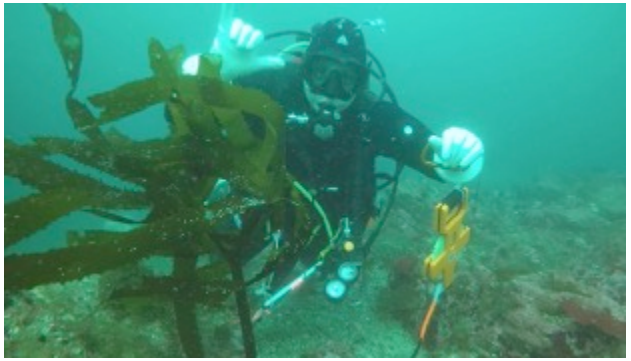


SUBTIDAL KELP SPECIES
Field Guide

Prepared by:

Jenn Burt & Tanya Prinzing

(Simon Fraser University)

May 2016

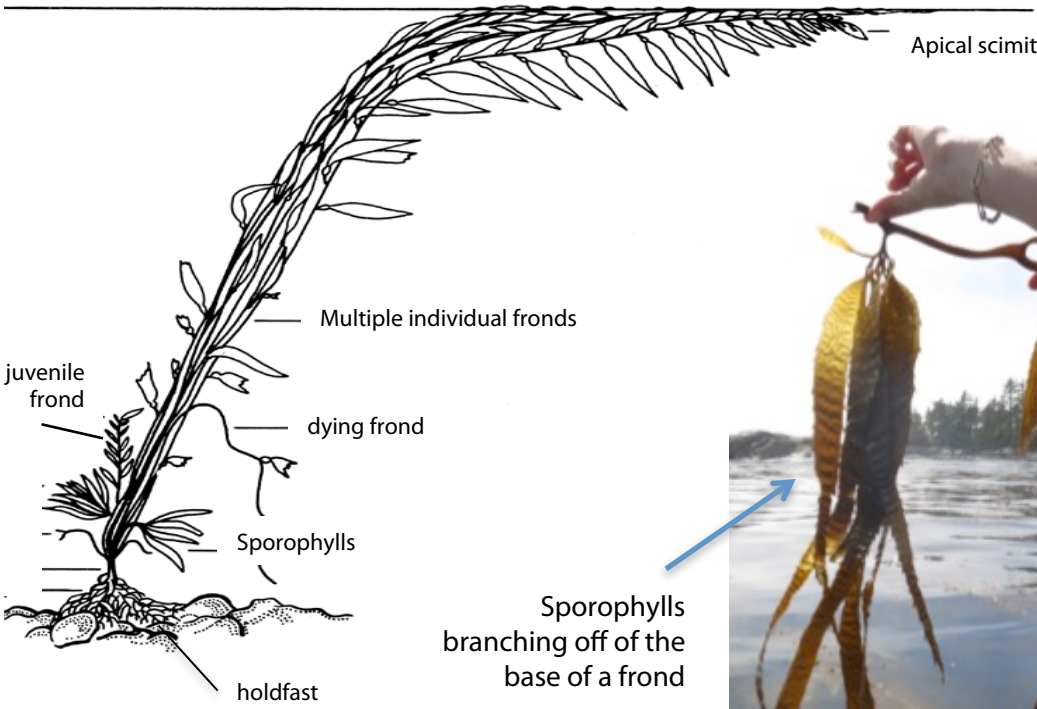
Hakai

Science on the Coastal Margin

Macrocystis pyrifera

IDENTIFICATION

- Canopy kelp species
- Branched holdfast with root-like haptera
- Each plant is composed of many vine-like fronds that have multiple blades.
- Blades have gas [CO] filled pneumatocysts at their base and are wrinkled with marginal teeth
- Sporophylls branch off from the base of fronds – are slightly narrower than the other regular blades and may appear 'whitish' when spores present (ie. Reproductive)
- Perennial species



OCCURRENCE

Semi-exposed habitats, preferring more sheltered habitat than *Nereocystis luetkeana*

Photos: Jenn Burt

Macrocystis pyrifera (Juvenile)

IDENTIFICATION

- Small delicate wrinkled blade
- Can see beginning of branched haptera forming the holdfast
- Can sometimes see the initial splitting of the blade

Photos: Jenn Burt

Nereocystis luetkeana

IDENTIFICATION

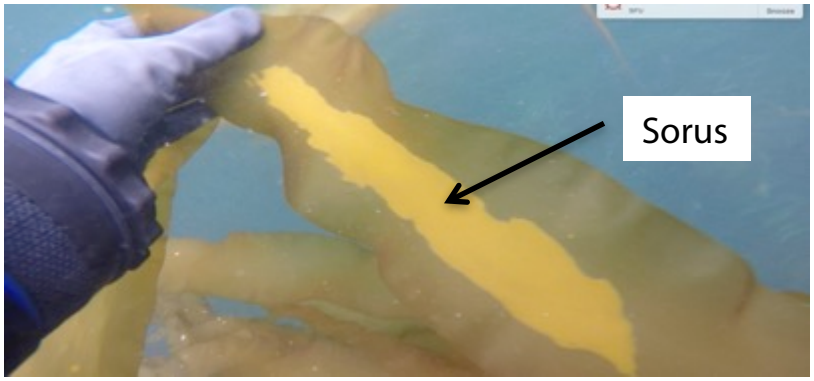
- Canopy kelp species
- Branched holdfast with root-like haptera
- Cylindrical stipe terminating in a single gas [CO] filled pneumatocyst, from which many blades develop.
- Sori develop on blades during reproductive season (late June onwards)
- Annual species

