Stramenopiles IV (Ch. 14): Phaeophyceae or Brown Algae

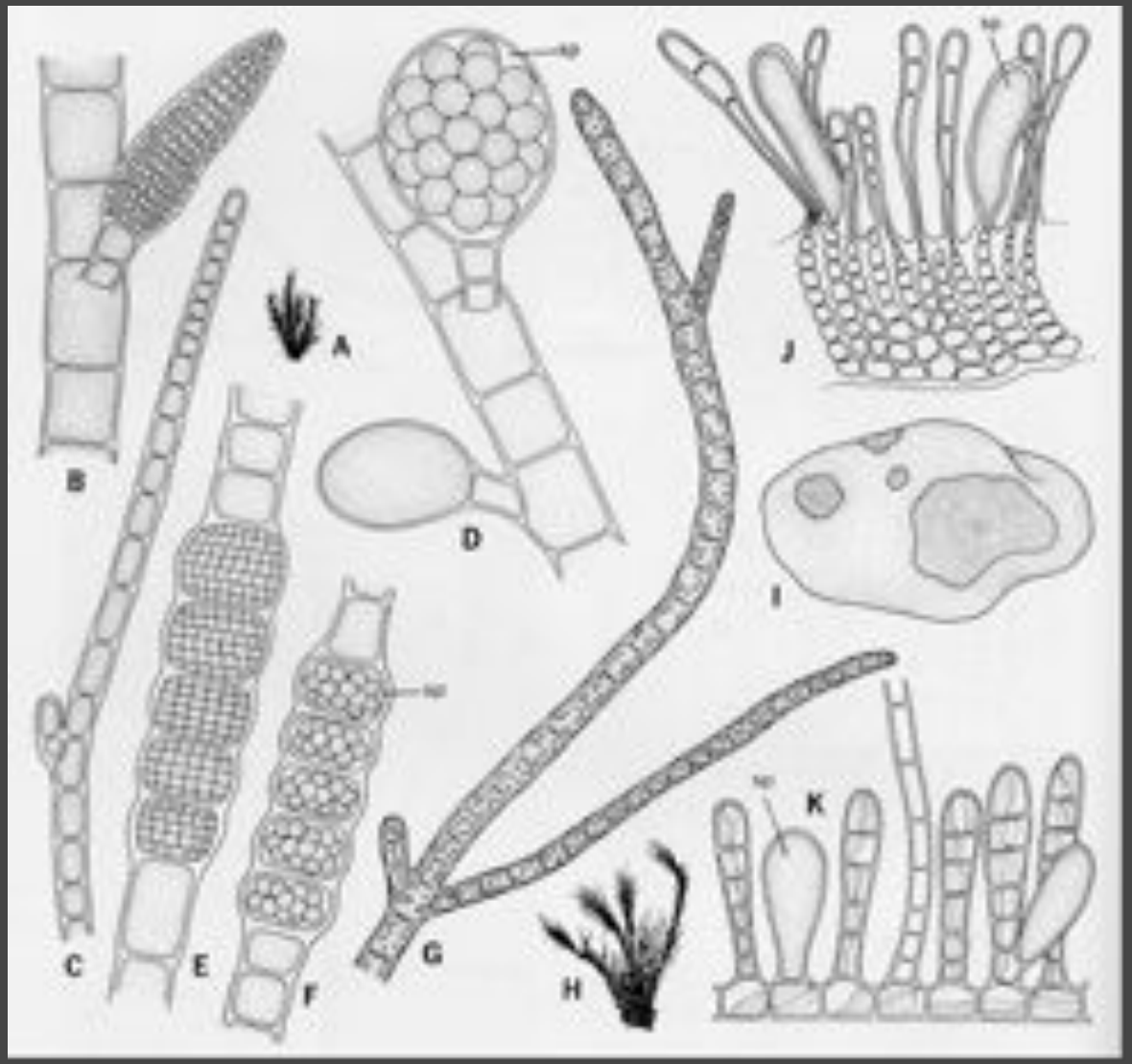
PHAEOPHYCEAE

- 250 genera and +1500 spp
- Seaweeds: large, complex thalli (kelp); some filaments (no unicells or colonies)
- Almost all are marine (@ 5 FW genera)
- Chlorophylls *a* & *c*, β-carotene, fucoxanthin & violaxanthin
- PER
- Physodes (tannins = phenols)
- Walls: cellulose fibers with alginic acid (alginate)
- Storage products are:
  - laminarin (β-1,3 glucan),
  - mannitol (sap & "antifreeze")
  - lipids
- Flagella: Heterokont, of course!
- Fucans or fucoidins are sulfated sugars

How these algae grow?

