

FISH' WORSHIP



IS IT WRONG?

PISCO Fish ID Training

1. Aids to identification
2. Test and identification (concurrent)
 - Display picture
 - Record what you think it is
 - Instant answer!
3. Discuss key characteristics

Take notes!



Pre-lecture Fish Quiz



[Link](#)

Aids to identification

- 1. Books**
- 2. PPT and Cheat sheet**
- 3. YOY identification flow diagram**

Aids to identification

- 1. Humann, Paul. 1996. Coastal Fish Identifications: California to Alaska. First Edition. New World Publications, Jacksonville, FL.**
- 2. Eschmeyer, W.N., E.S. Herald and H. Hammann. 1983. A Field Guide to Pacific Coast Fishes of North America. First Edition. Houghton Mifflin, Boston, MA (Peterson Guide)**
- 3. Gotshall, D. 1989. Pacific Coast Inshore Fishes. Third Edition. Sea Challengers, Monterey, California.**
- 4. Miller, D. J. and R. N. Lea. 1972. Guide to the Coastal Marine Fishes of California. California Fish Bulletin Number 157. University of California.**
- 4. Butler, JL, MS Love and TE Laidig. 2012. A Guide to the Rockfishes, Thornyheads, and Scorpionfishes of the Northeast Pacific**

Fish ID Cheat Sheet for Lecture

Common Name / Complex	Scientific Name	Freq. (1= very common, 5= rare)	Could be mistaken for	Distinguishing Characteristics:
Rockfish				
blue rockfish	Sebastes mystinus	1	black rockfish	2-4 dark bands on head, corners of anal fin sharp
blue rockfish YOY 5-10 cm		1	black rf, OYT	maroon mottling over whole body w/ dark blue fins
blue rockfish YOY <5cm		1	black rockfish, OYT	can still have black spot on the dorsal
black rockfish	Sebastes melanops	1	blue rockfish	light swath below lateral line, anal fin rounded; found clouded around macrocystis
kelp rockfish	Sebastes atrovirens	1	grass rockfish, brown rockfish	highly variable - often mottled w/ yellowish golden brown
gopher rockfish	Sebastes carnatus	2	copper rf, b&y rf	3 pale patches on dorsal fins extending on to back, white edging to posterior of scales; coloration is brown on cream
black & yellow rockfish	Sebastes chrysomelas	2	china rockfish, gopher rf	3 yellow patches on dorsal fins extending on to back; found more shallow than gopher
copper rockfish	Sebastes caurinus	2	gopher rf	clear swath along aft half of lateral line
KGB YOY kelp, gopher, black & yellow rockfish		1		deep bodied, no black spot
KGBC YOY kelp, gopher, black & yellow, & copper rockfish		1		
GB, gopher, black & yellow, (up ~8 cm)		2		
olive rockfish	Sebastes serranoides	1	kelpbass	dusky, some spots near dorsal
yellowtail rockfish	Sebastes flavidus	5	kelpbass	silvery with bright yellow fins
OYT YOY (olive / yellowtail rockfish)		1	black rf	black dorsal spot, bright white patches
OYTB YOY (olive / yellowtail / black rockfish)	Sebastes sp.	1		
canary rockfish	Sebastes pinniger	3	vermillion	white stripe along lateral line from gill cover to tail, may have black splotches on back
canary rockfish YOY		3		only deep bodied YOY w/ dark dorsal spot; found on the rock/sand interface; uniform colored after the saddling disappear
boccacio	Sebastes paucispinis	5		big protruding lower jaw
boccacio YOY		3	kelp YOY	
vermillion rockfish	Sebastes miniatus	3	canary rf	thin pale stripe along lateral line from mid body to tail, often has a dark edge on all fins except spinous dorsal
vermillion rockfish YOY		3		found on the rock/sand interface, black tinging on fins

In fish training Google drive: Fish ID Cheat Sheet.xls

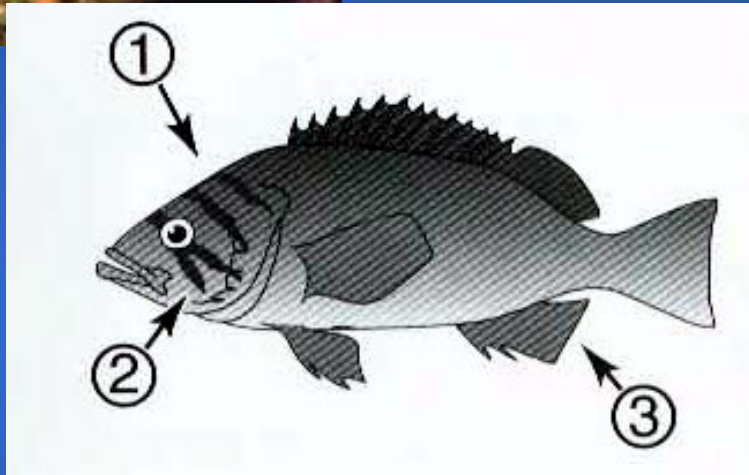
Identification Review

- 1) Images of juveniles and adult life stages
- 2) Distinguishing dimorphic sexes
- 3) Identifying key distinguishing features