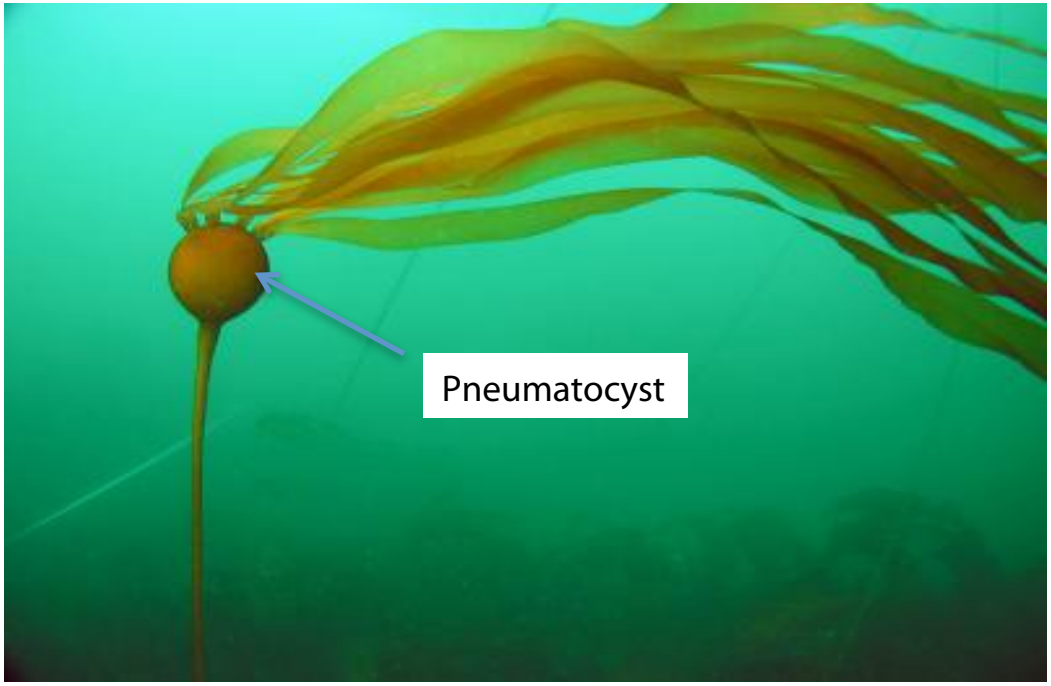
OCCURRENCE

Semi-exposed to exposed rocky reefs, generally more exposed than *M. pyrifera,* can be in areas with current

SIMILAR SPECIES

Juvenile *Nereo* look very similar to other baby kelps and especially *Desmarestia foliacea* (see next page)





Photos: Jenn Burt

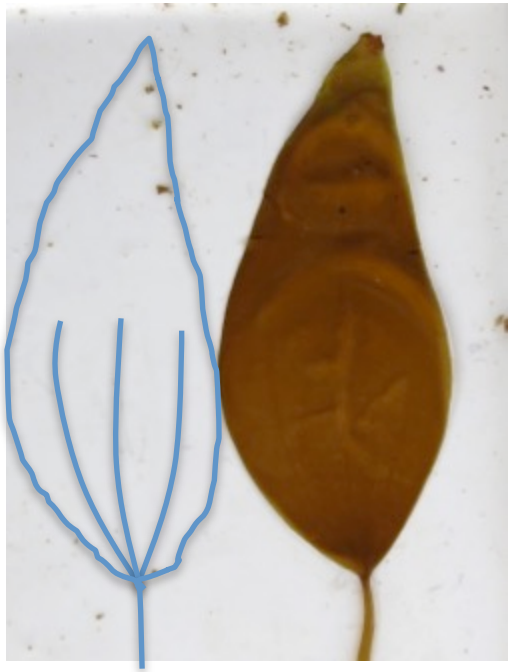
Nereocystis luetkeana (Juvenile)

IDENTIFICATION

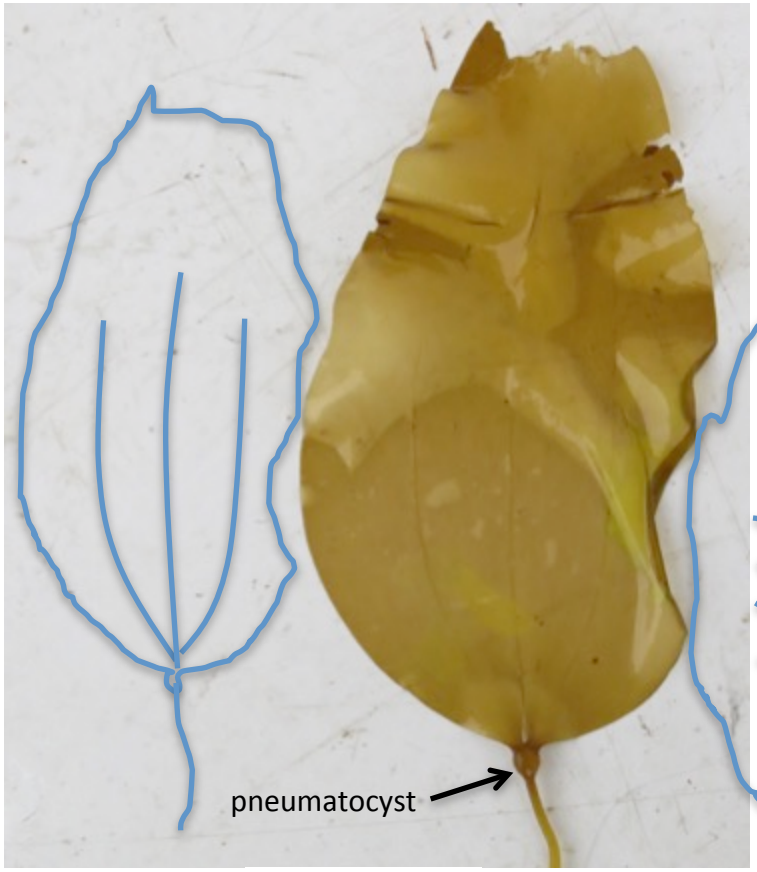
- Very young *Nereocystis* have just a single blade and a stipe – **look for characteristic three faint "veins" in blade**
- Pneumatocyst can be seen just starting to develop as juveniles grow
- Blade is very thin and delicate

SIMILAR SPECIES

Desmarestia foliacea: this species can look VERY SIMILAR to juvenile *Nereocystis*. Distinguish by observing horizontal faint "veins" on blade (bottom right)