GROWTH MODES AND MERISTEMS

DIFFUSE GROWTH: cell division is not localized: Ectocarpales

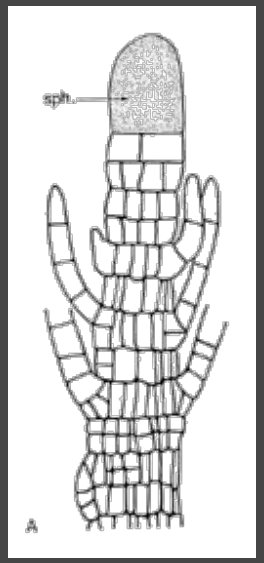


GROWTH MODES AND MERISTEMS

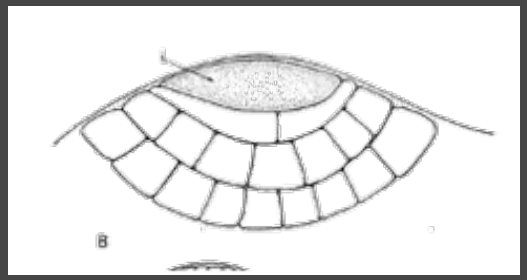
DIFFUSE GROWTH: cell division is not localized: Ectocarpales

MERISTEMATIC GROWTH: localized regions of cell division

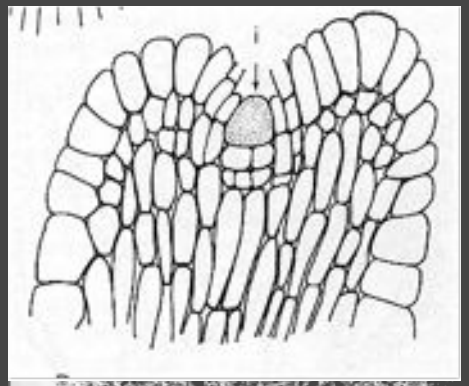
1. **Apical cell**
    - **Single: Sphacelariales, Dictyotales, Fucales**
    - **Marginal: Dictyotales**

