

Concepts of Genetics, 11e, Global Edition (Klug et al.)

Chapter 1 Introduction to Genetics

1) In the 1600s, William Harvey studied reproduction and development. What is the term given to the theory which states that an organism develops from the fertilized egg by a succession of developmental events that lead to an adult?

- A) preformation
- B) sequential pattern formation
- C) equational transformation
- D) transduction
- E) epigenesis

Answer: E

Section: 1.1

2) What is the term given to the theory which states that the fertilized egg contains a complete miniature adult?

- A) preformation
- B) transduction
- C) transformation
- D) conjugation
- E) cell theory

Answer: A

Section: 1.1

3) What is the term given to the theory that put forth the idea that living organisms could arise by incubating nonliving components?

- A) spontaneous generation
- B) natural selection
- C) evolution
- D) preformation
- E) collective combination

Answer: A

Section: 1.1

4) Who, along with Alfred Wallace, formulated the theory of natural selection?

- A) Gregor Mendel
- B) William Harvey
- C) Louis Pasteur
- D) Charles Darwin
- E) James Watson

Answer: D

Section: 1.1

5) Who was the Augustinian monk that conducted a decade of experiments on the garden pea, eventually showing that traits are passed from parents to offspring in predictable ways?

- A) Francis Crick
- B) Alfred Wallace
- C) Hippocrates
- D) Aristotle
- E) Gregor Mendel

Answer: E

Section: 1.2

6) In many species, there are two representatives of each chromosome. In such species, the characteristic number of chromosomes is called the _____ number. It is usually symbolized as _____.

- A) haploid; n
- B) haploid; $2n$
- C) diploid; $2n$
- D) diploid; n
- E) None of the answers listed are correct.

Answer: C

Section: 1.2

7) Genetics is the study of _____.

- A) inheritance and variation
- B) mutation and recession
- C) transcription and translation
- D) diploid and haploid
- E) replication and recombination

Answer: A

Section: 1.2

8) Name one of the botanists who, in 1900, rediscovered the work of Gregor Mendel.

Answer: Carl Correns, Hugo de Vries, Erich Tschermak

Section: 1.1

9) Early in the twentieth century, Walter Sutton and Theodor Boveri noted that the behavior of chromosomes during meiosis is identical to the behavior of genes during gamete formation. They proposed that genes are carried on chromosomes, which led to the basis of the _____.

Answer: Chromosome Theory of Inheritance

Section: 1.2

10) What is a mutation?

Answer: A mutation is an inherited change in a gene.

Section: 1.2

11) What is a simple definition of an allele?

Answer: An allele is a variant form of a gene.

Section: 1.2

12) Until the mid-1940s, many scientists considered proteins to be the likely candidates for the genetic material. Why?

Answer: Proteins are the most abundant, universally distributed components in cells. They were considered likely candidates because of their great structural and functional diversity.

Section: 1.2

13) Name the individual who, while working with the garden pea in the mid-1850s, demonstrated quantitative patterns of heredity and developed a theory involving the behavior of hereditary factors.

Answer: Gregor Mendel

Section: 1.2

14) What does the term *genetics* mean?

Answer: Genetics is a subdiscipline of biology concerned with the study of heredity and variation at the molecular, cellular, developmental, organismal, and populational levels.

Section: 1.2

15) Name two individuals who provided the conceptual basis for our present understanding that genes are on chromosomes.

Answer: Walter Sutton and Theodor Boveri

Section: 1.2

16) What term is used to describe the fact that different genes in an organism often provide differences in observable features?

Answer: phenotype

Section: 1.2

17) What term refers to the similarity between parents and offspring and what term refers to the lack of similarity between parents and offspring?

Answer: Heredity refers to the similarity between parents and offspring and the similarity of members of the same species. Variation refers to the lack of similarity between parents and offspring and members of the same species.

Section: 1.2

18) Alternative forms of a gene are called _____.

Answer: alleles

Section: 1.2

19) The various characteristics of organisms that result from their genetic makeup are collectively referred to as an organism's _____.