Blue Rockfish / Deacon Rockfish

Sebastes mystinus / *Sebastes diaconus*

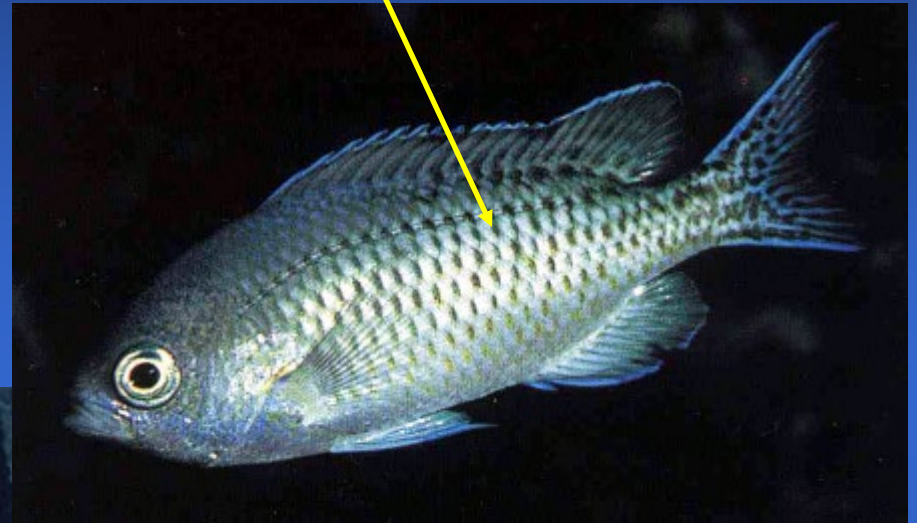
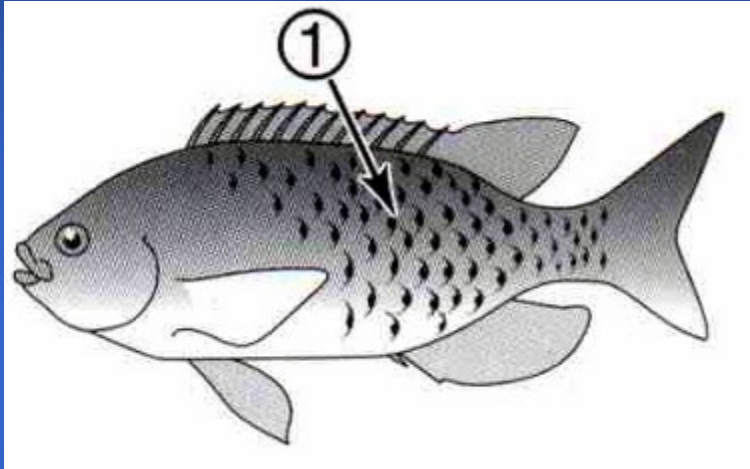
SMYS