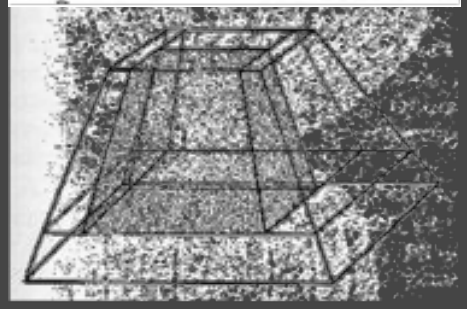


Sphacelaria

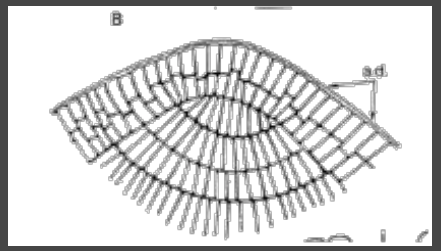


Dictyota





Fucus



Padina

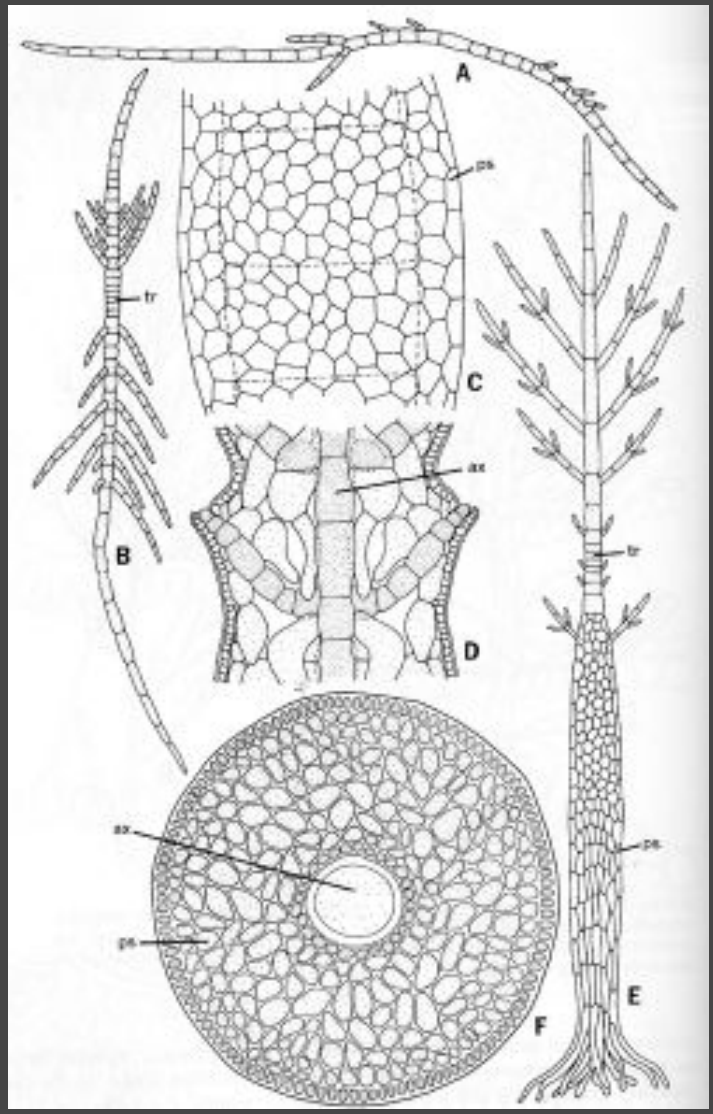
GROWTH MODES AND MERISTEMS

DIFFUSE GROWTH: cell division is not localized: Ectocarpales

MERISTEMATIC GROWTH: localized regions of cell division

1. **Apical cell**
2. **Trichothalic: Desmarestiales, Cutleriales**

Desmarestia



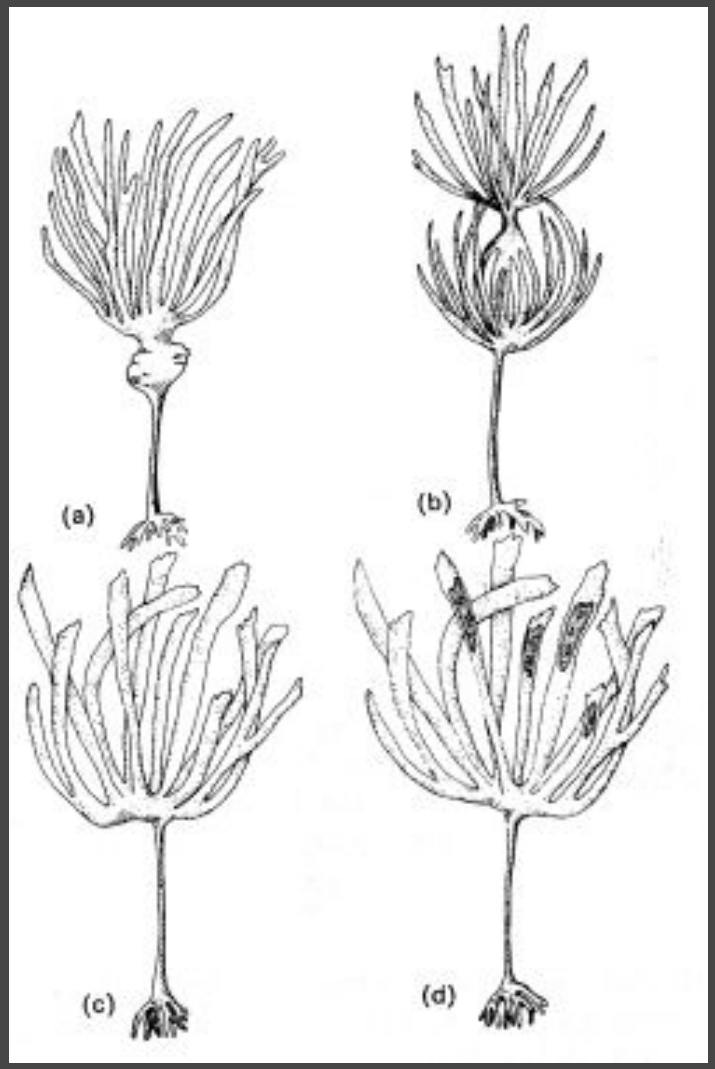
GROWTH MODES AND MERISTEMS

DIFFUSE GROWTH: cell division is not localized: Ectocarpales

MERISTEMATIC GROWTH: localized regions of cell division

