

# **Teacher's Guide For**

## **Core Biology:**

## **Environmental Sciences**

For grade 7 - College

Programs produced by  
Centre Communications, Inc. for  
Ambrose Video Publishing, Inc.

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Published and Distributed by...  
Ambrose Video Publishing, Inc.  
145 West 45th St., Suite 1115  
New York, NY 10036  
1-800-526-4663  
24-Hour Fax 212-768-9282  
<http://www.ambrosevideo.com>

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## **MATERIALS IN THE PROGRAM**

Teacher's Guide -This teacher's Guide has been prepared to aid the teacher in utilizing materials contained within this program. In addition to this introductory material, the guide contains the following:

- Suggested Instructional Notes
- Student Learning Goals
- Test Questions on Blackline Masters A for duplication and handout to students.

## **INSTRUCTIONAL NOTES**

It is suggested that you preview the program and read the related Lesson Plans, Student Goals and Teacher Points. By doing so, you will become familiar with the materials and be better prepared to adapt the program to the needs of your class. You will probably find it best to follow the programs in the order in which they are presented in this Teacher's Guide, but this is not necessary. It is also suggested that the program presentation take place before the entire class and under your direction. As you review the instructional program outlined in the Teacher's Guide, you may find it necessary to make some changes, deletions, or additions to fit the specific needs of your students. After viewing the programs you may wish to copy the Test Questions on Blackline Masters 1A, and distribute to your class to measure their comprehension of the events.

## **INTRODUCTION AND SUMMARY OF PROGRAM**

*Core Biology: Environmental Sciences* is a new approach to presenting in an exciting way the principles of environmental sciences. The program is designed to present *Core Biology: Environmental Sciences* in a way that promotes successful student learning. Beginning with the classification of biomes in 1920, the program discusses the important elements that would create the discipline of environmental science in the 20<sup>th</sup> century. The program outlines the theory of plant succession, the twin developments of ecology and ecosystems, the concept of niche, the five kingdoms of life, and ends with the Gaia hypothesis and the coining of the term 'biodiversity'.

### ***Core Biology: Environmental Sciences***

1920 - Biomes

1928 - The Theory of Plant Succession

1949 – Ecology

1953 – Ecosystems

1957 - Ecology's Concept of Niche

1969 – The Five Kingdoms of Life

1979 – Gaia Hypothesis

1986 - Biodiversity

## **LINKS TO CURRICULUM STANDARDS**

The design for this program includes the following curriculum correlations: National Science Educations Standards, Content Standard C - Life Sciences (Grades 9-12); California State Content Standards for Biology-Life Sciences: Cell Biology, Genetics, Ecology, Evolution and Physiology (Grades 9-12). The content of this program presents the foundational discoveries and principles of the environmental sciences in an historical order.

## **SUMMARY OF PROGRAM SEGMENTS**

### **Program: *Core Biology: Environmental Sciences***

Environmental sciences examines the significant turning points in the development of this critical 20<sup>th</sup> century science.

Segment one examines the Earth's seven major biomes.

Segment two looks at why plant communities are constantly changing in a manner called plant succession.

Aldo Leopold, the founder of ecology and his land ethic concept, are discussed in Segment three.

The idea that an ecosystem is an interrelated group of plants animals and microorganisms is shown in Segment four.

Segment five examines the concept of niche, a place in an ecosystem where a species population can live.

The formation of the five kingdoms of life and what they are is shown in Segment six.

Segment seven discusses James Lovelock's hypothesis that the earth is a self-regulating, living organism.

E.O Wilson's coining the term biodiversity and what it means is shown in Segment eight.

## **1920 - Biomes**

**Student Goals - In this Core Biology: Environmental Sciences segment the students will learn:**

- The environmental sciences are a uniquely 20th-century phenomenon.
- Nikolai Vavilov introduced to the scientific world was the innovative concept of biomes: terrestrial communities of plants and animals, each with their own climates, altitudes and soil types
- The seven terrestrial biomes
- Biomes form the foundation for all environmental studies

## **1928 - The Theory of Plant Succession**

**Student Goals - In this Core Biology: Environmental Sciences segment the students will learn:**

- That plant communities were constantly changing and appeared to be subject to a force of nature separate from the broader geographic and climatological forces.
- This directional, non-seasonal change was called, plant succession
- One of the earliest proponents of plant succession was biologist Frederic Clements
- The key concepts of plant succession are that in different climates different plant communities achieve the role of climax state and define the major biomes

## **1949 - Ecology**

**Student Goals - In this Core Biology: Environmental Sciences segment the students will learn:**

- Aldo Leopold was the founder of the environmental movement
- An ecosystem is like a living organism, living in relationship to other living things
- Leopold's concept of the environmental ethic

## **1953 – Ecosystems**

**Student Goals - In this Core Biology: Environmental Sciences segment the students will learn:**

- What an ecosystem is
- How Eugene P. Odum's book, *Fundamentals of Ecology*, would place the understanding of ecosystems on a scientific basis
- Energy flows are a mathematical way to measure the dynamics of an ecosystem
- An Ecosystem is a concept that can be applied to any geographical scale

## **1957 - Ecology's Concept of Niche**

**Student Goals - In this Core Biology: Environmental Sciences segment the students will learn:**

- The definition of a habitat and niche in an ecosystem
- The key idea about habitats is that they can be home to many species populations
- Only one species population can occupy a niche
- The laws of niche dynamics control species populations

## **1969 – The Five Kingdoms of Life**

**Student Goals - In this Core Biology: Plant Sciences segment the students will learn:**

- The difference between single cellular and multi cellular life
- The break down of life on Earth and how they are spread throughout the five kingdoms of life
- The largest kingdom is that of animals

## **1979 – Gaia Hypothesis**

**Student Goals - In this Core Biology: Environmental Sciences segment the students will learn:**

- Under the Gaia Hypothesis the Earth is treated as a living organism
- The Gaia model has become a major tool in our understanding of the importance behind the stability of greenhouse gases

**1986 - Biodiversity**

**Student Goals - In this Core Biology: Environmental Sciences segment the students will learn:**

- Prior to the rise of human industrialization, 4 billion years of evolution on the planet had produced a vast interconnected web of life
- Through the process of industrialization, the web of life's diversity is being reduced by human activity
- A political and philosophical debate has arisen over the human responsibility for preserving biodiversity

**Answers to Blackline Master 1A Quiz**

1-c; 2-b; 3: a-2, b-3, c-1; 4-d; 5-c; 6-d; 7-a; 8: a – 4, b – 1, c – 3, d – 5, e – 2; 9-d; 10-b; 11-c; 12-c