Answer: phenotype

Section: 1.2

20) Name the substance that serves as the hereditary material in eukaryotes and prokaryotes.

Answer: DNA or deoxyribonucleic acid

Section: 1.3

21) In nonviral systems, what is the nature of the hereditary substance?

Answer: DNA (deoxyribonucleic acid) is a double-stranded polymer organized as a double helix.

Section: 1.3

22) A fundamental property of DNA's nitrogenous bases that is necessary for the double-stranded nature of its structure is _____.

Answer: complementarity

Section: 1.3

23) Distinguish the functions of DNA and RNA in a eukaryote.

Answer: DNA is responsible for the storage and replication of genetic information; RNA is involved in the expression of stored genetic information.

Section: 1.3

24) Name the bases in DNA and their pairing specificities.

Answer: adenine:thymine, guanine:cytosine

Section: 1.3

25) What is meant by the term *genetic code*?

Answer: The genetic code consists of a linear series of three adjacent nucleotides present in mRNA molecules.

Section: 1.3

26) List the two relatively complex processes in which genetic information is converted into functional products.

Answer: transcription and translation

Section: 1.3

27) What is the composition of the genetic material?

Answer: polymers of nucleotides making up DNA

Section: 1.3

28) What is meant by *complementarity* in terms of the structure of DNA?

Answer: base pairing of A with T, and G with C

Section: 1.3

29) Reference is often made to *adapter molecules* when describing protein synthesis in that they allow amino acids to associate with nucleic acids. To what class of molecules does this term refer?

Answer: tRNA

Section: 1.3

30) Given that DNA is the genetic material in prokaryotes and eukaryotes, what other general structures (macromolecules) and substances made by the cell are associated with the expression of that genetic material?

Answer: RNA (messenger, ribosomal, transfer), ribosomes, enzymes, proteins

Section: 1.3

31) What is another term for a biological catalyst?

Answer: enzyme

Section: 1.3

32) Research dealing with which human blood disorder was instrumental in linking the genotype to a specific phenotype, and what conclusion was reached?

Answer: The work on sickle-cell anemia was instrumental in showing that a mutant gene produced a mutant protein molecule.

Section: 1.3

33) Recombinant DNA technology is dependent on a particular class of enzymes, known as _____ that cuts DNA at specific nucleotide sequences.

Answer: restriction enzymes

Section: 1.4

34) What represents an organism's genome?

Answer: An organism's genome can be defined as the complete haploid DNA content of an organism.

Section: 1.4

35) What is a transgenic organism?

Answer: A transgenic organism is an organism produced by biotechnology that involves the transfer of hereditary traits across species.

Section: 1.5

36) In 1996, a cloning experiment produced the sheep named Dolly. Contrary to the more traditional method of cloning by embryo splitting, Dolly was produced by which procedure?

Answer: transfer of genetic material from an adult mammary cell

Section: 1.5

37) What term is applied to a variety of projects whereby genome sequences are deposited in databases for research purposes?

Answer: genomics

Section: 1.6

38) The human genome sequence was reported in 2003 by two groups, the publicly funded _____ and _____.

Answer: Human Genome Project; a private, industry-funded project

Section: 1.6

39) A number of genomes have been sequenced in recent years: *Escherichia coli*, *Saccharomyces cerevisiae*, *Caenorhabditis elegans*, *Drosophila melanogaster*, and *Mus musculus*. What are the common names for these organisms?

Answer: bacterium, yeast, roundworm, fruit fly, mouse

Section: 1.7

40) Organisms that are well understood from a scientific standpoint and are often used in basic biological research are often called _____.

Answer: model organisms

Section: 1.7

41) *Arabidopsis* is a model organism for the study of _____.

Answer: plants

Section: 1.7

42) Genetics is the study of heredity and variation.

Answer: TRUE

Section: 1.2

43) Complementarity in a genetic sense refers to the polymerization of nucleotides in DNA.

Answer: FALSE

Section: 1.3

44) Bioinformatics is a discipline involved in the development of both hardware and software for processing, storing, and retrieving nucleotide and protein data.

Answer: TRUE

Section: 1.6