1. **Apical cell**
2. **Trichothalic: Desmarestiales, Cutleriales**
3. **Intercalary: Laminariales**

Laminaria

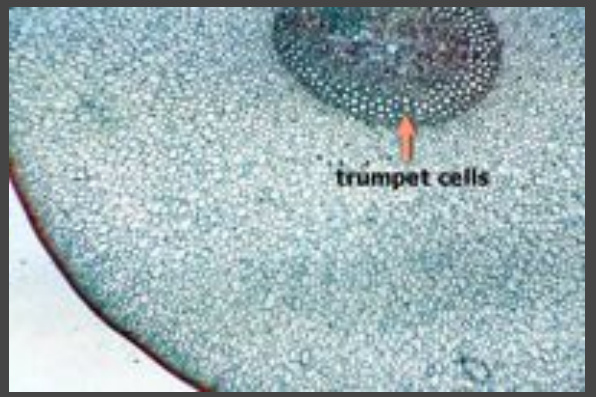


GROWTH MODES AND MERISTEMS

DIFFUSE GROWTH: cell division is not localized: Ectocarpales

MERISTEMATIC GROWTH: localized regions of cell division

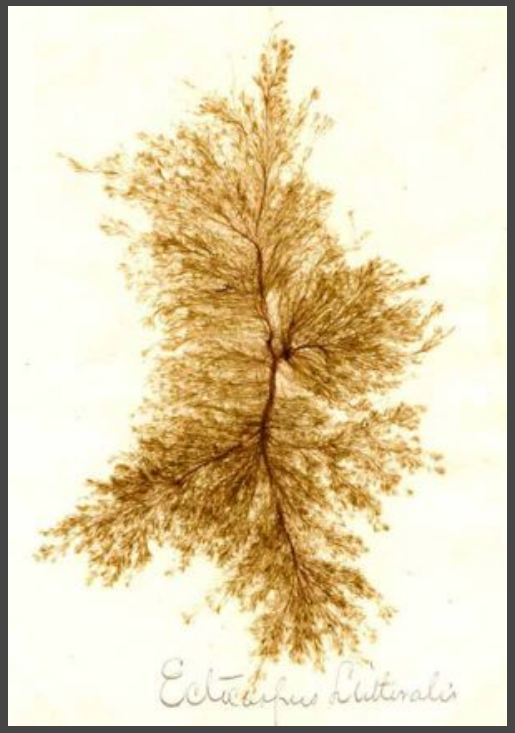
1. **Apical cell**
2. **Trichothalic: Desmarestiales, Cutleriales**
3. **Intercalaly: Laminariales**
4. **Meristoderm: Laminariales, Fucales**



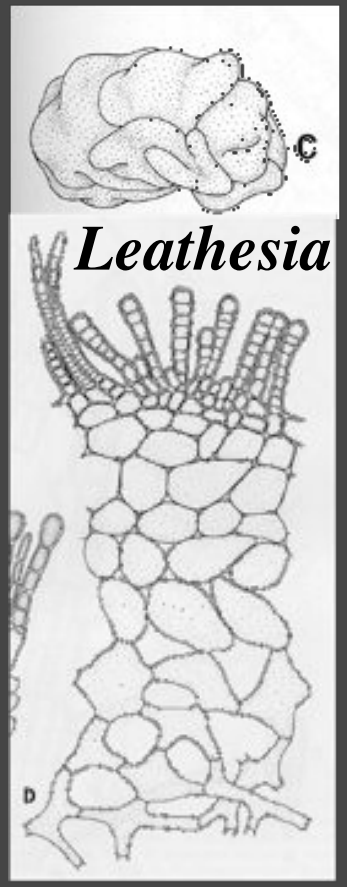
How these algae are organized?