N. luetkeana

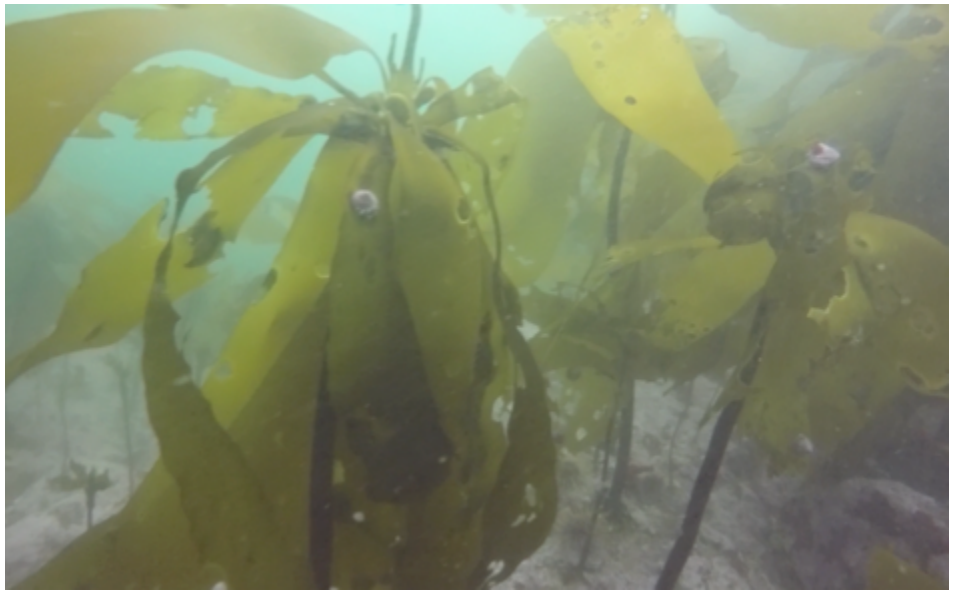


N. luetkeana

D. foliacea

Photos: Jenn Burt

Pterygophora californica



IDENTIFICATION

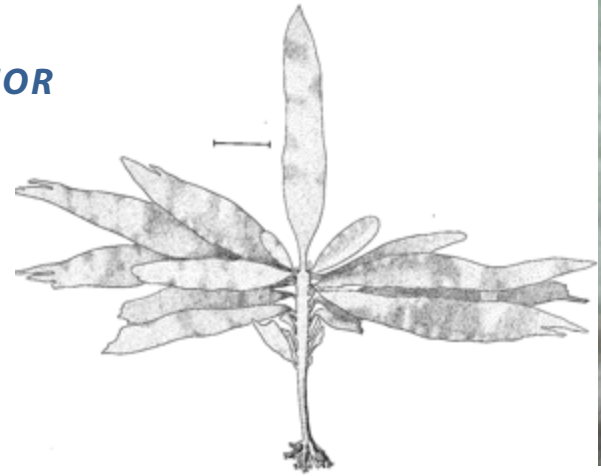
- Erect kelp with stiff woody round stipe (can get thick!)
- Distal end of stipe flattened with many long smooth blades branching off (lateral ones are sporophylls, only one terminal blade at the top)
- Dark stipe, often lighter green/brown blades
- Branched holdfast with root-like haptera
- Sporophylls/blades can be heavily grazed and tattered
- Long-lived perennial species

OCCURRENCE

Subtidal zone of more exposed coasts
Shallow subtidal to 15m

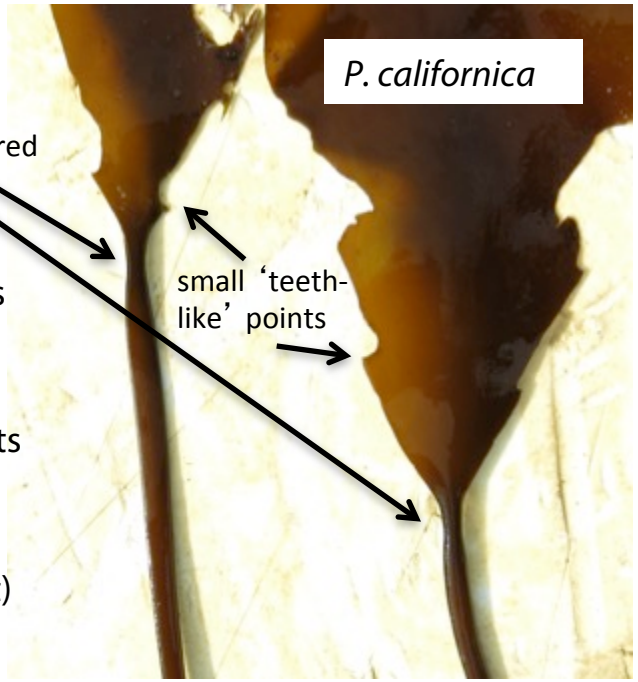
WHAT TO LOOK FOR

Long, woody stipe with a flat distal end that has sporophylls/blades growing from each side



Photos: Jenn Burt

Pterygophora californica (Juvenile)

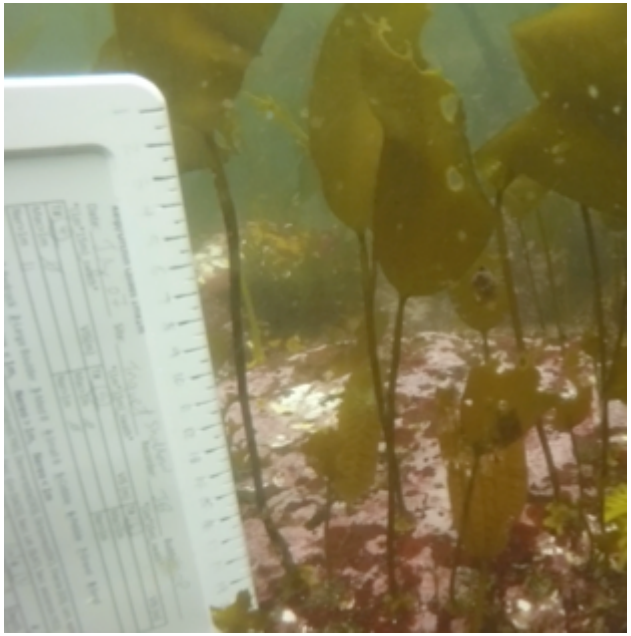


IDENTIFICATION

- Young individuals have a single blade, no sporophylls
- Distal end of stipe is thinner and slightly tapered inward just before blade initiates (key feature)
- Blade can have some irregular 'little teeth-like" points (not always, but if present, confirms ID)
- Blades may be heavily grazed, sometimes almost completely eaten (blade can re-grow if meristem intact)

WHAT TO LOOK FOR

Narrow tapered section stipe near blade origin
1-2 'teeth' or 'points' at blade base



SIMILAR SPECIES

Laminaria setchellii juvenile can look very similar but has non-tapered distal stipe, smooth base of blade, and sometimes a subtle colour change at blade base where new blade has grown on perennial stipe (see left photo).

Photos: Jenn Burt

Ecklonia arborea (previously *Eisenia arborea)*

IDENTIFICATION

- ▶Round, long stipe with distinct "Y-shaped" fork
- ▶Flat, narrow strap like blades are corrugated with distinct 'toothed' edges
- ▶Branched holdfast with root-like haptera
- ▶Perennial species

OCCURRENCE

Shallow subtidal down to 10m+, often exposed areas

WHAT TO LOOK FOR

Fork in stipe is very distinct
2 clusters of blades with **toothed texture of blade edges**

SIMILAR SPECIES

Pterygophora californica has similar upright form, but no fork in stipe and no 'teeth' on blade margins.