Flat forehead
Two bars from eye
Straight caudal fin



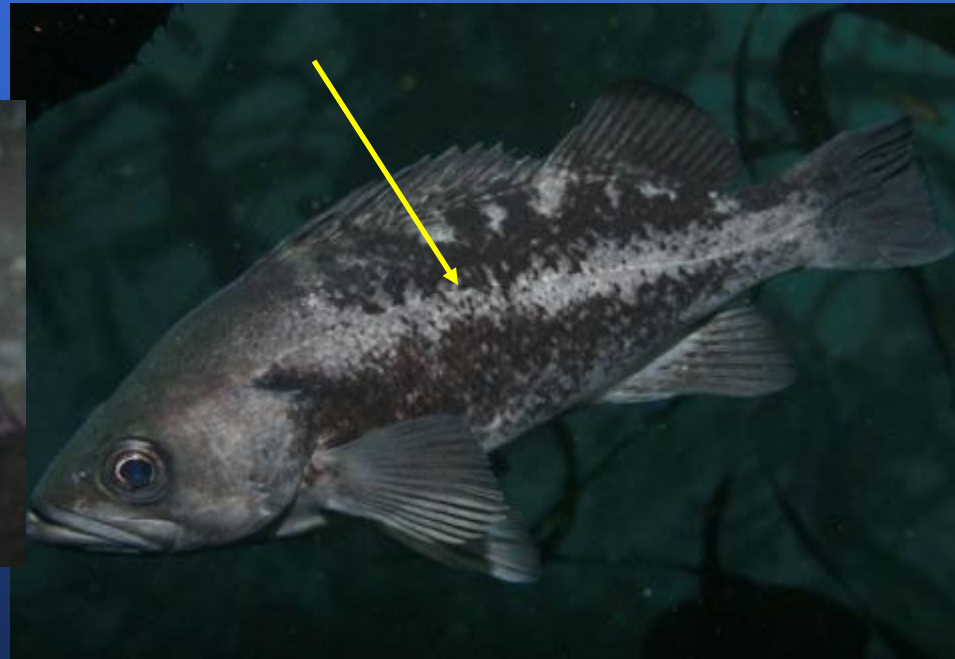
Blacksmith
Chromis punctipinnis
CPUN



Black Rockfish

Sebastes melanops

SMEL



Black rockfish, *Sebastes melanops*



OYT olive-yellowtail Complex



OYT olive-yellowtail Complex



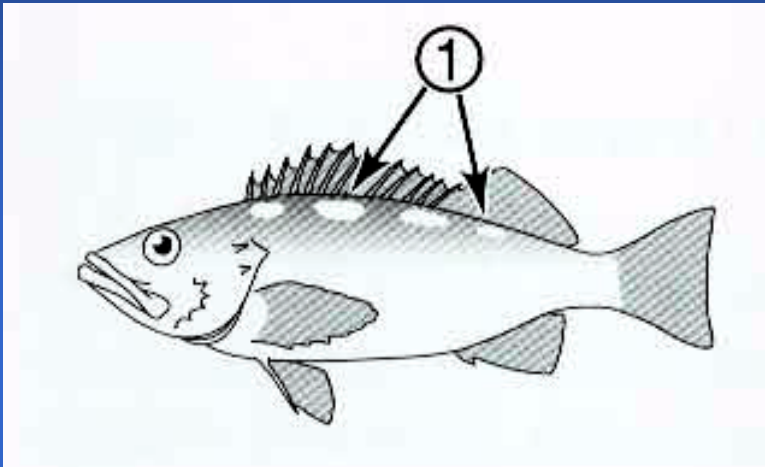
OYT olive-yellowtail Complex



Olive Rockfish

Sebastes serranoides

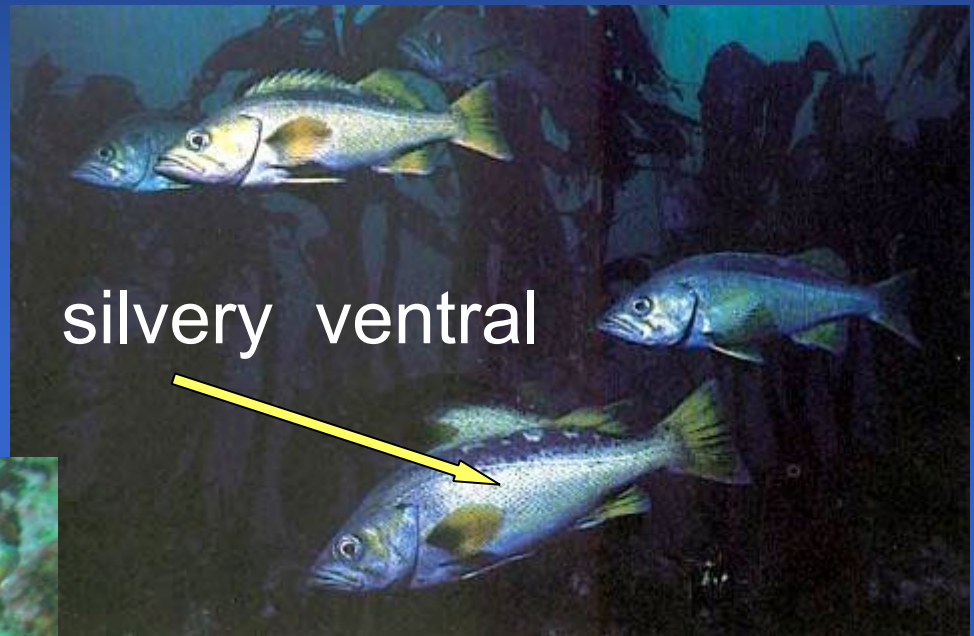
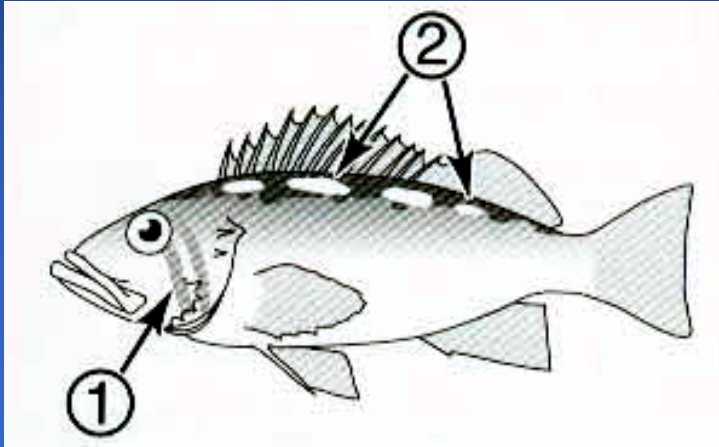
SSER