MORPHOLOGY - STRUCTURAL FORMS

1. Haplostichous (filamentous or pseudoparenchymatous)
    a. Simple heterotrichy (e.g. *Ectocarpus*)
    b. Heterotrichous held together with mucilage (pseudoparenchymatous) (e.g. *Leathesia*)
    d. Crusts (e.g. *Ralfsia*)

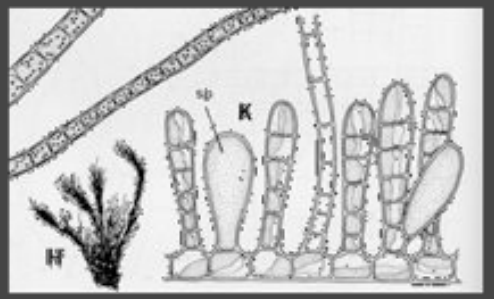


Ectocarpus



Leathesia

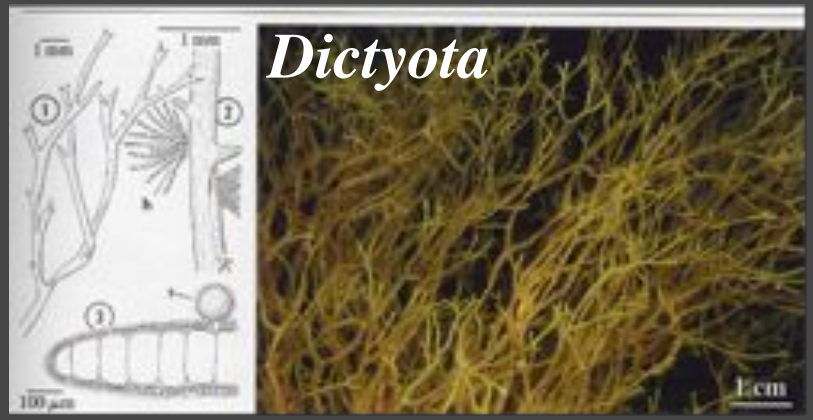
Ralfsia

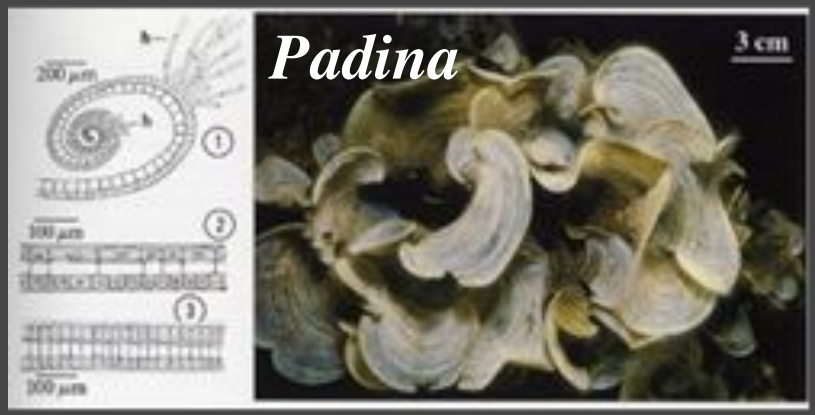


MORPHOLOGY - STRUCTURAL FORMS

1. Haplostichous (filamentous or pseudoparenchymatous)
2. Polystichous (true parenchymatous)
    a. Terete axes unbranched (e.g. *Scytosiphon*)
    b. Solid axes branched (e.g. *Dictyota*)
    c. Blades (e.g. *Padina*)
    d. Complex thalli (Laminariales & Fucales, aka kelps)