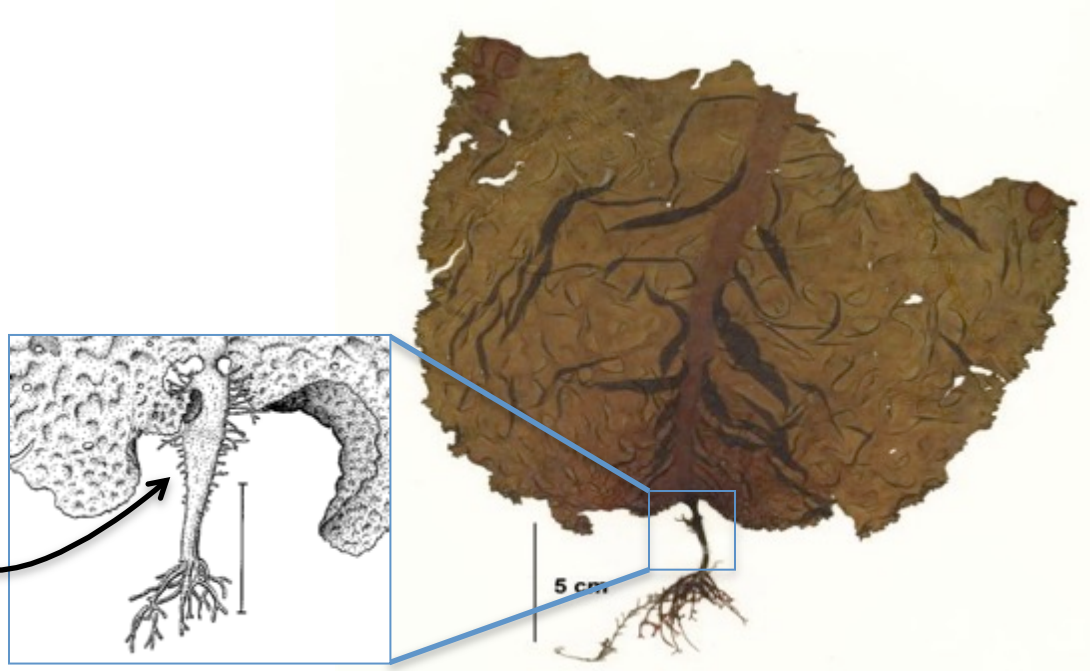
Juvenile *E. arborea*

Photos: Jenn Burt

Agarum fimbriatum

IDENTIFICATION

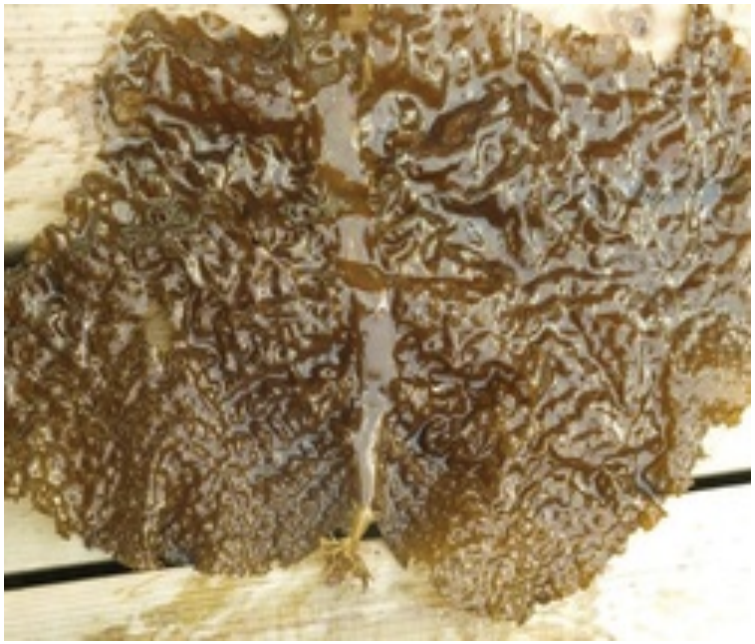
- Wrinkly large brown blade with bullations and scattered/irregular holes
- Can be very large (up to 1m+ long)
- Broad, flattened midrib
- Branched holdfast with root-like haptera
- Distal end of blade is often tattered and torn
- Flattened stipe with fimbriations (projections) – key feature
- Perennial species



OCCURRENCE

Subtidal to 20m (can be deep!)
Semi-protected to semi-exposed habitats

Juvenile *A. fimbriatum*



WHAT TO LOOK FOR

Has distinct midrib
Fimbrea on stipe: *A. clathratum* has a smooth stipe
Irregular holes: often less than *A. clathratum,* but not always
Flat stipe: unlike *A. clathratum, which* is round
Note: Juveniles may not have fimbriae, look for flattened stipe

SIMILAR SPECIES

Agarum clathratum

Photos: Jenn Burt

Agarum clathratum

IDENTIFICATION

- Wrinkly large brown blade with bullations and somewhat regular holes
- Can be very large (up to 1m+ long)
- Broad, flattened midrib
- Branched holdfast with root-like haptera
- Distal end of blade is often tattered and torn
- Smooth, rounded stipe (key feature)
- Perennial species

OCCURRENCE

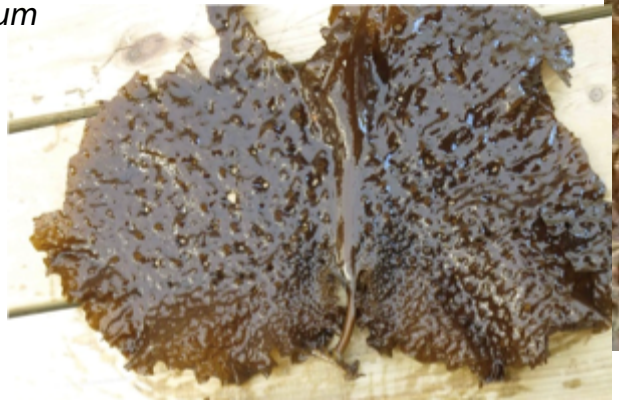
Subtidal to 20m (can be deep!)
Semi-protected habitat

