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## **SYNOPSIS:**

Algae have sustained life on this planet since they first modified its atmosphere with photosynthetic by-products over two and a half billion years ago. Algae made more recent forms of life on earth possible and have served humankind in many capacities. But some algae can turn killer when their growth explodes into massive algal blooms. In this program researchers discover how algae can transform from life supporting to life threatening. Learn how we've depended on algae in the past and see the new ways we are putting them to use in cancer research, sewage and wastewater treatment, agriculture and household products.

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## **CURRICULUM UNITS:**

Agriculture  
Chemistry  
Life Science  
Botany  
Environmental Science  
Marine Biology  
Biology  
General Science  
Marine Science

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## **CAREER OPPORTUNITIES:**

Algologist  
Aquaculturist  
Biochemist  
Biologist  
Biotechnician  
Biotechnologist  
Ecologist  
Marine Biologist  
Phycologist  
Toxicologist

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## **PROGRAM OVERVIEW:**

Algae are found on land, in field and forest as well as in fresh and saltwater. Most algae are microscopic but some larger forms include those that grow in symbiosis with fungi as lichens that float as pond scum, or that grow as seaweeds such as the giant kelps. This program explores the significance of algae to our world and how science is working to utilize their unique qualities. Algae are considered the first link in the World's food chain. For this reason, however, they can sometimes have a disastrous impact on aquatic or even human life. Algae may explode into growth and form huge colonies called algal blooms, sometimes choking other organisms or killing them with a release of toxins. This program explains how the toxins can be passed along the food chain to people and what researchers have been able to discover about the poisonous aspect of algae.

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## **ISSUES & CRITICAL THINKING:**

- 1) After showing the program, ask your students:
  - a. How are algae associated with the development of more recent life forms on Earth?
  - b. How can algal blooms affect the World's food chain?
  - c. What factors can result in algal toxins?
  - d. What are some ways algae have been beneficial?
  - e. What are some ways algae could be put to use in the future?
- 2) List and introduce some of the major divisions of algae, such as the green, red and brown. How do the "blue-green algae" differ from the true algae?
- 3) Have students examine prepared slides or collected samples of various types of algae under a microscope.
- 4) There is such diversity in the algae, it may be difficult for students to understand how they include everything from microscopic forms to giant seaweeds. Talk with students about the characteristics that algae share. How are most algae different from plants? How do they reproduce?
- 5) Ask students how the internal chemistry of algae is affected by nutrients, as explained in the program.
- 6) Have students make up a shopping list of items that might contain alginates. There are other products that use algal ingredients. Have them investigate and report on them.
- 7) Seaweeds are food staples for many people, delicacies for others. What nutrients might they provide?

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## GLOSSARY:

**Algal blooms-** A rapid increase or accumulation in the population of algae in an aquatic system.

**Alginates-** Made from a substance in the cell walls of brown algae. Extracted into granular or powder form it absorbs water quickly; capable of absorbing 200-300 times its own weight in water.

**Biocoil-** A revolutionary photosynthetic Photobioreactor that provides an environment for biological organisms to grow in a controlled manner.

**Chlorella-** A genus of single-celled green algae, belonging to the phylum Chlorophyta.

**Dinoflagellates-** Unicellular protists which exhibit a great diversity of form.

**Dunaliella-** A type of halophile pink micro-algae especially found in sea salt fields.

**Flagella-** Long, thread-like appendages which provide some live single cells with the ability to move, motility.

**Mass Spectrometer-** An instrument which can measure the masses and relative concentrations of atoms and molecules.

**Protozoa-** One-celled animals and the smallest of all animals. Most of them can only be seen under a microscope.

**Red Tide-** A common name for a phenomenon more correctly known as an algal bloom (large concentrations of microorganisms).

**Rotifers-** Microscopic aquatic animals of the phylum Rotifera. Rotifers can be found in many freshwater environments and in moist soil, where they inhabit the thin films of water that are formed around soil particles.



# BIOLOGY: PUTTING ALGAE TO WORK

K4550DVD



### TMW MEDIA GROUP

2321 Abbot Kinney Blvd., Venice, CA 90291

(310) 577-8581 Fax (310) 574-0886

Email: [sale@tmwmedia.com](mailto:sale@tmwmedia.com)

Web: [www.tmwmedia.com](http://www.tmwmedia.com)

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