Scytosiphon



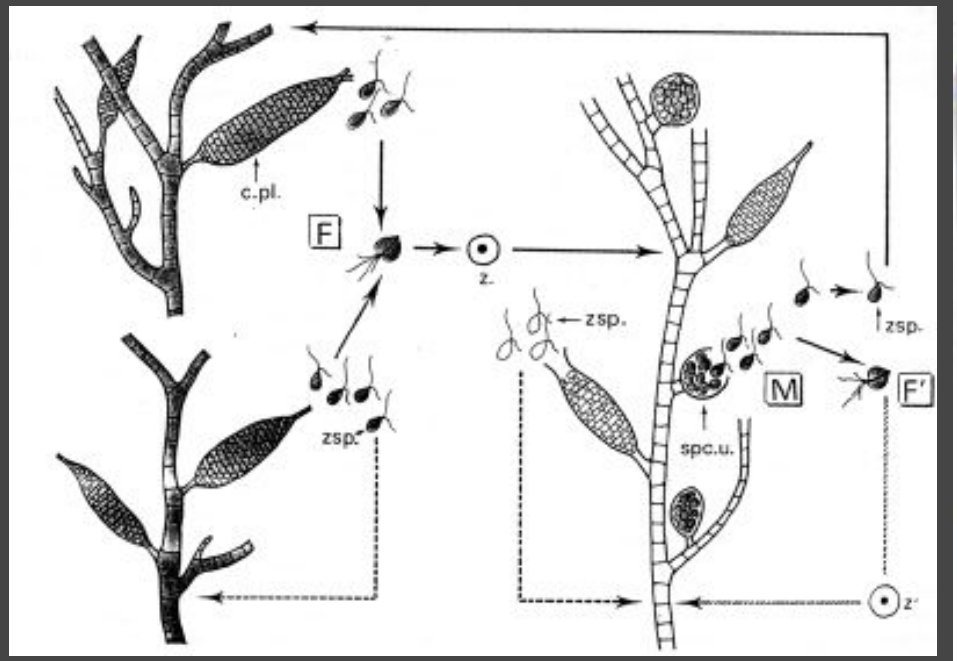


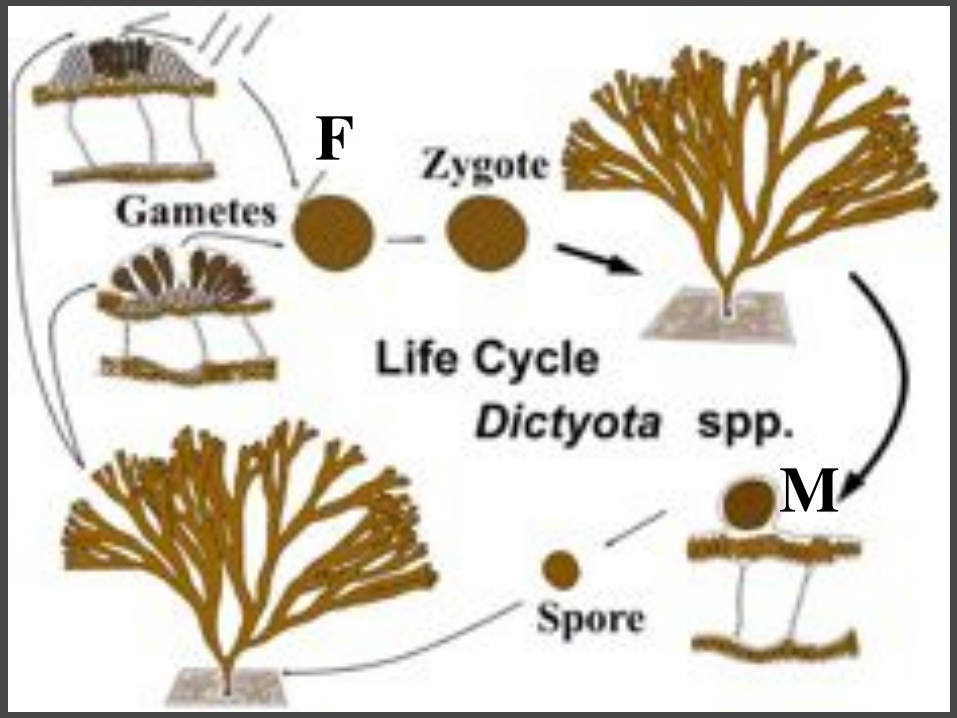
Nereocystis
"kelp"

What type of life cycles these algae show?

