

Teachers Guide For

Core Biology: Plant Sciences

For grade 7 - College

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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 Master 1A, and distribute to your class to measure their comprehension of the events.

INTRODUCTION AND SUMMARY OF SERIES

Core Biology: Plant Sciences is a new approach to presenting in an exciting way the core principles of plant sciences. The series is designed to present plants sciences in a way that promotes successful student learning. *Core Biology: Plant Sciences* examines the key points in the development of plant science from its founding by Theophrastus in 323 B.C. through its foundational discoveries beginning with plant physiology and reproduction in the 17th century and continuing with the cellular basis of plant life, Mendel's laws of inheritance, photosynthesis and ending with the kingdoms of life.

Below is a list of the program and its segments. Using this program, teachers can create a lesson plan to cover the specific issues, themes and the historical figures mentioned.

Core Biology: Plant Sciences

323 B.C. – Theophrastus Finds Botany
1682 - Plant Physiology
1694 - How Plants Reproduce
1838 – Cellular Basis of Plant Life
1866 - Mendel's Laws of Inheritance
1886 - Nitrogen-Fixing of the Pea Family Is Explained

1946 – Photosynthesis
1969 – The Five Kingdoms of Life

LINKS TO CURRICULUM STANDARDS

The design for this series 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 series presents the foundational discoveries and principles of the plant sciences in an historical order.

SUMMARY OF PROGRAM

Core Biology: Plant Sciences

Core biology presents the key concepts in the development of plant sciences.

Segment one examines the beginnings of plant sciences with hunter gatherers and continues through to Theophrastus who systematically investigated hundreds of plants, providing in depth information.

Segment two shows the revolution in plant physiology begun by English botanist, Nehemiah Grew.

Segment three investigates how plants reproduce and how this knowledge jumpstarted the agricultural revolution the 17th century.

How all life is made up of cells is examined in Segment four.

Mendel's laws of inheritance and what they mean are discussed in Segment five.

Segment six investigates the beneficial properties of legumes and their symbiotic relationship with bacteria to fix nitrogen in the soil.

The miracle of photosynthesis - the process by which plants use sunlight to synthesize foods from carbon dioxide and water - is explained in Segment seven.

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

323 B.C. – Theophrastus Founds Botany

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

- That new plants were produced from seeds was one of the greatest scientific deductions of all time
- Each kind of plant has a unique seed
- Each type of seed produces only one type of plant
- Theophrastus discovered many aspects of present-day botany
- Theophrastus, understood that plants could be organized around common characteristics

- Theophrastus catalogued and classified hundreds of plants

1682 - Plant Physiology

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

- Different tissue types create physiology and anatomy
- Plants show a variety of different tissue types, including leaves, spores, and fertilized eggs that develop into embryos
- About the different types of seed bearing and non-seed bearing plants
- With the publishing of Nehemiah Grew's *Anatomy of Plants* in 1682, many important aspects of plant physiology and anatomy were laid out

1694 - How Plants Reproduce

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

- The concept that plants have male and female forms and reproduce sexually was discovered in the 17th century
- About pollination and the physiology of the various parts of a flower
- Out of the understanding of the sexual reproduction of plants came crosspollination and hybridization leading to the selective breeding of plants

1838 – The Cellular Basis of Plant Life

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

- The single lens microscope by the Dutch lens maker Anton van Leeuwenhoek in the last half of the 17th century would lead to answering the questions about plant cells
- English naturalist Robert Hooke gave the name to cells and described them
- All life is cellular life

1866 - Mendel's Laws of Inheritance

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

- Prior to Mendel's ground-breaking work, the way physical traits were passed from parents to children was a mystery
- Mendel's laws of inheritance, including the principle of genetic dominance
- Modern genetics would confirm Mendel's laws

1886 - Nitrogen-Fixing of the Pea Family Is Explained

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

- Plants in the legume family have a symbiotic relationship with a bacteria identified as *rhizobium*, which produces nitrogen
- When the roots of the legumes die, they release soluble nitrogen into the soil, which can be utilized by other plants
- Nitrogen is often the limiting factor in plant growth, therefore food supply

1946 – Photosynthesis

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

- Plants require only light energy, carbon dioxide and water to make sugars and starches

- Plants convert light energy into chemical energy through a process called photosynthesis
- In 1946 American chemist Melvin Calvin discovered how photosynthesis works
- How photosynthesis works

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

Answers to Blackline Master 1A Quiz

1-c; 2-a; 3-d; 4-a; 5-c; 6-b; 7-a; 8-c; 9-a; 10-d; 11-b; 12-a; 13-c;

14: a – 4

b – 1

c – 3

d – 5

e - 2