_____10. Izard's theory stresses visceral responses as crucial to the experience of emotion.

Passage 25

Pre-reading

Read the title of this article. Then choose the topics that you think this article will probably refer to.

1. Human behaviour
2. Tradition and culture
3. Education
4. Linguistic knowledge
5. Family background
6. People's ability to use language
7. Good listening
8. Effective communication and free discussion
9. Language acquisition
10. Writing ability

LANGUAGE AND SOCIETY*

Respect for the language of familiar conversation has induced Charles Carpenter Fries of the University of Michigan to use it as the material for a new kind of grammar. In his textbook called *The Structure of English* he presents a study in which he shows not how certain authorities think native speakers ought to use their language, but how people actually do use it in natural discourse. Fries, therefore, has taken as his data fifty hours of direct and telephone conversations by three hundred speakers of standard English who were at the time talking spontaneously and who were quite unaware that their voices were being mechanically recorded. Their talk comprised some quarter of a million running words. The experiment was a notable one because it was in full accord with current views on linguistic rectitude and efficiency.

Effective speech is the product of education and training, even in primitive and unsophisticated societies. People do not learn to speak well by instinct or intuition as they learn to breathe, to eat and drink, or to walk. They learn to speak from the society into which they are born—first the family circle, then the village street or the town quarter, and later the school, the farm, the factory, the workshop, the business house, the professional group, the church, the club, and so

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*Ken Methold and Barbara Fonseca, *Reading for Meaning: A Practice Book in Cursory Reading* (Hong Kong: Longman Group (Far East) Ltd., 1974), pp. 40-43.

on. A British or American child consigned at birth to a Chinese home would learn to speak Chinese with complete normality. A child's educability is almost limitless, and so too are its powers of adjustment.

Good speech is a social convention. It preserves a reasonable balance between discipline and freedom—between the discipline imposed by social convention and the freedom required by the speaker or writer in his endeavour to express himself adequately and effectively. A great poet may scorn prevailing conversation and deliberately choose another style, but the ordinary writer is bound by necessity to steer a more even course between discipline and freedom, tradition and novelty, authority and individuality. Well-balanced writing is ineluctably conversative, and yet it needs to be continually revitalized and refreshed by the springing wells of colloquial utterance in all its manifold varieties.

In a time of rapid scientific and technological advance, the need to convey information accurately and unambiguously becomes more and more urgent. Indeed, the problems involved in the presentation of complicated facts are by no means so straightforward as many suppose, nor are their solutions simple. As Reginald Otto Kapp has recently reminded us, the present-day engineer can accomplish little except in co-operation with others. His day is crowded with talks, conferences, committees . . . Talk and paper are, in these days, among the engineer's most important tools. He must learn to handle them well. The executive engineer has a greater use for them than for the tools that are found in the carpenter's and fitter's shops. So why think that these alone are educative? Why train engineers in the use of tools that they may never have to touch again once they have been launched on their professional career and teach them nothing

about the tools that they will have to use? It goes without saying that every engineer, even a high-ranking executive, must be able to use simple tools in an emergency, but the higher he rises the greater his need of dexterity in using the tools of language.

Let us imagine, by way of illustration, that an entirely new piece of machinery has just been installed at a motor-car factory and that its place in the assembly line is so important that every senior operative needs to know all about its mechanism without delay. The visiting engineer entrusted with the task of expounding the parts and functions of the new device to these sectional managers has not only to know all that there is to know about it but he has also to be acquainted with the capacities and experiences of the individuals he is addressing. If he is to make his informative talk fully effective, he needs complete technical knowledge, a ready vocabulary, a brisk and businesslike delivery, and a personality that will inspire confidence and overcome unobtrusively any initial prejudices that his hearers may harbour towards the new mechanism. His exposition may or may not be accompanied by diagrams and printed instructions, but in no circumstances should it last more than three-quarters of an hour, because this seems to be man's normal limit of concentrated hearing beyond which attention inevitably flags. Moreover, the lecturer must allow plenty of time at the end of his discourse for those searching questions which he will do his best to elicit, answering them cheerfully and briefly, but with great precision and care, adding felicitous illustrations here and there with touches of sparkling wit to keep everyone happy and contented. After question-time he will show no pressing need to scamper off to another engagement, but he will gladly linger with his

audience and show no reluctance to continue the discussion in the canteen over friendly cups of coffee.

No two speakers would act in quite the same way in this particular operation, whose successful performance requires, first of all, a good command of language. The more complicated the mechanical change-over and the more involved the human relationships, the greater the linguistic ordeal to which the responsible technician is subjected.

