

Lesson 12 Study Guide

7. While it has not yet been done for all organisms on earth, based on what we now know, it is possible to clone any gene from almost any living organism, transfer that gene into another unrelated organism, and make the same protein coded for by that gene. This means that the genetic code is a universal language for life on this planet.

- (A) this statement is generally true
- (B) this statement is generally false
- (C) there is still not enough information
- (D) this is confidential information held only by the government
- (E) it is therefore impossible to use this information to create new plant cultivars

8. It has been said that 'Biotechnology is not a threat...starvation is.' Vitamin A deficiencies are responsible for a million lives a year globally and many of those are in developing countries where the main staple is rice. Genetically modified rice has been made to accumulate high levels of beta carotene the natural precursor for vitamin A. Some have argued that it would be unethical to deny this population of such a useful tool to alleviate suffering. This variety is known as:

- (A) Terminator rice
- (B) Golden rice
- (C) Fried rice
- (D) Green Revolution rice
- (E) The Gold Revolution

9. It is interesting that because all life on this planet uses information in the form of either DNA, RNA or both, and that the same bases are used, and that the genetic code is almost always the same using three of those bases to code for one of twenty amino acids...because now genes can be cloned and moved from one organism into another and the foreign gene will make the same protein! So a gene from a bacteria can be expressed in plant to make the same protein that was made in the bacteria. The process of taking a gene from one species and expressing it in the genome of another species is called:

- (A) transgenics
- (B) eugenics
- (C) carcinogenics
- (D) pharmacogenomics
- (E) agricultural forensics

10. The first commercially available genetically engineered plant was released in 1992. It was:

- (A) a slow ripening tomato called the Flavr Savr
- (B) a glow in the dark daisy with a GFP protein from fluorescent jellyfish
- (C) high vitamin A rice called Golden Rice
- (D) a corn plant with resistance to the herbicide Round-Up
- (E) a seedless watermelon made by radiation

11. Gene constructs can be readily made in the laboratory by fusing together DNA segments from different sources. If done correctly, these cloned constructs can be delivered into plants where there will be stably integrated into the plant's DNA and expressed to confer new and useful traits. Gene constructs can be introduced into plants by:

- (A) Microprojectile bombardment (also known as the 'gene gun' or biolistics) delivers DNA by coating small particles of gold with the vector and shooting them into plant cells
- (B) all of the examples shown have worked
- (C) Microinjection: by using a small needle to inject DNA directly into plant cells
- (D) *Agrobacterium tumefaciens*: a bacteria that acts as a natural gene transfer vector to deliver DNA into plants
- (E) osmotic or electric shock treatments

12. It is now possible to make gene constructs in the laboratory by fusing together DNA segments from different sources. If done properly, these cloned constructs can be expressed in plants to confer new and useful traits. For example, genes that encode proteins from a bacteria can be moved into plants to make them resistant to pests without using pesticides.

This process of plant improvement has been:

- (A) only theoretical but hotly debated for over ten years
- (B) only accomplished by big companies but not by academic labs
- (C) applied widely and successfully in US agriculture for over fifteen years
- (D) has been shown to be fraudulent and dangerous to people and livestock
- (E) shown to be a link in the rising incidence of autism in the US

13. Agricultural Biotechnology:

- (A) is a new form of organic agriculture that uses synthetic manure with the promise of providing safer and more healthy plants
- (B) includes domestication, varietal selection, genetics, wide crosses, mutagenesis, and gene transfer for the overall goal to help produce new varieties of crop plants that are useful for people
- (C) a unnatural process for developing genetically modified (GM) plants that have been shown to cause birth defects in humans
- (D) is too recent of a technology to be of practical use, but has great promise for the future to aid in global food resources
- (E) has now been banned by all US farmers and grocery stores as inherently unsafe

14. GMO is:

- (A) a designation used by a group called 'Germplasm Movement from Origins' that tracks the origins of first crops domesticated by humans ~10,000 yrs ago**
- (B) a designation for 'Genetically Modified Organism' indicated the use of transgenics**
- (C) the acronym for militant 'Global Motivation Organization', a non-governmental organization that tracks the release of genetically engineered plants as something they think is harmful to the environment, health and safety of all US citizens**
- (D) a crop that is 'Grown More Organically' as a designation of safety used by the USDA for crops that have a clear environmental and health advantage**
- (E) a type of IED developed by the US specifically for use in Iraq and Afghanistan to control the production of Opium poppies**

15. Genetically engineered crops are now grown:

- (A) in large scale agricultural production in many countries across the world including US, Canada, Brazil, and China**
- (B) only in greenhouses because of gene containment issues**
- (C) only on large megafarms and only in the US**
- (D) all across Europe**
- (E) only in high security laboratories owned by the military for bioweapons research**