LIFE CYCLES AND CLASSIFICATION OF BROWN ALGAE

1. Isogeneratae - alternation of isomorphic generations
    a. Isogamy & anisogamy (e.g. Ectocarpales)
    b. Oogamy (Dictyotales)

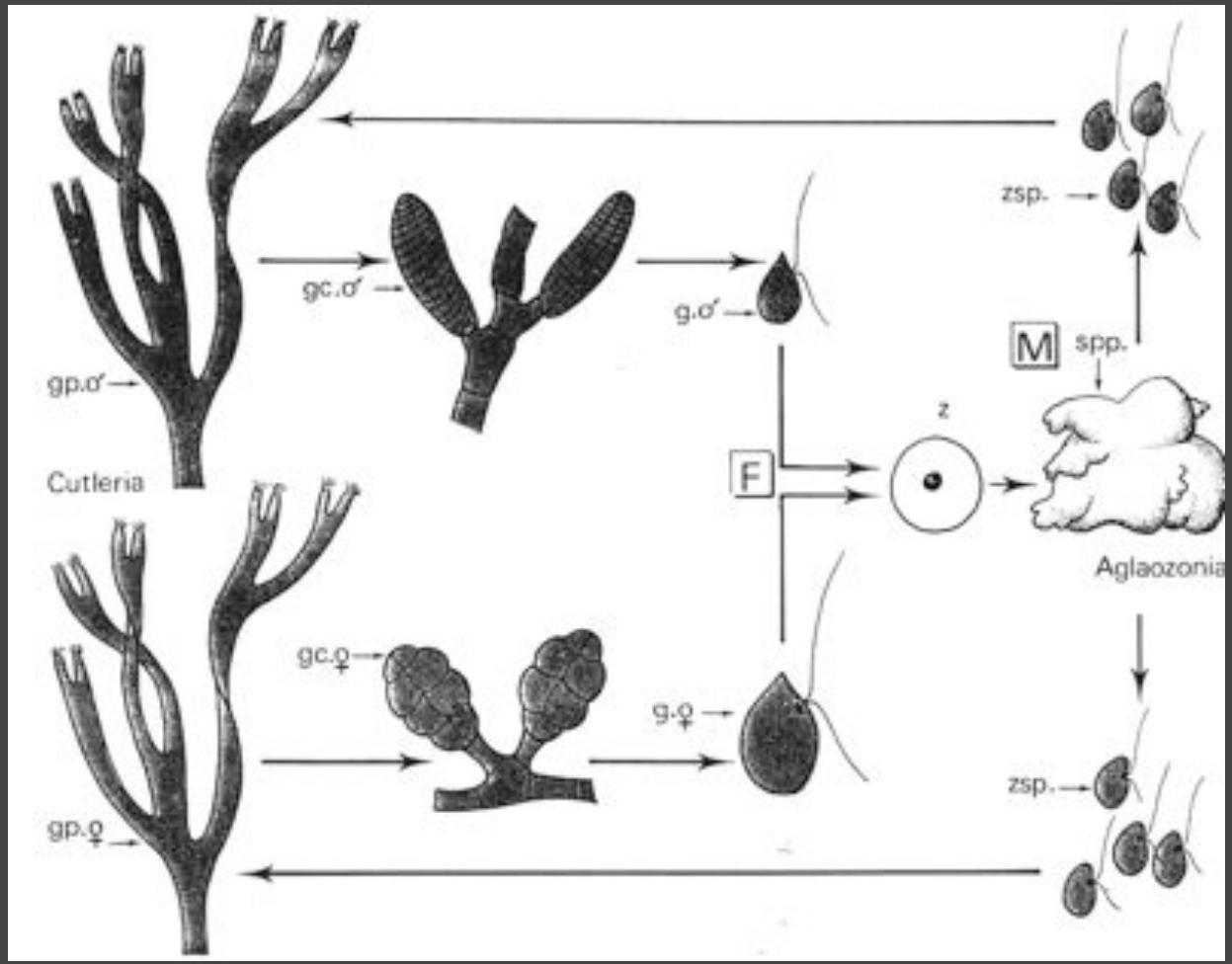




LIFE CYCLES AND CLASSIFICATION OF BROWN ALGAE

1. Isogeneratae - alternation of isomorphic generations
2. Heterogeneratae - altern. of heteromorphic generations
   a. Sporophytes small (Cutleriales)