Linguistic dexterity combined with good social sense is also required by the writer of technical reports. It is frequently averred that for too many writers of scientific documents are only semi-literate, when, in fact, their short-comings are attributable to social causes. A junior technician, say, is called upon to compose a report on some new development without being told for whom the report is intended or how full and detailed it should be. Is it so very surprising that the finished document should give little or no satisfaction? It is dull and formal because it is made to deal with machines and processes which seem to have no connection with living society. Perhaps a highly qualified man has devoted many precious hours to its composition. Addressed to a remote authority, it evokes no response and it calls forth not a single word of praise or blame. The writer henceforth makes out his reports as an irksome duty which he performs without zest or zeal. Good writing, least of all in practical affairs, is seldom a matter of technique that can be detached and isolated from other facts of human behaviour and experience.

For the following questions, choose the answer best reflecting the opinions of the writer:

1. C. C. Fries conducted an experiment to show _____.
   a. that people speak incorrectly
   b. how people speak naturally
   c. that rules of grammar are wrong
   d. that people speak better on the telephone
2. Well-balanced writing is conversative because _____.
   a. easy communication depends on accepted conventions
   b. individuality in language should be discouraged
   c. older forms of language should be preserved
   d. traditional forms are inadequate
3. The engineer or scientist of today must be able to use language skillfully _____.
   a. because science and technology are advancing very rapidly
   b. because he has to work with other people all the time
   c. information must be transmitted accurately
   d. for all the above reason
4. In the example given, what does the engineer need most to carry out his task well?
   a. A complete knowledge of his subject.
   b. An excellent command of language.
   c. An inspiring personality.
   d. Good illustrations.

5. What is meant by the writer when he says that the faults of many writers of scientific documents come from social causes?

He means that _____.

a. scientists are discouraged initially by the lack of meaningful communication between them and the recipients of their reports

b. scientific reports are socially formal and young scientists know nothing about this

c. these reports are isolated from social behaviour and experience

d. good writing is a practical matter regarded as having no social importance

Passage 26

Pre-reading

Answer the following questions.

1. Who are native Americans?

_____

2. When did European migrate to America?

_____

3. How did they treat native Americans?

_____

4. Why were native Americans first referred to as Indians?

_____

5. Were native Americans happy to be living with European migrants?

_____

6. Are there still native Americans in America?

_____

7. List things that European migrating government had done to native Americans.

_____

_____

_____

NATIVE AMERICANS*

The term *Native Americans* refers to the hundreds of distinct societies—including Aleuts, Eskimos, Cherokee, Zuni, Sioux, Mohawk, Aztec, and Inca—who were the original inhabitants of the Americas. Thousands of years ago, migrating people crossed a land bridge from Asia to North America where the Bering Strait (off the coast of Alaska) lies today, and over the centuries they spread throughout the West hemisphere. When Christopher Columbus and other European explorers arrived late in the fifteenth century, Native Americans numbered in the millions and had a thirty-thousand-year history in this hemisphere (Dobyns, 1966).

Contact with Europeans was disastrous for Native Americans. What some Europeans ethnocentrically called "taming the wilderness" actually amounted to the destruction of many ancient civilizations. Exposure to European diseases took a terrible toll among Native Americans, and tens of thousands more fell victim to violence at the hands of the Europeans seeking wealth and land. By the beginning of the twentieth century, the "vanishing Americans" numbered a mere 250,000 (Tyler, 1973).

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*Jeanne Shay Schumm and Shawn A. Post, ***Executive Learning: Successful Strategies for College Reading and Studying (New*** Jersey: Prentice Hall, Inc., 1997), pp. 274277.

Native Americans were first referred to as Indians by Christopher Columbus, who landed in the Bahama Islands in the Caribbean while searching for India. Columbus found indigenous Americans to be passive and peaceful (Matthiessen, 1984; Sale, 1990). Such attitudes clashed with those of Europeans, whose way of life was more competitive and aggressive. Even as Europeans seized the land of Native Americans, the invaders demeaned their victims as thieves and murderers in an attempt to justify their actions (Unruh, 1979; Josephy, 1982).

After the Revolutionary War, the new United States government adopted a pluralistic approach to Native-American societies, seeking to gain more land through treaties. Payment for land was far from fair, however, and when Native Americans resisted demands to surrender their homelands, superior military power was brought in to evict them. Thousands of Cherokees, for example, died on a forced march-the Trail of Tears-from their homes in the southeastern United States to segregated reservations in the Midwest. By the early 1800s, few Native Americans remained east of the Mississippi River.