Yellowtail Rockfish

Sebastes flavidus

SFLA

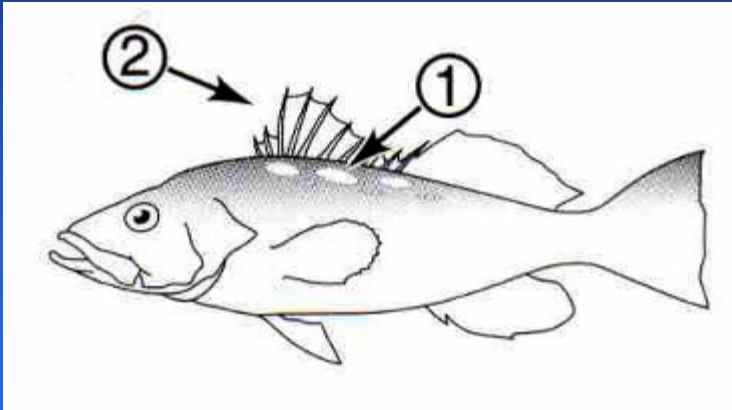


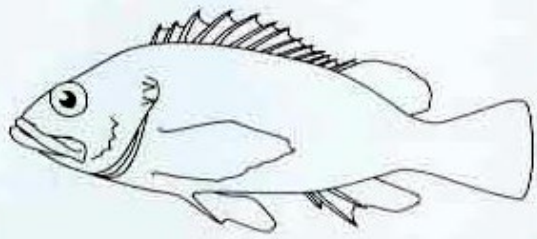
reddish-brown speckling



Kelp Bass

Paralabrax clathratus, PCLA



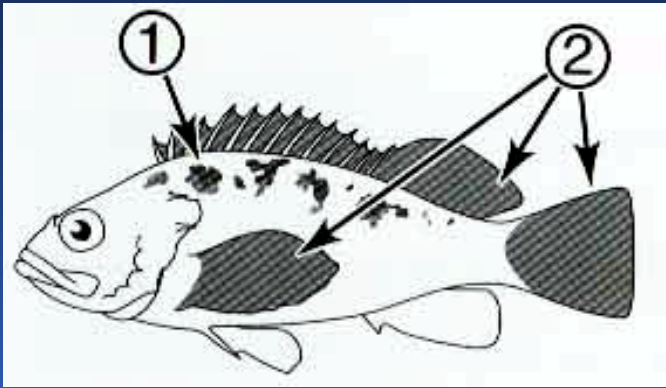


Kelp Rockfish
Sebastes atrovirens
SATR



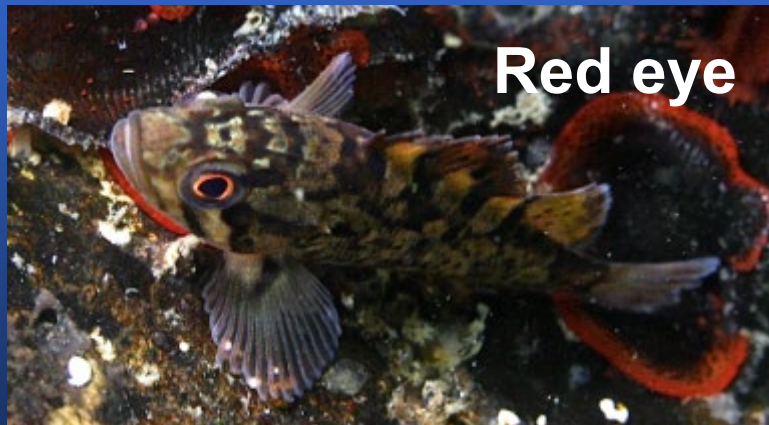
Grass Rockfish

Sebastes rastrelliger, SRAS



Grass Rockfish (juveniles)