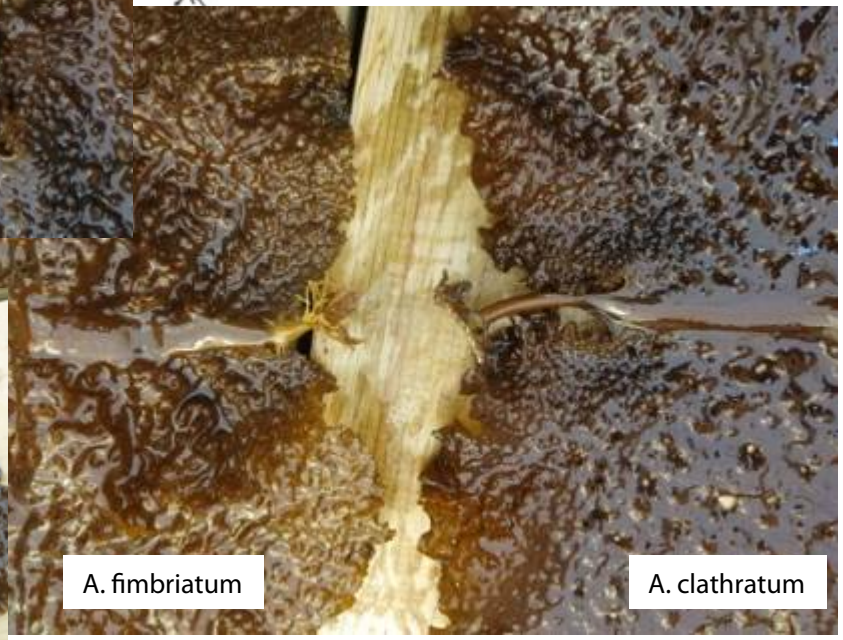
WHAT TO LOOK FOR

Smooth and rounded stipe (no fimbriae)
Single large blade with **many holes**
Longer stipe than *A. fimbriatum*

SIMILAR SPECIES

Agarum fimbriatum





A. fimbriatum

A. clathratum

Photos: Jenn Burt

Alaria marginata

IDENTIFICATION

- Thin long blade with solid midrib
- Elliptical sporophylls branch out from stipe, just below the blade
- Stipe is cylindrical near base, flattened near blade
- Branched holdfast with root-like haptera
- Annual species

OCCURRENCE

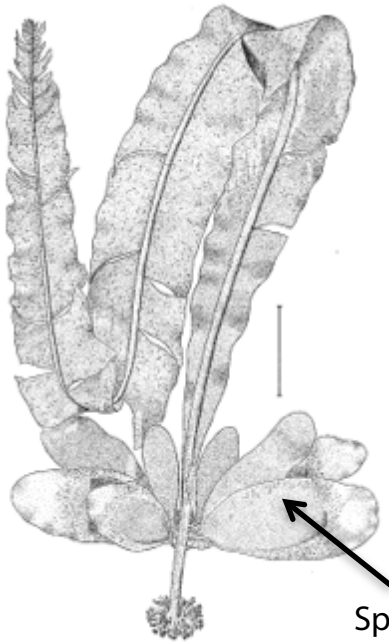
Mid to low intertidal (ie. shallow), semi-protected to exposed habitats

WHAT TO LOOK FOR

Distinct thin main blade with thin midrib, **Sporophyll bunches** emerging from base of blade

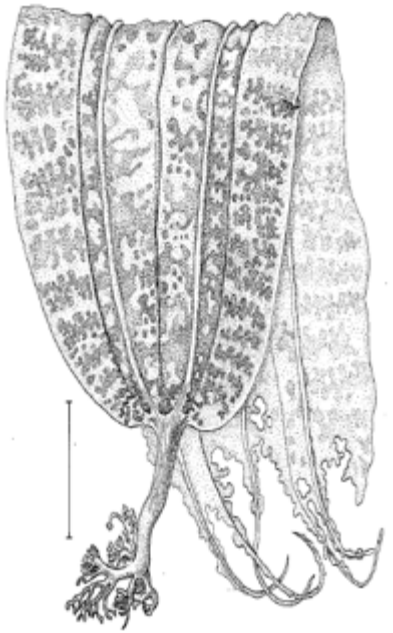
SIMILAR SPECIES

Alaria nana used to be a distinct species, but now all species called *A. marginata*
Pleurophycus gardneri – has a much wider midrib and no branching sporophylls



Photos: Jenn Burt

Costaria costata



IDENTIFICATION

- Single tapering blade with 5 parallel ribs running its length (3 ribs on one side, 2 on the reverse side)
- Branched holdfast with root-like haptera
- Blade is often puckered and wrinkled
- Stipe has obvious grooves/ridges/striations
- Annual species

OCCURRENCE

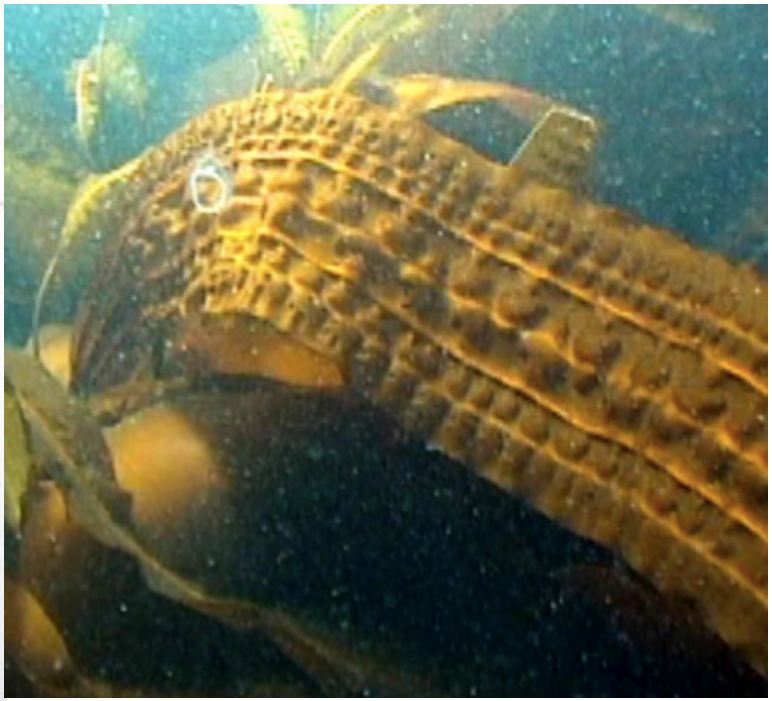
Low intertidal to upper subtidal, semi-protected to semi-exposed habitats

WHAT TO LOOK FOR

5 ribs on a single large, **puckered blade**

SIMILAR SPECIES

Three-ribbed *Cymathaere triplicata*



Photos: (left) Jenn Burt, right (www.racerocks.com)

