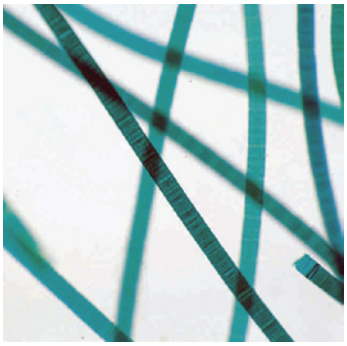
Algae & Cyanobacteria

Conditions for Customer Ownership



We are a USDA compliant facility and hold all necessary permits to transport our organisms. Each state is assisted by the USDA to determine which organisms can be transported across state lines. Some organisms may require end-user permits. Please contact your local regulatory authorities with questions or concerns. To access permit conditions, click here.

Never purchase living specimens without having a disposition strategy in place.
Live specimens should not be released into the wild! Please dispose of any unwanted organisms using the guidelines below.

Primary Hazard Considerations

Wash your hands before and after handling algae and cyanobacteria. It is not safe to release your algae into the environment because it could disrupt the normal ecosystem.

Availability and Short-term Care

- Most algae and cyanobacteria are cultured in our labs and are available year-round.
- **The following algae are collected, so shortages may occur:**
  Nostoc colonial: Shortages possible December– February and July–August.
  Porphyra: Shortages possible October–March.
- Your algae culture will arrive in a plastic jar or sterile glass test tube filled with media. Immediately upon receipt, loosen the jar cover or test tube cap to allow gas exchange and store in a cool area (15–20˚C) with dim light. Do not store your culture in direct sunlight or at temperatures above 30°C. In its packing container, the culture can retain its high quality for 4–7 days at room temperature. If the culture is not going to be used in this time frame, it should be subcultured to prevent death and overcrowding.

Care

Habitat:

- Your cultures arrive in a habitat that is suitable for short-term use in classrooms.
- If you wish to subculture, a more specialized environment is required. Algae require specific lighting and media in order to flourish. Generally, cultures should be grown in a 16-hour light period alternating with an eight-hour dark period. Ideally, the cultures should be illuminated by 40-watt cool-white fluorescent tubes on a timer. A 40-watt fluorescent tube at a distance of about 15 cm will provide roughly 500 foot candles of illumination. Freshwater algal cultures should be grown under a light intensity of 400 to 500 foot candles. At this light intensity, cultures will reach optimum growth or density for microscopic viewing in 7–14 days, depending on the species and condition of the initial algal inoculum. After this period, reduce the light to 50–100 foot candles. Marine algae grow best in slightly lower intensities than those required by freshwater algae: 200–300 foot candles. The media that algal cultures are grown in varies based upon the requirements of each individual culture (see tables below, links at end of information section).

Subculturing:

- Flasks, tubes, bottles, or Petri dishes can be used as culture containers. If using a 250 mL Erlenmeyer flask, fill the flask to approximately 150 mL with freshly prepared media and sterilize the media (autoclave for 20 minutes at 121°C and 15 PSI). Allow the media to cool overnight before adding any algae. Add a small amount (2–5 mL) of inoculum from the culture provided, handling both containers in a sterile manner. Always prepare more than one subculture in case one of the new cultures becomes contaminated. Make new subcultures from the freshest cultures.

Basic Types of Algae

Blue-Green Algae (Cyanobacteria):

The cyanophytes are the only prokaryotic algae. They are found in virtually every type of environment, including terrestrial, freshwater, and marine habitats. Since cyanobacteria are prokaryotes, they lack membrane bound organelles. However, the external structure can range from unicellular or colonial, to branched or unbranched, and filamentous. The life-cycle is binary fission with the majority undergoing fragmentation to split. Spores/akinetes are produced as protected cells when unfavorable conditions exist. Like the rhodophytes, the cyanophytes possess no flagellated or ciliated cells at any stage of their lifecycle, although simple movements such as bending and swaying are made possible by internal pressure changes exerted on the cell wall. They are heavily pigmented with chlorophyll a, beta carotene, and several xanthophylls. The presence of several phycobiliproteins gives the cyanophyta their unique blue-green coloration. Food is stored in the form of glycogen.