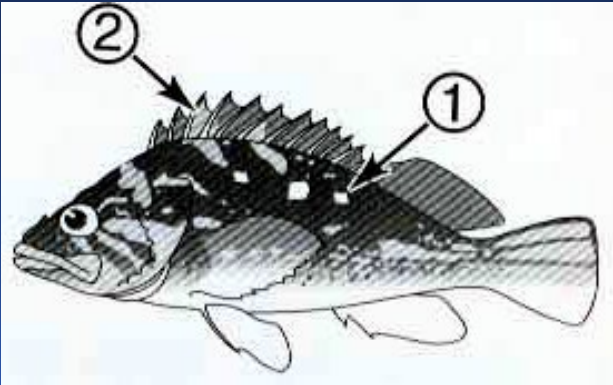
Sebastes rastrelliger,
SRAS



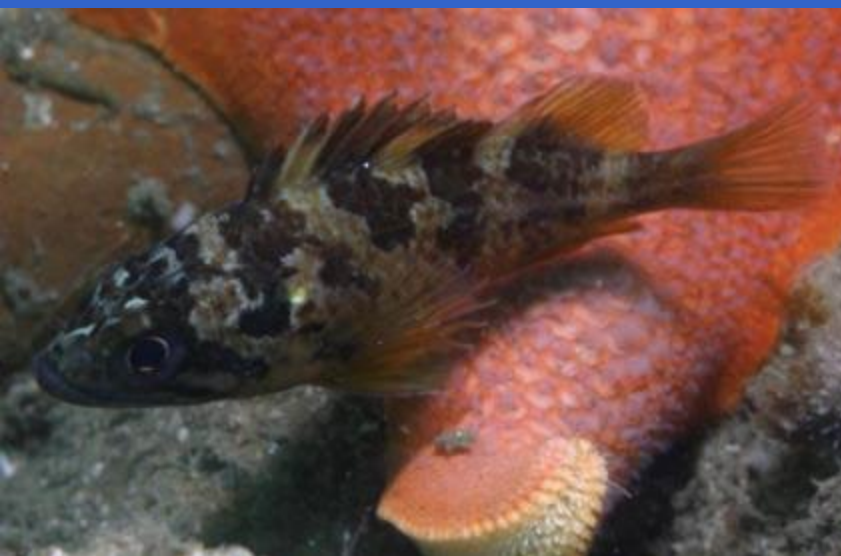
Black and Yellow Rockfish

Sebastes chrysomelas

SCHR

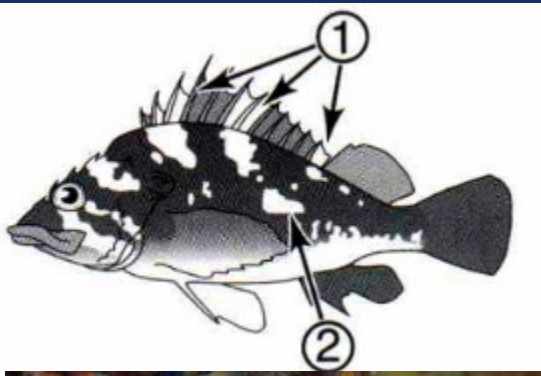


Black and Yellow Rockfish, *Sebastes chrysomelas*



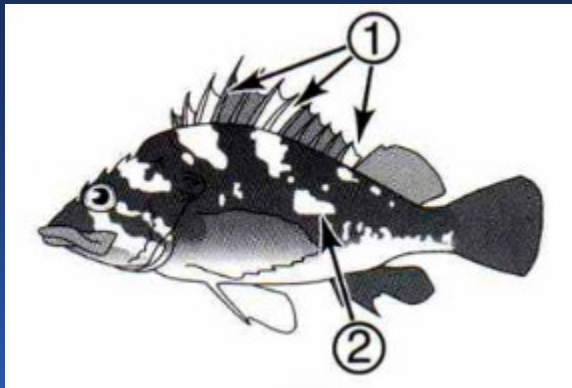
Gopher Rockfish

Sebastes carnatus, SCAR



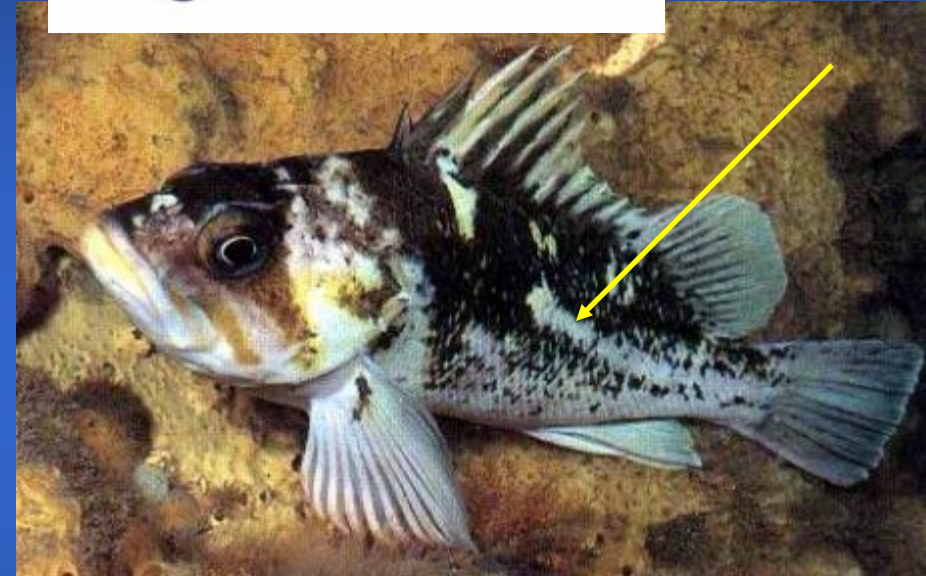
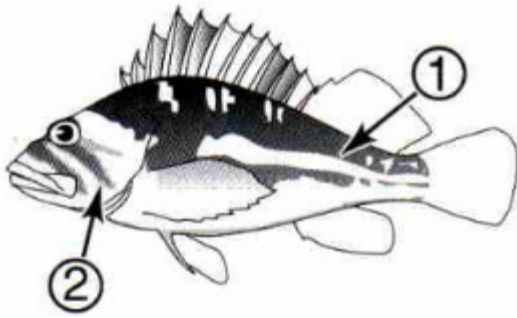
Gopher Rockfish