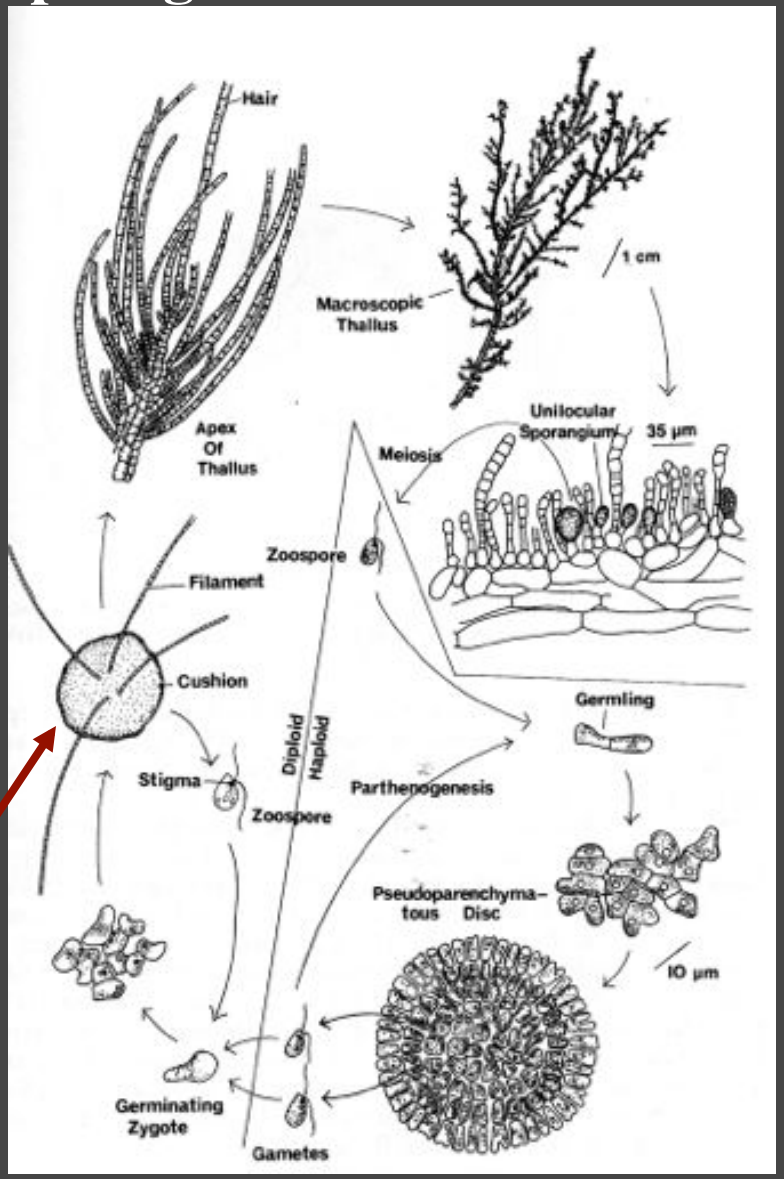
Cutleria



LIFE CYCLES AND CLASSIFICATION OF BROWN ALGAE

1. Isogeneratae - alternation of isomorphic generations
2. Heterogeneratae - altern. of heteromorphic generations
   a. Sporophytes small (Cutleriales)
   b. Sporophytes large
      i. isogamous (Chordariales)

Haplogloia



Plethysmothallus: juvenile filamentous stage in the sporophytic generation that can multiply itself by spores

LIFE CYCLES AND CLASSIFICATION OF BROWN ALGAE

1. Isogeneratae - alternation of isomorphic generations
2. Heterogeneratae - altern. of heteromorphic generations
    a. Sporophytes small (Cutleriales)
    b. Sporophytes large
        i. isogamous (Chordariales)
        ii. oogamous (Laminariales)

Laminaria

LIFE CYCLES AND CLASSIFICATION OF BROWN ALGAE

1. Isogeneratae - alternation of isomorphic generations
2. Heterogeneratae - altern. of heteromorphic generations
3. Cyclosporae - W/o alternation of generations: Fucales

Fucus