Organism	Item Number	Media (captive care)	Reproduction	Wild habitat	Shape/Characteristic (Special Notes)
Anabaena	470176-660	Basic	Trichome fragmentation	Freshwater	filamentous; unbranched; heterocysts
Cylindrospermum	470179-866	Basic	Trichome fragmentation	Freshwater	filamentous; heterocysts & akinetes terminal
Fischerella	470179-872	Basic	Trichome fragmentation	Freshwater	true branching, dimorphic structures
Glaucocystis	470179-876	Basic	Binary fission	Freshwater	symbiont, lives within colorless host
Gloeocapsa	470176-684	Basic	Mitosis and colony fragmentation	Freshwater	colonial; concentric layers of gelatinous sheath
Gloeotrichia	470179-880	Basic	Trichome fragmentation	Freshwater	filamentous; trichomes radiating from basil heterocysts
Lyngbya	470179-884	Basic	Trichome	Freshwater	filamentous; unbranched trichome, thinly sheathed
Merismopedia	470176-612	Soil-water	Binary fission	Freshwater	colonial; sheet of many cells one cell thick
Nostoc, filamentous	470176-620	Basic	Trichome fragmentation	Freshwater	filamentous; unbranched, contorted filaments
Oscillatoria	470176-666		Trichome fragmentation	Freshwater	filamentous; unbranched trichome, thinly sheathed
Scytonema	470179-888	Basic	Trichome fragmentation	Freshwater	filamentous; displays false branching
Spirulina	470176-412	Marine	Trichome fragmentation	Marine	brackish; helically coiled filament

Green Algae:

Chlorophytes are a diverse group and are common in fresh water, saltwater, and soil. They are very similar to plants, and most botanists agree the ancestor of higher plants can be found somewhere within this group. Chlorophyte reproduction varies greatly, from asexual division to isogamy and heterogamy to oogamy. Cell walls are constructed of cellulose and pectin. The food storage product is true starch, the same as plants. This can be demonstrated by staining with IKI, which turns the starch in the algae blue-black. Green algae possess true chloroplasts, which contain the same pigments found in higher plants: chlorophyll a and b, alpha and beta carotene, and many xanthophylls.

Organism	Item Number	Media (captive care)	Wild habitat	Shape/Characteristic (Special Notes)
Carteria	470179-720	Basic	Freshwater	large cells, four flagella
Chlamydomonas reinhardtii (+)	470177-288	Basic/Proteose agar	Freshwater	small, round, biflagellated
Chlamydomonas reinhardtii (-)	470179-744	Basic/Proteose agar	Freshwater	small, round, biflagellated
Chlamydomonas moewusii (+)	470179-828	Basic/Proteose agar	Freshwater	small, round, biflagellated
Chlamydomonas moewusii (-)	470179-732	Basic/Proteose agar	Freshwater	small, round, biflagellated
Chlorella	470179-746	Basic/Proteose agar	Freshwater	small, round, non-motile
Cladophora	470176-496	Erdschreiber's	Marine	filamentous; freely branched
Closterium littorale	470179-752	Basic	Freshwater	homothallic strain
Cosmarium	470176-678	Basic	Freshwater	circular desmid
Dunaliella	470179-760	Erdschreiber's	Marine	halophilic flagellate
Eudorina	470176-630	Basic	Freshwater	colonial; with spherical, biflagellated cells
Fritschiella	470179-768	Basic	Freshwater	filamentous; displays differentiation
Gonium	470176-636	Basic	Freshwater	colonial; 4-32 cells, flattened colony
Hydrodictyon	470176-640	Basic	Freshwater	colonial; net-like, multinucleated cells
Micrasterias	470176-686	Basic	Freshwater	circular, large desmid
Microspora	470179-776	Basic	Freshwater	filamentous; H-shaped cell walls
Pandorina	470176-700	Basic	Freshwater	colonial; elliptical; made up of 16-32 cells
Pediastrum	470176-702	Basic	Freshwater	colonial; polygonal cells
Scenedesmus	470176-652	Basic	Freshwater	colonial; four cells with spines
Selenastrum	470179-800	Proteose agar	Freshwater	lunate
Spirogyra	470176-596	Soil-water	Freshwater	filamentous; spiral chloroplasts
Staurastrum	470179-802	Basic	Freshwater	triangular desmid
Stigeoclonium	470179-808	Basic	Freshwater	filamentous; produces zoospores
Ulothrix	470176-656	Basic	Freshwater	filamentous; unbranched filaments
Ulva	470176-672	Sea water	Marine	macroalga, membranous thallus; collected
Volvox aureus	470176-362	Basic/soil	Freshwater	colonial; cytoplasmic connections about the size of flagella
Volvox globator	470176-716	Basic/soil	Freshwater	colonial; thickest cytoplasmic collections
Zygnema	470176-368	Basic	Freshwater	filamentous; 2 stellate chloroplasts per cell

Diatoms:

Bacillariophytes, which occur in fresh water, salt water, and terrestrially, date back to the Cretaceous Period. They are single-celled algae with shells constructed of two overlapping valves composed of pectin and impregnated with silica; these shells can be quite ornate. Although the diatoms are single-celled organisms, they can form colonies and filaments. The group comprises two main types: centric and pennate. Centric diatoms are radially symmetrical and contain numerous plasmids, while pennate diatoms are bilaterally symmetrical and contain fewer plasmids. Many diatoms have conspicuous oil droplets within the cell, which is the photosynthetic food reserve, chrysolaminarin. The plastids of diatoms contain the pigments chlorophyll a and b, alpha and beta carotene, and several xanthophylls.