After 1871, the United States made Native Americans wards of the government and tried to resolve "the Indian problem" through forced assimilation. Native Americans continued to lose their land, and were well on their way to losing their culture as well. Reservation life fostered dependency, teaching English in place of ancestral languages and eroding traditional religion in favor of Christianity. Many children were taken from their parents and placed in boarding schools, operated by the Bureau of Indian Affairs, to be resocialized as "Americans." Local control of reservations was placed in the hands of the few Native Americans who supported government policies, and reservation land—

traditionally held collectively-was distributed as the private property of individual families (Tyler, 1973). In the process, some whites managed to grab still more land for themselves.

Not until 1924 were Native Americans entitled to U.S. citizenship. Since then, the government has encouraged their migration from reservations Some have adopted mainstream cultural patterns and married non-Native Americans. Many large cities now have sizable Native-American populations. However, median family income for Native Americans was far below average in the United States in 1980, and Native Americans were much less likely to earn a college degree (7.7 percent) than Americans as a whole (17.1 percent).

From in-depth interviews with Native Americans in a western city, Joan Albon (1971) concluded that many were disadvantaged by little education, few marketable skills, less than perfect English, and dark skin that provokes prejudice and discrimination. Additionally, she noted, Native Americans often lacked the pointed individualism and driving competitiveness that contribute to success in the United States. This passivity stemmed from both traditional values and long dependence on government assistance.

Like other racial and ethnic minorities in the United States, Native Americans have recently reasserted pride in their cultural heritage. As the 1990s began, Native American organizations were reporting a surge of new membership applications from people who had long ignored their heritage (Johnson, 1991). These organizations not only promote the self-esteem of Native Americans, they also pursue greater rights and opportunities for their members. In lawsuits against the federal government, they have pressed for

return of lands forcibly seized in the past, and they have sought democratic control of reservation lands by Native Americans themselves. In some instances, violent confrontations with federal officials have erupted. Few Native Americans support violence as a way to address grievances, but the vast majority share a profound sense of the injustice endured at the hands of whites (Josephy, 1982; Matthiessen, 1983).

A. In the spaces provided, indicate by selecting option A, B, C, or D the phrase that completes the following items most accurately.

_____ 1. The central thought of this selection is:

A. Racial and ethnic equality is nearly impossible for a society to attain.

B. The United States has continually attempted to assimilate Native Americans.

C. The passivity of the Native Americans has allowed the government to become dominant.

D. Minorities have continually been neglected in the United States.

_____ 2. The Trail of Tears refers to:

A. Native Americans' exposure to European diseases

B. migration of Native Americans from Asia to North America

C. a forced march in which Cherokees had to leave their homes in the southeastern United States

D. the forcing of Native Americans onto reservations

_____ 3. Which of the following does not accurately describe reservation life?

A. the teaching of English instead of ancestral languages

B. the erosion of traditional religion

C. the separation of children from parents

D. the ownership of all reservations given to the Native Americans

_____ 4. Joan Albon concluded from her interview that:

A. Native Americans had few marketable skills

B. Native Americans spoke less than perfect English

C. Native Americans had little education

D. All of the above.

_____ 5. Since 1924, Native Americans:

A. have remained isolated on reservations

B. have remained outside of cities

C. have adopted mainstream cultural patterns

D. have gone to college and earned high incomes

B. Write T beside the true statements and F beside the false statements.

_____ 6. The United States is an example of a nearly ideal pluralistic society.

_____ 7. Reservation life fostered dependency.

_____ 8. Since 1924, migration from reservations has been encouraged.

_____ 9. Native Americans were considered competitive and aggressive.

_____10. In the 1990s, many new members joined the Native American organizations.

Passage 27

Pre-reading

By reading only the title of this passage, what words do you think will appear in this passage?

1. prehistoric
2. wax
3. productive
4. pollution
5. domestication
6. pests
7. ideal
8. pollination
9. fertilize
10. tend
11. modernization
12. ratio
13. repellent
14. diet
15. overpopulation
16. wild
17. integrate
18. chemicals
19. cultivate
20. cash crop

TAMING THE WILD JOJOBA*

People depend on plants for their existence. Plants in the form of seeds, especially grains, are important to people because they are the principal ingredient in most people's diets. Yet most of the plants that are important to people were domesticated, or tamed, in prehistoric times. For example, before history was written, corn and wheat became part of people's diets. People have grown these grains as crops in small fields for thousands of years.

Scientists have only recently begun to keep records of the domestication of plants. Because of their records, scientists can predict some of the problems in domesticating a plant. On the other hand, there are three reasons why scientists cannot guess all of the problems or all of the solutions. The first reason is that they have never been successful in taming a wild plant. The second is that scientists have kept records for a relatively short time. The third reason is that each plant species is unique, different from all other plants. The jojoba is an example of a plant that scientists are trying to domesticate.

