

Chapter 11

REPRODUCTION – An Introduction

OVERVIEW: Reproduction is the second on our list of “basic life functions.” The biology of reproduction provides answers to questions like, “How can there be *continuity* from generation to generation?” Secondly, how can there be *genetic variation* within kinds but *limits* so that one kind does not give birth to another kind?” Answers to such questions are found in the nature of the DNA *blueprint* and its information-storing capacity.

STRATEGY: Read Chapter 11, pages 219-223, which present an introductory overview of the second *basic life process*, namely reproduction. The Study Outline (next page) will give you a view of our approach to this material and the emphasis.

VOCABULARY: Review the following familiar terms and write accurate definitions for each, noting that all but three are processes:

gamete	biogenesis	mitosis
zygote	fertilization	deoxyribonucleic acid
reproductive barrier	cell reproduction	

INTERNET: See “BIO 100 Web Links” Page, Assignment #19 for animated graphics about DNA

LEARNING GOALS:

1. Explain how programming (analogous to computer), continuity, and genetic variation are in evidence in any two generations of animal, plant, or microbe.
2. Describe the genetic connections between a sperm, egg, and zygote.
3. Why are DNA and RNA referred to as “information molecules?” How are DNA molecules like words?
4. Describe the structure of a DNA molecule. What parts are predictable in all DNA molecules? What parts make possible the “somewhat unpredictable” coding?
5. Name the four nitrogen bases and explain how they pair in complementary fashion.
6. Define *gene*. How are individual genes analogous to “words” with respect to information transfer?
7. What is meant by the human genome? What is the estimated number of genes in the human genome? The estimated number of nitrogen base pairs?

APPLICATION: Explain how the Scriptures speak of *genetic continuity* within kinds, and *barriers to reproduction* between kinds in passages such as Genesis 1:20-25. See Romans 5:12-14 and Hebrews 7:6-10 for scriptural claim that sin spread through the genealogy of Adam. How did Christ overcome this curse of sin within the lineage following Adam?

STUDY OUTLINE: **Reproduction of Cells**

I. BIOLOGICAL AND SCRIPTURAL SIGNIFICANCE OF REPRODUCTION

Introduction: Death is inescapable for every creature, but each individual has the potential to pass along genes through offspring within its population, or interbreeding unit. What is the design that permits this process to continue? “Reproduction” is an amazing process!!

A. SCRIPTURAL BASIS: Genesis 1:25 – *And God made...every [creature] after its kind*

B. BIOLOGICAL IMPLICATIONS: How is this possible??

1. A QUESTION OF **P**_____ of each creature’s FORM and BEHAVIOR

Examples:

2. A QUESTION OF **C**_____ of each KIND

Questions:

3. QUESTION OF **G**_____ **V**_____

C. DIVINE DESIGN CALLS FOR

ADULT MALE AND FEMALE TO FORM GAMETES

SPERM EGG

ZYGOTE

CONCEPT: The genetic PROGRAMMING, CONTINUITY, and VARIATION are made possible by means of the DNA BLUEPRINT” passed from generation to generation via the ZYGOTE

II. WHY IS DNA CONSIDERED A “BLUEPRINT?”

A. DNA IS AN “INFORMATION MOLECULE”

1. ANALOGY – “WORDS”

a. Words must contain different letters – e.g. _____

b. **S**_____, or the **S**_____ is crucial to “information”

c. Words are “strings of letters” with a beginning and end – DNA likewise has “strings” or “segments” known as **genes**. Genes are usually hundreds of base pairs long.

B. TWO TYPES OF NUCLEIC ACIDS:

1. DNA – Deoxyribonucleic Acid – located in NUCLEUS (of Eukaryotes)
2. RNA – Ribonucleic Acid – in NUCLEUS and CYTOPLASM

III. DNA STRUCTURE

A. DOUBLE-STRANDED, SPIRAL HELIX – or, a two-stranded, repeating (helical) spiral

B. COMPONENTS:

1. EACH STRAND HAS A “BACKBONE” of _____ and _____
2. INFORMATION is CODED on **N** _____ **B** _____ of **four** types:
 - a. A = _____
 - b. G = _____
 - c. T = _____
 - d. C = _____
3. COMPLEMENTARY PAIRING – Nitrogen Bases form “rungs” between strands
> Predictable Pairing – A – ___ and C – ___
4. HOW MANY GENES (“WORDS”) MAKE UP THE HUMAN “BLUEPRINT?”
 - a. Estimated at _____ genes (“words”) each gene having hundreds of N. Base pairs
 - b. Estimated total Nitrogen Base pairs in Human Blueprint (Genome) = ___ billion

IV. REPRODUCTION OF CELLS – DNA must be replicated and passed to each “daughter cell”

A. CELL THEORY — “All living matter is _____”

B. IMPLICATIONS

1. Genetic material is localized in cells where it exercises METABOLIC CONTROL
2. Therefore, GROWTH in size and volume requires CELLULAR REPRODUCTION:

MITOSIS + CYTOPLASMIC DIVISION = CELL REPRODUCTION