Organism	Item Number	Media (captive care)	Wild habitat	Shape/Characteristic (Special Notes)
Cyclotella	470179-756	Marine	Marine	small, centric
Navicula	470179-846	Basic	Freshwater	pennate, with bilateral symmetry
Synedra	470176-422	Basic	Freshwater	pennate, with bilateral symmetry
Thalassiosira	470179-814	Marine	Marine	brackish, centric

Dinoflagellates:

Dinoflagellates are mostly marine organisms and they compose nearly all marine plankton. They occur as free-living flagellates, sessile unicells, colonies, and filamentous forms. The fossil record of the dinoflagellates can be dated back to the Cambrian period, with some evidence suggesting they existed even earlier. The term dinoflagellate actually refers to the twirling motion exhibited by the pair of whip-like undulipodia (flagella). These flagella originate in the sulcus, or groove, of the organism. Some dinoflagellates have thecal plates embedded in their cytoplasmic membrane and are called armored; others lack these plates and are called naked. Food is stored in the form of true starch and oils. Dinoflagellates contain the pigments chlorophyll a and c, beta carotene, and several xanthophylls that often give these organisms a brownish color. Some dinoflagellates produce powerful toxins with potentially dangerous results. When "blooms" occur, the water can take on a pinkish or red hue known as a red tide. This often causes massive fish kills and can be dangerous to humans as well. Some, such as Noctiluca, are bioluminescent, and can cause ocean waves to glow at night. This is the only example of bioluminescence in the algae kingdom.

Organism	Item Number	Media (captive care)	Wild habitat	Shape/Characteristic (Special Notes)
Amphidinium	470176-428	Erdschreiber's	Marine	Lower cell half is longer and broader than upper
Peridinium	470176-434	Soil-water	Freshwater	Thick, armored plates

Euglenoids:

Typically green and unicellular, euglenoid flagellates live in fresh water. They have characteristics of both plants and animals yet are distinct in many ways. Most are photosynthetic, but many, lacking chloroplasts, are heterotrophs. Most do not reproduce sexually. Euglenoids lack a cellulose cell wall; instead, they have a proteinaceous pellicle just inside the plasmalemma. The plastids contain chlorophyll a and b, beta carotene, and xanthophylls. If placed in the dark over the course of several divisions, the chloroplasts of Euglena gracilis will become colorless. When returned to the light, the plastid structure is reformed and the green color returns.

Organism	Item Number	Media (captive care)	Wild habitat	Shape/Characteristic (Special Notes)
Euglena gracilis	470180-112	Euglena agar	Freshwater	Z strain; used in vitamin B12 assay
Euglena sp.	470175-818	Euglena	Freshwater	good for general flagellates study
Phacus	470179-898	Soil-water	Freshwater	heart-shaped

Brown Algae:

Multicellular and structurally complex, with no colonies or simple, unbranched filaments, the Phaeophytes, or brown seaweed, are primarily marine algae; less than one percent occur in fresh water. They are most abundant and reach their maximum development in the colder water of the oceans. While some species of Sargassum are found floating in enormous numbers in the Atlantic, the algae are usually firmly attached to a substrate by means of elaborate hold-fast structures. Food is stored as soluble carbohydrates such as lamarin, fats and the alcohol mannitol. The plastids of the brown algae contain pigments chlorophyll a and c, c-carotene, and xanthins; an accessory pigment, fucoxanthin, gives the algae their characteristic dark brown or olive green color. The Phaeophytes are an economically important resource, used for alginic acid, fertilizer, and food. The brown algae are all collected from marine sources.