Cymathaere triplicata

IDENTIFICATION

- Single, long linear blade with three distinct ribs
- Often distinct lighter yellowy/brown colour
- Smooth surface with no folds/wrinkles
- Discoidal holdfast
- Smooth, short stipe
- Annual species

OCCURRENCE

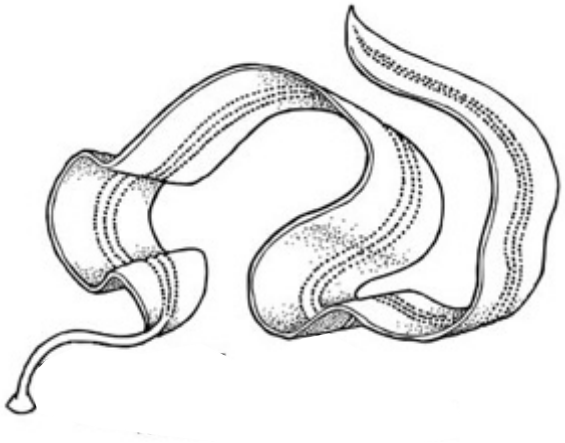
Low intertidal to upper subtidal
semi-protected to semi-exposed habitats

WHAT TO LOOK FOR

Three ribs on a single large, long blade
Often grow in groups (top photo)
Discoid holdfast

SIMILAR SPECIES

Costaria costata, has 5 ribs, with a grooved stipe, darker colour and is more puckered



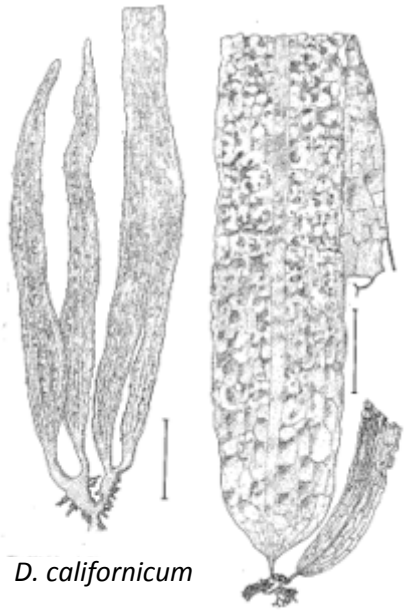
Photos: Jenn Burt

Dictyoneurum reticulatam & *Dictyoneurum californicum*

(ID and photos below show *D. reticulata*)

IDENTIFICATION

- Blades with distinct "rectangular-shaped" reticulations
- Branched holdfast with root-like haptera
- Blades often golden brown
- *D. reticulatam* has flattened midrib that runs the length of the blade (not in *D. californicum*)
- *D. reticulatam* blade is more broad; *D. californicum* is narrower
- Perennial species



D. californicum

D. reticulatam

OCCURRENCE

Not commonly encountered, except at certain sites, often in clumps
Upper subtidal region, likes surge/surf

WHAT TO LOOK FOR

Distinct geometric bullations (almost honeycomb shaped)
Flattened midrib

Photos: (left) Mark Wunsch (right) Jenn Burt

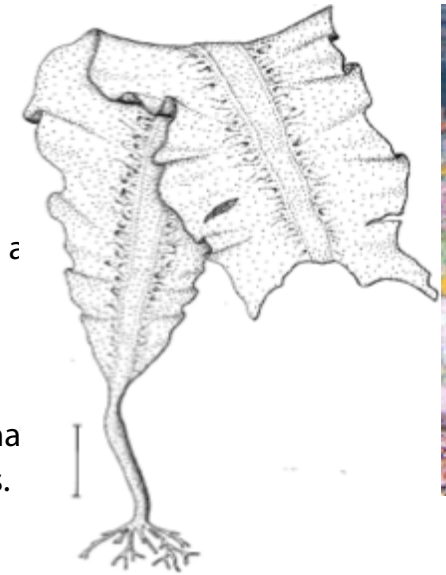
Pleurophycus gardneri

IDENTIFICATION

- Distinctive thick, broad midrib runs the length of blade (often different shade than blade tissue)
- The blade is ruffled/puckered along the sides of the midrib
- Stipe is cylindrical at the base and flattened near the blade
- Branched holdfast with root-like haptera
- Stipe perennial, blade annual

OCCURRENCE

Low intertidal to upper subtidal,
semi exposed habitats or high current areas.



WHAT TO LOOK FOR

Wide, thick midrib on a single blade, puckered a
edge of midrib

SIMILAR SPECIES

Pleurophycus gardneri has much wider midrib tha
Alaria marginata and does not have sporophylls.

Photo: (top) Sarah Wickham (below) NOAA

Laminaria setchellii

IDENTIFICATION

- Blade is thick, smooth (no ruffles/ bullations)
- Blade often has splits toward distal end (but not always)
- Stipe is cylindrical at base, flattening toward blade
- Stipe is rigid, but when blade is large it often "flopped over"
- Branched holdfast with root-like haptera
- Stipe perennial, blade annual (can often see colour difference)

OCCURRENCE

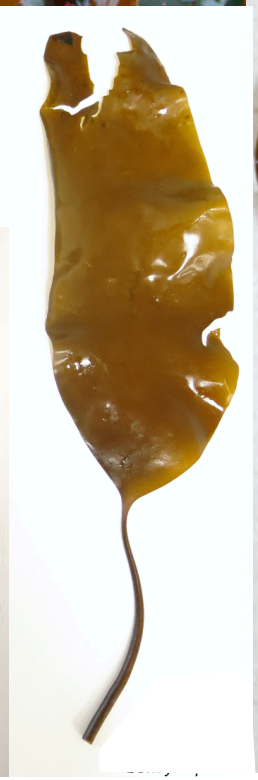
Exposed habitats, extreme low intertidal to upper subtidal, can forms bands or extensive patches in good habitat, found commonly with *Pterygophora*

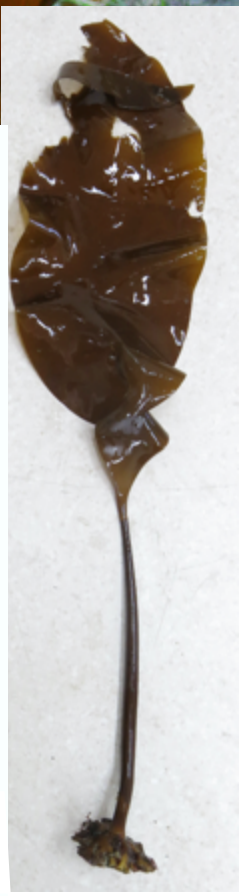
WHAT TO LOOK FOR

Stiff stipe. "Flopped over" blade. Single **smooth blade (no ruffles/bullations),** often split**.**

SIMILAR SPECIES

Juvenile similar to *Pterygophora*- but closely examine distal portion of stipe (*Pterygophora* has narrowed/tapered section.