The jojoba (pronounced ho-HO-ba) is a desert plant that grows wild in the dry regions of the southwestern United States and northern Mexico. It is a bush that grows to be about two meters high. On its many woody branches, the jojoba produces a fruit that is 40 percent to 60 percent liquid wax. This liquid

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*Jean Zukowski/Faust, Susan S. Johnston and Clark S. Atkinson, *Between the Lines* (New York: CBS College Publishing, 1983), pp. 90-100.

substance, called jojoba oil, is valuable. It can be used as a base for all kinds of cosmetics. It works as an ingredient in high-quality machine lubricants. By domesticating jojoba, scientists can change unproductive desert land into productive agricultural land.

Scientists can predict that, when a plant is domesticated, there will be problems with pests such as insects and rodents. A wild plant has some natural protection from pests. Other plants in a natural environment may protect the plant in two ways. They repel insects and serve as other sources of food for rodents. However, a domesticated plant is usually grown in a field where all of the plants are the same. When a wild plant is grown in this way, as a crop, the natural insect repellents and the other sources of food for insects are missing. Scientists do not know yet which pests will be a problem for jojoba growers. They do not know which plants repel the enemies of the jojoba in its natural environment. They do not even know which animals eat jojoba fruit. To learn about pest problems and to find solutions, scientists must make careful studies.

Scientists can also predict that, when a plant is domesticated, there will be problems with diseases. Disease spreads quickly among plants that are grown close together just as it spreads quickly among people who live or work close together. Scientists now have very little information about the diseases that affect jojoba in its natural environment. They know even less about diseases that affect cultivated jojoba.

Another problem with the domestication of jojoba is a problem with the sex ratio, the number of male plants to female plants. Under cultivation, the ideal sex ratio is one male jojoba plant to five female jojoba plants. Male plants do

not produce the valuable fruit: instead they have flowers that produce pollen. The pollen is carried by the wind to the flowers of female plants. When the female flowers are pollinated, they can produce fruit. One male jojoba produces enough pollen to fertilize the flowers of five female jojobas. Therefore, jojoba growers want to have five times as many female plants as male plants. Unfortunately, it is absolutely impossible to tell the difference between male and female jojobas until they are at least one year old. Furthermore, it is often impossible to tell the different until the plants are three years old. A jojoba grower might tend 100 plants for three years and then find that 50 of these plants are male and 50 female. He needs only 10 male plants for the 50 female plants. Therefore, for three years he has tended 40 plants that have no value to him. Scientists hope to find an easy, economical way to tell the sex of a jojoba when the plant is very young.

Domesticating the jojoba is like the domestication of rice, corn, or wheat. Prehistoric people had the same problems that modern scientists face today: they had to learn about pests and diseases and how to recognize productive plants. If modern scientists knew the ancient solutions to timeless problems, perhaps they could domesticate the jojoba more quickly and more easily.

Jojoba Update

A recent breakthrough in jojoba research promises to solve one of the problems with its domestication. A plant geneticist at the University of California at Riverside, Demitrios Yermanos, has developed a hermaphrodite jojoba—one that produces both male and female flowers. Thus, with both male

and female flowers on only one plant. The problem of obtaining the correct sex ratio could be solved. Now Yermanos hopes to develop a strain of jojoba that will produce more oil.

A. Decide whether each statement is True or False according to the passage.

_____ 1. Corn and wheat are examples of domesticated plants.

_____ 2. Modern scientists have tamed many wild plants.

_____ 3. Jojoba oil is a valuable product.

_____ 4. Some plants protect other plants by keeping pests away.

_____ 5. Male jojoba plants do not have flowers.

_____ 6. The ideal sex ratio for cultivated jojoba plants is five males to one female.

_____ 7. Scientists have discovered a cheap, easy way to tell the sex of young jojobas.

_____ 8. Modern scientists face some of the same problems that prehistoric people faced.

B. Indicate which of the following statements are <u>facts</u>, <u>inferences</u>, or <u>opinions</u> of the author. Be sure that you answer according to the information in the passage.

_____ 1. Farmers usually grow plants close together.

_____ 2. Domesticated jojobas may be affected by diseases that do not affect wild jojobas.

_____ 3. Fewer male jojoba plants are needed than female plants.

_____ 4. A crop of only male jojoba is useless.

_____ 5. If modern scientists knew the ancient solutions to timeless problems, they could domesticate the jojoba more quickly and more easily.