Organism	Item Number	Media (captive care)	Wild habitat	Shape/Characteristic (Special Notes)
Dictyota	470194-680	Seawater	Marine	thin, flat forking branches; macroalgae; collected
Ectocarpus	470177-290	Seawater	Marine	filamentous; branched thallus, zoospores
Fucus	470177-296	Seawater	Marine	bladderlike floats, disk-shaped holdfasts for clinging to rocks; macroalgae; collected
Laminaria	470179-976	Seawater	Marine	long, leathery laminae and large in size; kelp; collected

Golden Algae:

Chrysophytes are a large and complex group characterized by plastids containing distinctive golden yellow pigments. The group is diverse in form, yet all feature this yellow color, permitting easy identification. Chrysophytes are usually found in cold freshwater lakes and ponds, although some marine forms are common. Synura, existing in colonies in fresh water, can cause a fishy odor in reservoirs even in low concentrations, but is not harmful.

Organism	Item Number	Media (captive care)	Wild habitat	Shape/Characteristic (Special Notes)
Coccolithophora	470179-912	Marine	Marine	coccoid, from coccoliths
Synura	470176-424	Soil-water	Freshwater	colonial; radically arranged colonies

Red Algae:

Although Rhodophytes, the most abundant type of seaweed, are widely distributed in the oceans, most occur in tropical and subtropical littoral zones. Of the 4,000 species, the vast majority are marine. Rhodophytes are not mobile—they possess no flagellated or ciliated cells at any stage of their life cycle—yet all reproduce sexually. Many red algae, such as Corallina, are calcified and encrusted appearing much like coral. This calcification has made it possible to trace the Rhodophytes to the Paleozoic Period.

Single-celled forms such as Porphyridium are a rarity. Rhodophytes are characterized by reddish plastids, called rhodoplasts, which contain the pigments chlorophyll a and d, alpha and beta carotene, some xanthophylls and phycobiliproteins.

Organism	Item Number	Media (captive care)	Wild habitat	Shape/Characteristic (Special Notes)
Bangia	470179-894	Erdschreiber's	Marine	filamentous; unbranched thallus
Batrachospermum	470194-682	Basic	Freshwater	filamentous
Corallina	470179-984	Seawater	Marine	macroalga; pink, coral like appearance; collected
Polysiphonia	470179-974	Seawater	Marine	filamentous; polysiphonious construction; collected
Porphyra	470179-978	Seawater	Marine	macroalga, long, irregular lobed; collected
Porphyridium	470179-906	Erdschreiber's	Marine	thin, gelatinous, blood red layer

Yellow-Green Algae:

Xanthophytes are highly successful in fresh water and terrestrial environments, although some marine forms also exist. The yellow-green algae have pectin-rich cellulose walls. Starch is absent and food is stored in the form of oils. Xanthophytes are characterized by yellow-green plastids (xanthoplasts) which contain pigments chlorophyll a and c, several xanthins, and beta carotene. Vaucheria is a large, macroscopic, filamentous form that was classified as a chlorophyte until pigment analysis showed the absence of chlorophyll b and true starch. Tribonema is a typical freshwater, unbranched, filamentous form which clearly demonstrates overlapping walls.

Organism	Item Number	Media (captive care)	Wild habitat	Shape/Characteristic (Special Notes)
Tribonema	470176-364	Basic	Freshwater	filamentous; H-shaped overlapping cell wall
Vaucheria	470176-710	Soil-water	Freshwater	filamentous; oogamous

Media for Algae and Cyanobacteria

See the label or tables above for the appropriate media for each specimen.

Blue-Green Algae (Cyanobacteria):
For culture of freshwater algae. Sterile. Makes one liter.
470180-750—125 mL bottle

Basic Culture Solution, Working Solution
For culture of freshwater algae. Sterile.
470175-828—1 L bottle

***Euglena* Medium**
Sterile.
470180-764—1 L bottle

Erdschreiber's Medium
For culture of marine algae. Sterile.
470180-760—1 L bottle

Soil-Water Medium
For culture of freshwater forms. Sterile.
470180-754—1 L bottle

Pond Water
Non-sterile; may contain organisms.
470180-778—1 gallon jug

Seawater
From our marine tanks. Used in culturing saltwater invertebrates or in media recipes. Non-sterile.
470177-394—1 gallon jug

Disposition

- Please dispose of excess living material in a manner to prevent spread into the environment. Consult with your school to identify their preferred method of disposal.
- You can safely use one of the following methods:
  - Treat culture with a 10% bleach solution for 24 hours (1 part bleach to 9 parts culture medium or water culture medium removed). Then rinse bleach solution down the drain with water until you can no longer smell bleach. Rinse remaining materials and containers with water and dispose of them in a general garbage container.
  - Carefully wrap specimens and their containers in a biohazard bag (without containing anything sharp that might puncture the bag) and tie closed (a twist tie works well). Autoclave the bag for 30 minutes at 121°C and at a pressure of 15 lbs. PSI. Dispose of autoclaved bag as your school recommends.

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