Photos: (top) Flikr (below) Jenn Burt

Saccharina groenlandica (Name recently changed to *S. nigripes*)

IDENTIFICATION

- Thick robust blade, bullate (puckered) margins when young, thicker and smoother with age. Can be split (or not) at distal end. Can be large!
- "Ace-of-spades" or heart shape where blade meets stipe in older specimens (key feature)
- Branched holdfast with root-like haptera
- Highly variable morphology!!
- Stipe perennial, blade annual

OCCURRENCE

Low intertidal to subtidal, wave-exposed or surge-exposed areas

WHAT TO LOOK FOR

Thick darker blade, puckered near margins, Heart-shaped blade base. More exposed habitat.

SIMILAR SPECIES

VERY similar to *S. latissima*, which likes slightly more protected habitat, has more narrow and not-as-thick blade, has more uniform corrugations).
S. groenlandica is darker in colour.
Some specimens impossible to assign 'certain' ID in field. Can verify in lab by cross-sectioning stipe to look for mucilage ducts (present in *S. groenlandica,* absent in *S. latissima*). However, young *S. groenlandica* lack mucilage ducts.

L. setchellii

Saccharina groenlandica

"Ace of spades" or heart shape where blade meets stipe (mostly on larger specimens)

Photos: Jenn Burt

Saccharina latissima

IDENTIFICATION

- Blade is moderately thin, with lateral rows of corrugations
- No midrib!
- Branched holdfast with root-like haptera
- Shorter, cylindrical stipe
- Perennial species, but blade dies back in fall/regrows in spring.

OCCURRENCE

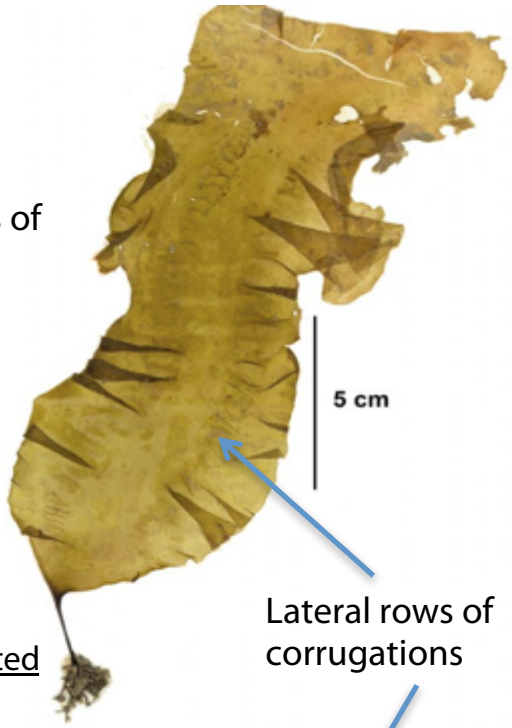
Low intertidal to subtidal, prefers more protected wave-sheltered habitat

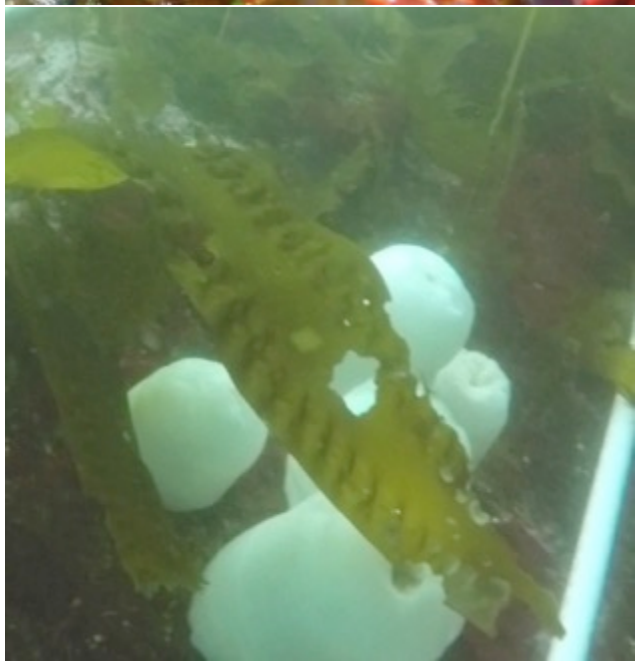
WHAT TO LOOK FOR

Thinner and lighter coloured blade!!! More protected waters. Shorter stipe. Lateral rows of corrugations.

SIMILAR SPECIES

- VERY similar to *S. groenlandica* which is thicker, darker, with heart shaped base of blade.
- May be impossible to give 'certain' ID in the field, especially for young specimens. - In the lab, *S. groenlandica* has mucilage ducts in stipe, *S. latissimas* has none.
- Some references suggest *S. latissima* and *S. groenlandica* can (and do) hybridize.





Photos: (top) Mego Huang (below left) R. long (below right) Jenn Burt

Laminaria yezoensis

IDENTIFICATION

- Distinct discoid holdfast – can have a larger 'disc' that spreads a bit
- Blade is thick, smooth, often split at ends
- Stipe is cylindrical at base, flattening toward blade
- Perennial species

OCCURRENCE

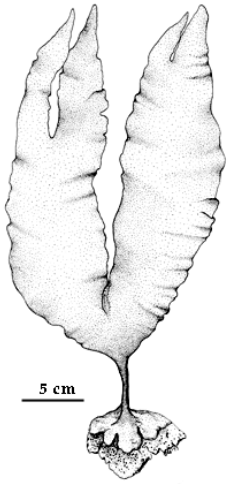
Very rare!
See maybe 1-2 in a summer of diving.
Intertidal to shallow subtidal, Semi-protected sites

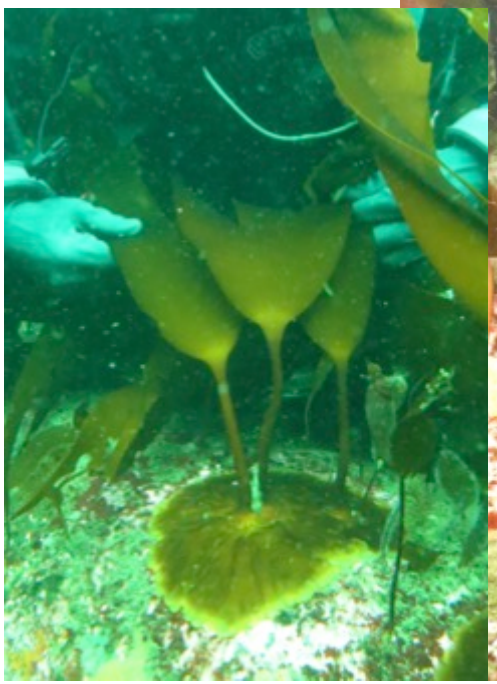
WHAT TO LOOK FOR

Distinct/unique large discoid holdfast

SIMILAR SPECIES

Looks VERY similar to *S. groenlandica* except for very distinct discoid holdfast