Sebastes carnatus, SCAR



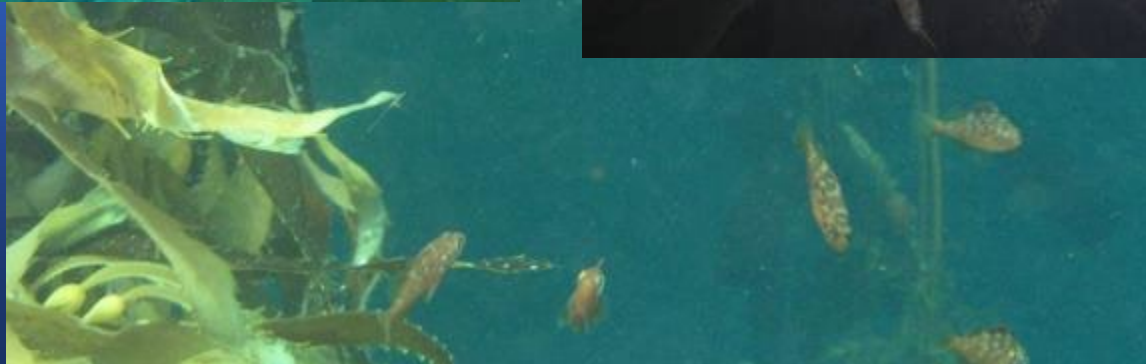
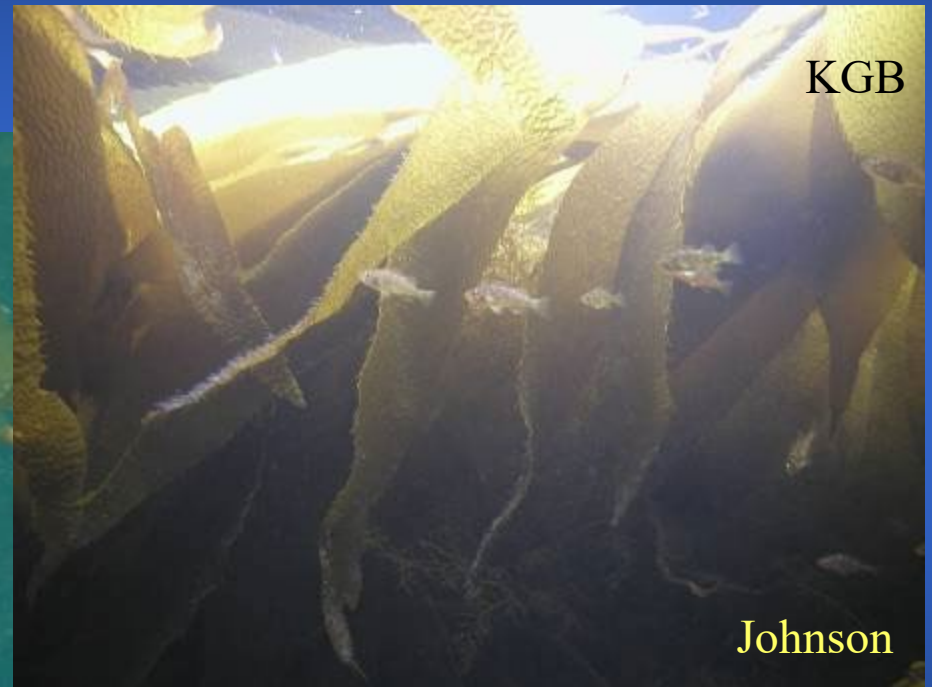
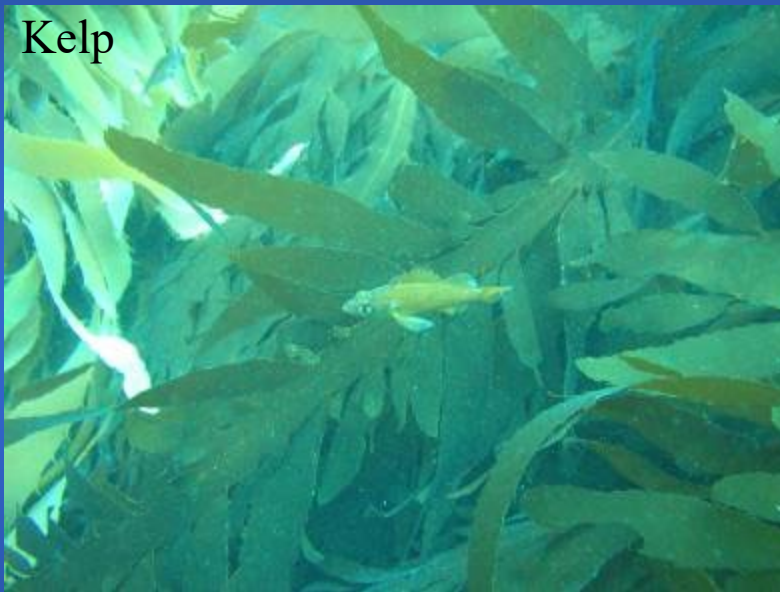
Copper Rockfish

Sebastes caurinus, SCAU



KGB (C)

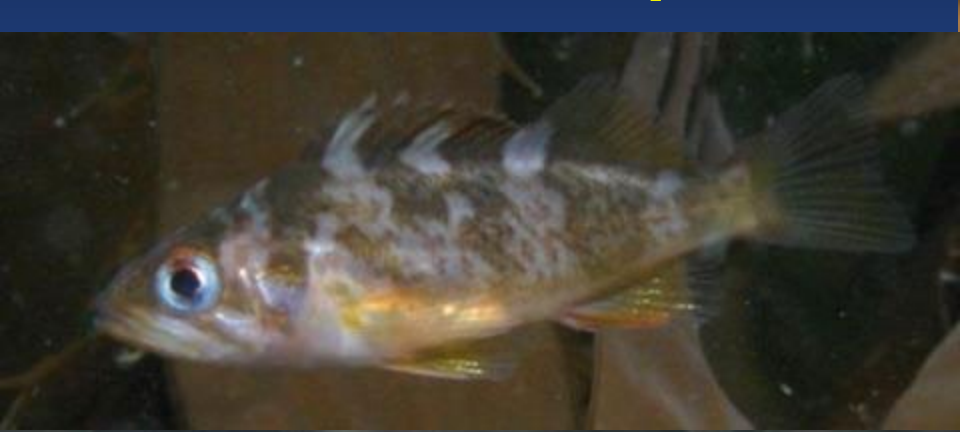
Kelp-Gopher-Black and Yellow (Copper) Complex



