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Weblinks

Alga: what's in a name?

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In exam papers, you may find questions based on work with algae (the plural of alga), such as Calvin and Benson's famous experiment, the distribution of *Pleurococcus* on tree trunks, or seashore ecology. In all cases, the exam boards have to give a brief explanation of what these organisms are, e.g. 'single-celled/multicellular photosynthetic organisms'. The reason is that the term alga is not a scientific term. Why, you might well ask, do exam boards use it? The simple reason is that most experts agree it is very useful. Most authorities use it as a handy term to encompass mostly chlorophyllous, mostly non-vascular, plants that mostly prefer to live in wet places that most people would group with seaweeds. Algae include cyanobacteria — prokaryotes also referred to in the centrespread of Volume 29, No. 1 as 'blue-green algae'. All of these organisms contain chlorophyll and many have an accessory pigment that make them a beautiful, bright bluey-green (see Figure 1). Although individually tiny, given sufficient minerals (e.g. in eutrophic waters) these cyanobacteria can grow in such profusion that they form 'algal blooms', which can cover the surface of ponds and lakes (see, for example, www.youtube.com/watch?v=CDOLdF0PnA0).

Figure 1 Light microscope image of cyanobacteria (blue green algae) ×300

Algae also include single-celled organisms that some animal biologists describe as Protozoa (another non-scientific term, usually used to mean unicellular animals). Among these are the euglenids — unicellular eukaryotes, many of which are usually photoautotrophic — 'self-feeding from light energy' — like all green plants. However, many of these can lose, or be bleached of, their chlorophyll and continue life as heterotrophs — getting their energy from organic compounds. This would cause most people to describe them as animals (or Protozoa), as would the absence of the rigid cellulose cell wall that characterises most land-dwelling plants. Euglenids are bounded by a flexible, protein-based covering — look at Figure 2 and you will see cells of many different shapes. This is because they have been trapped under a coverslip on a microscope slide and so cannot swim free using their flagella, but instead show movement rather like an *Amoeba* — flexing and manoeuvring to get out of the tight spot.

Have a look at this movie www.youtube.com/watch?v=Md0PtdRxXvw to contrast the *Euglena* (the bigger cells) with the more conventional, rigid-walled green algal *Chlamydomonas* cells. Both organisms have flagella but if the euglenids were in a natural environment in a tight spot, they would stand the better chance of getting free.

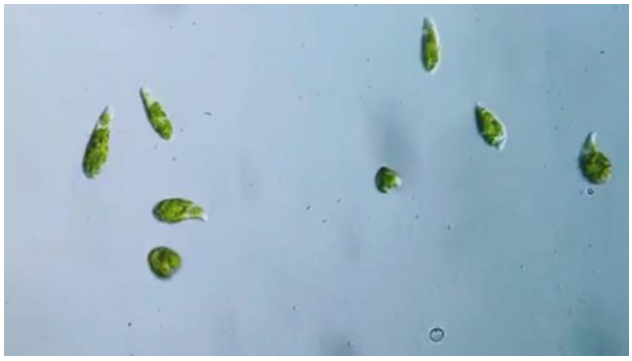

Figure 2 Light microscope image of *Euglena* cells under a cover slip on a slide ×300

Chlamydomonas is a common freshwater green alga, and there are hundreds of other freshwater algal species, ranging from its motile multicellular relative *Volvox* (*volvo* = I roll; see www.youtube.com/watch?v=v6D9OUoD7E4), which is just about big enough to be visible to the naked eye, to much larger pond 'weeds' such as *Spirogyra* (shown in Figure 3).

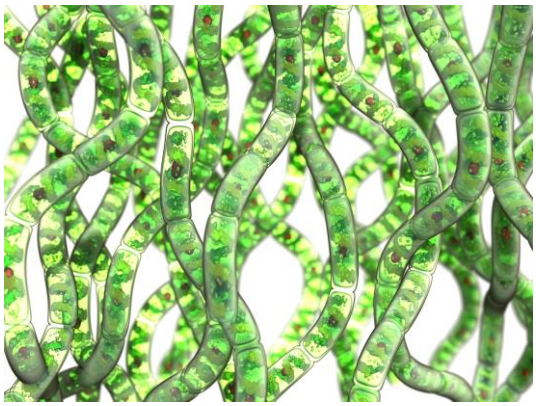

Figure 3 Light microscope image of the green alga *Spirogyra* ×70

Why the quotation marks around weeds? Well, weed is another non-scientific term used for 'plants' that are growing somewhere that humans would prefer them not to (e.g. see https://tinyurl.com/ydxesqvv). Why the quotation marks around plants? Again, this is not a scientific term and it is difficult to give you a consensus on when to use it — have a look in your specification and textbooks and you will probably find a variety of uses. For example, in the AQA A-level biology specification you will find 'plants and algae' mentioned. In the AQA A-level Biology 2 textbook by Lowrie et al., published by Hodder Education, in the section on eutrophication, 'aquatic plants and algae' are discussed in one paragraph, 'aquatic plants, and especially algae' in the next. I am comfortable with including algae when I talk about plants but as neither of these words is a scientific term they shouldn't trouble you.

People who insist on distinguishing algae from plants usually justify this on the basis of the non-vascular nature of algae. I expect you can guess what is coming by now — the word 'vascular' is also not a scientific term. Most definitions in dictionaries include the concept of tissues that conduct

materials from one location to another. You are probably familiar with phloem as an example of a conducting tissue in so-called vascular plants. This tissue transports photosynthates from the leaves to the roots of most land-dwelling plants. You may have heard about studies that have tracked radiolabelled carbon fixed in photosynthesis from leaves, down stems and into roots far faster than could possibly happen via diffusion. The problem with describing algae as lacking such conducting tissue is that some of them do have these tissues. The algae that dominate underwater forests include 60 metre long structures such as those shown in Figure 4.

Figure 4 View from the base of a canopy of an underwater forest formed by the large brown alga *Macrocystis*

The leafy canopy is tens of metres above the anchoring structures, to which research has shown photosynthates are transported at the same pace as in the phloem of land-dwelling plants. (Notice that I did not describe these organisms as seaweeds, as they form the basis of one of the most productive ecosystems on the planet and are of huge benefit to humans. They are certainly not growing somewhere we would prefer they didn't — but I am happy to concede that most people can agree on what 'seaweeds' are…).