Photos: Jenn Burt

Desmarestia ligulata

(Note: not a 'kelp' species b/c in the order Desmarestiales)

IDENTIFICATION

- ▶Fern or 'feathery' like appearance
- ▶Blade is flattened and highly branched
- ▶Central axis has a midrib, narrower side branches do not
- ▶Discoid holdfast
- ▶Contains sulfuric acid in blade vacuoles – when exposed to air it will start to 'bleach' and deteriorate/discolour (do not store with other kelp species)
- ▶Annual species

OCCURRENCE

Low intertidal to subtidal, semi-protected to semi-exposed habitats

Photo (top) Julie Mundy (right) Jenn Burt

Desmarestia latissima

(Note: not a 'kelp' species b/c in the order Desmarestiales)

IDENTIFICATION

- Very wide central blade with wide branching side blades (larger than 1cm, and up to 15cm wide)
- Can be very large (right photo)
- Discoid holdfast
- Contains sulfuric acid in blade vacuoles – when exposed to air it will start to 'beach' and deteriorate/discolour (do not store with other kelp species)
- Annual species

OCCURRENCE

Low intertidal to subtidal, semi-protected to semi-exposed habitats

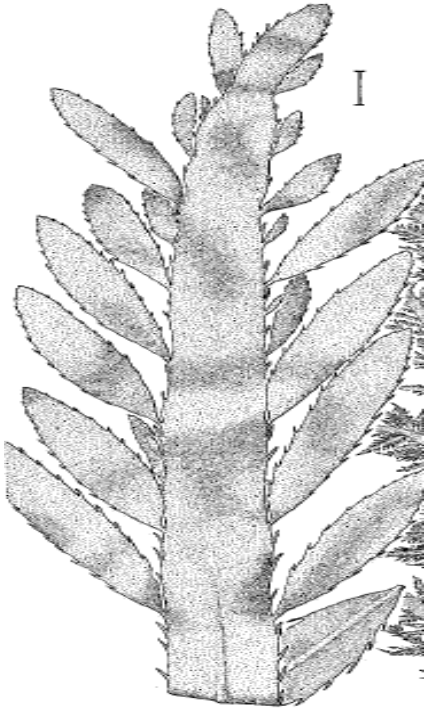


Photo: Jenn Burt

Desmarestia viridis & *Desmarestia aculeata*

(Note: not a 'kelp' species b/c in the order Desmarestiales)

IDENTIFICATION

- Filamentous, stringy looking tuft of wavy filments
- Discoidal holdfast
- *D.* viridis has opposite branching, D. aculeata has alternate branching
- *D. aculeata* usually appears very dark brown to almost black with fairly coarse branches whereas *D. viridis* is often a more golden color with very fine branches.
- Contains sulfuric acid in tissue vacuoles – when exposed to air it will start to 'bleach' and deteriorate/discolour (do not store with other kelp species)
- Sulfuric acid in tissues makes these species less desirable to urchin grazing (may see these species in areas with urchins)
- Annual species

OCCURRENCE

Low intertidal to subtidal, often in areas recently grazed by urchins

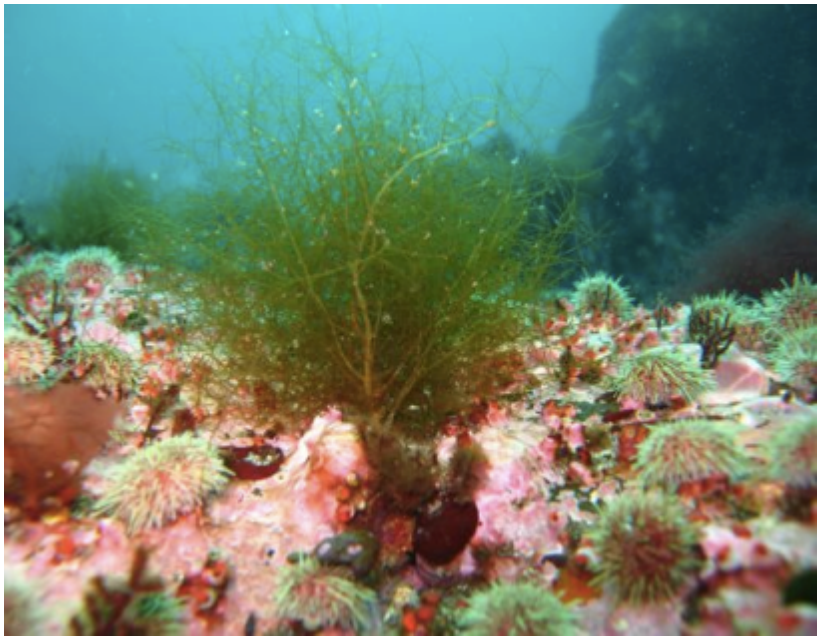


Photo (left) Jenn Burt (right) Seaweeds of Alaska

Desmarestia foliacea

(Note: not a 'kelp' species b/c in the order Desmarestiales)

IDENTIFICATION

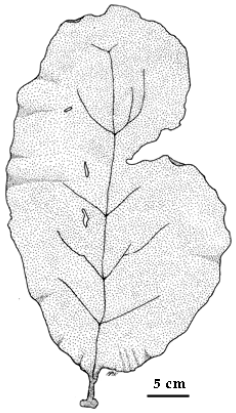
- Thin, 'rounded leaf shaped' flattened blade
- Can see faint "central vein" with branches outward
- Contains sulfuric acid in blade vacuoles – when exposed to air it will start to 'bleach' and deteriorate/discolour (do not store with other kelp species)
- Sulfuric acid in tissues makes this species less desirable to urchin grazing (may see this species in areas with urchins)
- Annual species

OCCURRENCE

Low intertidal to subtidal, semi-protected to semi-exposed habitats

SIMILAR SPECIES

Small specimens could be confused with juvenile *Nereocystis luetkeana*. Distinguish by looking closely at "vein" pattern, and notice short stipe, discoid holdfast, and lack of pneumatocyst



Photos: Jenn Burt

Happy Diving!