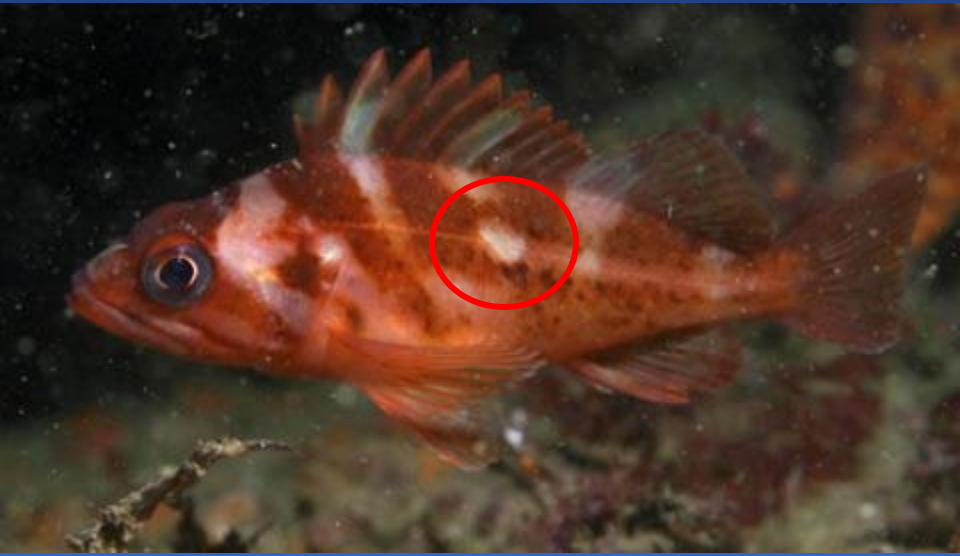
Kelp rockfish YOYs



Gopher rockfish YOYs



Copper rockfish YOYs



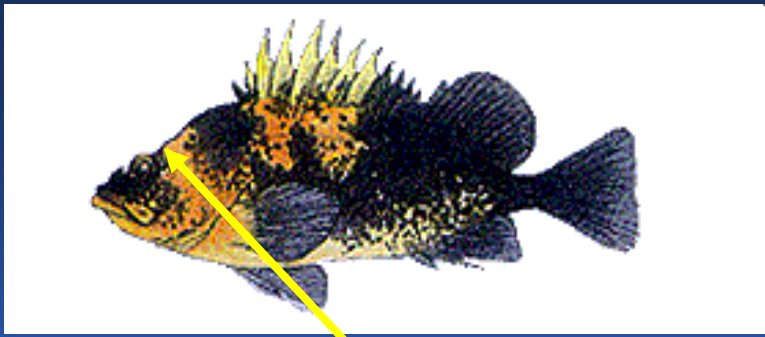
Black & Yellow YOYs



KGB(C) YOYs



Quillback Rockfish *Sebastes maliger*, SMAL

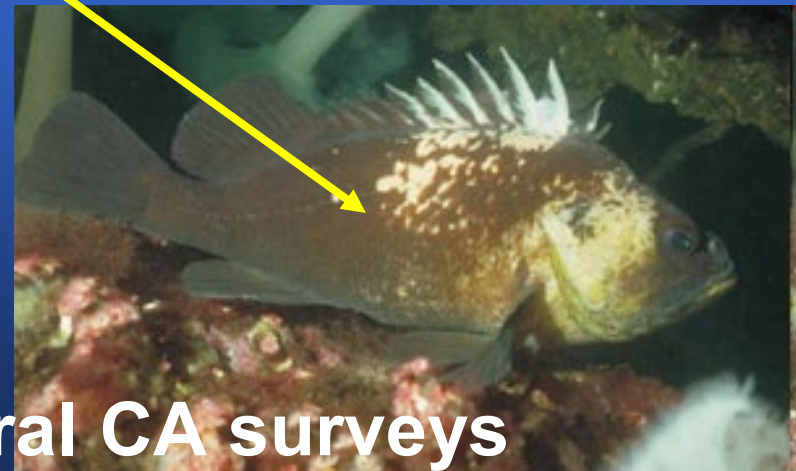
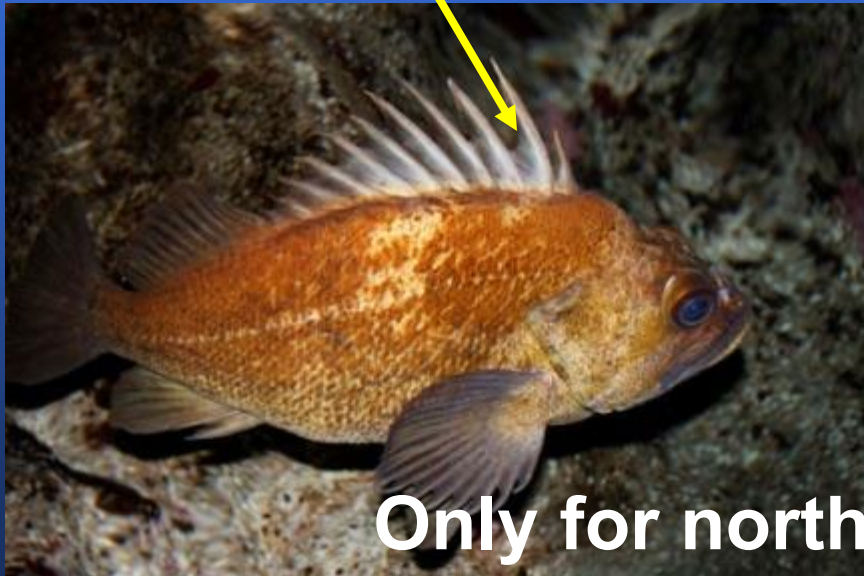


