



TOPIC NOTES FOR BIOL1301: INTRODUCTION TO MARINE BIOLOGY

Completed in 2016 with High Distinction

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WK1: The Science of Marine Biology - (Associate Professor Luciana Moller)

Marine Biology: It is the study of organisms that can be found in the sea and environments with a certain degree of salinity e.g. marshlands, mangroves, etc.

Oceanography: the study of the non-living environment of the sea.

SONAR (Sound navigation ranging) is used to detect underwater echoes, as well as map seafloor depths and formations.

SCUBA (Self-contained underwater breathing apparatus) allow for people to spend extended amounts of time underwater at greater depths.

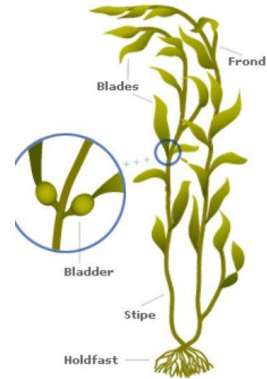
Induction observations are used to arrive at general principles while deduction reasoning from general principles lead to a specific conclusion.

WK2: Seaweeds & Marine Plants - (Professor Peter Fairweather)

Both of these groups share the trait of being photosynthesises, converting carbon dioxide and water into sugar and oxygen.



Seaweeds: consist of multicellular algae which can be seen by the naked eye (therefore macroalgae or macrophytes). They are primarily eukaryotic protists with the exception of the blue-green algae (cyanobacteria) which are prokaryotes. The seaweeds are also said to be 'colour coded' and can be separated into either green, brown or red. A unique feature of seaweeds is that all parts of the organism is capable of photosynthesis.



The body of a seaweed is called the thallus, which primarily consists of three parts, the blade, stipe and holdfast. The blade includes leaf like structures which exist to increase surface area for photosynthesis. The stipe exists for support of the organisms similar to stems in true plants. The holdfast is a root-like structure that is used for the attachment of the organism to a surface and unlike true plant roots cannot absorb nutrients. Some seaweeds may also possess pneumatocysts which act as floats and assist in holding the organism up within the water column.

Seaweeds are utilised by humans for food and resources. They can be harvested for direct usage in food, particularly in Asian countries in meals such as sushi. Specific chemicals can also be extracted from seaweed, which are used in products including ice cream, toothpaste and cheese.

Green algae: encompasses the phylum Chlorophyta which consists of approximately 7,000 species with only about 10% being marine. These normally possess a green thallus and have chlorophyll types A., B., and carotenoids. Excess energy is stored as starch.

It is also believed that they are closely related to true plants due to common similarities regarding chlorophyll types, energy reservation and genetics.

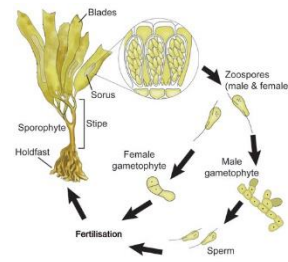
Brown Algae: encompasses the phylum Phaeophyta (also known as *heterokoniophyta*) which consists of 1,500 species with majority being marine. The thallus is normally olive green to dark brown in colour and they possess chlorophylls A, C and fucoxanthin pigments. These are important primary producers on rocky coastlines of cooler regions, particularly as they include some of the largest and complex seaweeds (kelp) which create a biodiverse habitat for many species.

- Kelps: are largest of the brown algae's, which can grow up to 60 metres long. They are commonly found in temperate and subpolar regions where they produce an environment referred as a kelp forest. These organisms can also (and are) commercially harvested, particularly off the coast of westerns North America and locally in the Southeast S.A.

Red Algae: encompasses the phylum Rhodophyta which consists of approximately 4,000 species with majority being marine. Most are filamentous with some possessing a thallus of thin blades. Some red algae are also coralline whereby they produce calcium carbonate similarly to corals. They also have the chlorophyll A and phycobilins pigments.

Seaweeds can reproduce through both asexual and sexual reproduction. Asexual reproduction occurs through vegetative means whereby **fragments of the thallus can produce a new individual**. Sexual reproduction involves the production of gametes. However, seaweeds can also have complex reproduction which differs in each species. This includes **alternation of generations** (a sporophyte generation followed by a gametophyte generation and vice-versa).

- **Gametophytes**: plants produce gametes (sexual reproduction). These produce haploid cells (egg & sperm) via meiosis which can fuse to form a diploid zygote.
- **Sporophytes**: plants that produce spores (asexual reproduction). These produce spores, which divide mitotically to produce haploid cells.



True marine plants: belonging to the Kingdom Plantae, this consists of multicellular photosynthetic organisms which possess chlorophylls A & B as well as cell walls. Energy is reserved as starch and there is alternation of generations in reproduction.

Flowering plants (**Angiosperms**) consists of approximately 250,000 species with less than 300 marine species including seagrasses, mangroves and saltmarsh plants. **They possess true leaves, stems and roots with specialised conducting tissues**. Plants that are adapted to high salinity environments are referred as **halophytes**.

- **Seagrasses**: they are about 60 species of marine flowering plants commonly found in temperate and tropical regions. They possess generally small, inconspicuous flowers with large pollen that is dispersed by water currents. **They grow horizontally via rhizomes and have roots and upright growing shoots**. The seagrasses commonly form beds/meadows in sheltered, shallow water.
- **Mangroves**: includes approximately 70 unrelated flowering plant species found in tropical and subtropical regions. These are adapted to intertidal areas and can be exposed to seawater up to half of the day. They generally grow higher than 0.5 metres consisting of trees and large shrubs. **A forest of mangrove plants is collectively called a mangal**, which is high in biodiversity. **Some mangroves possess seeds that germinate while still connected to the parent plant** allowing the seedling to begin developing before they fall from the parent plant.
- **Saltmarsh plants**: these are intertidal plants, which are highly salt-tolerant and are associated with estuaries. This group includes succulents, grasses and shrubs.