Top of
head flat



Dorsal fin membrane
deeply incised

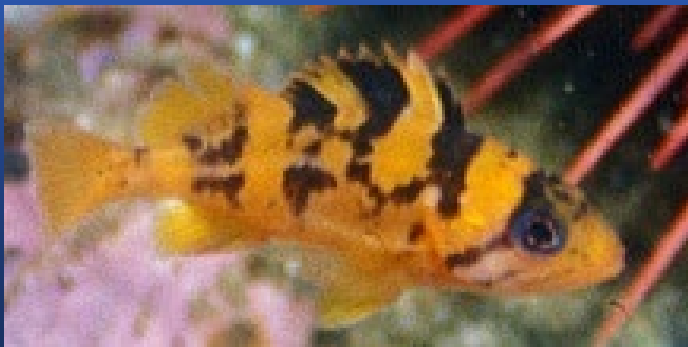
Rear half can be gray
to black with front of
body light brown and
yellow



Only for north-central CA surveys

China Rockfish

Sebastes nebulosus, SNEB



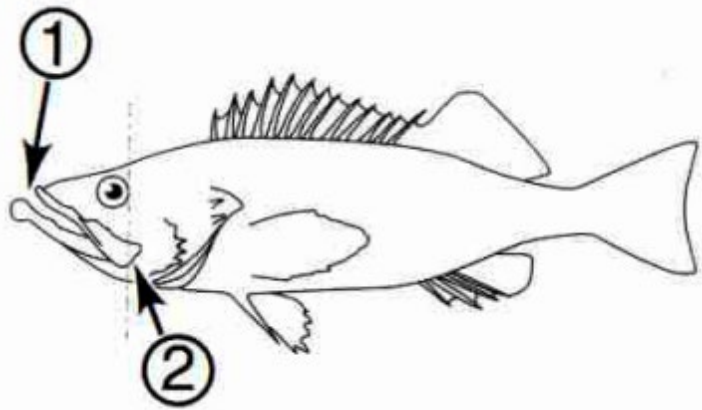
China Rockfish

Sebastes nebulosus, SNEB



Bocaccio

Sebastes paucispinis, SPAU

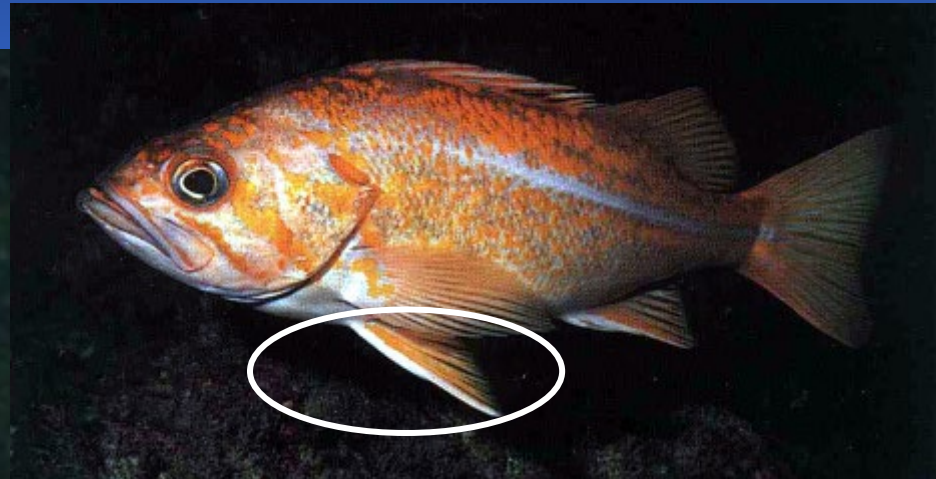
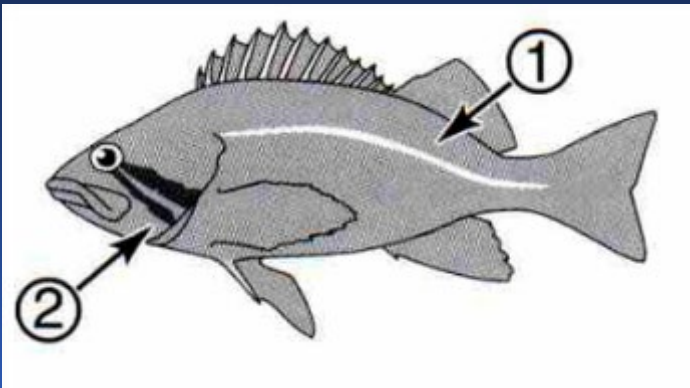


Bocaccio, *Sebastes paucispinis*, SPAU



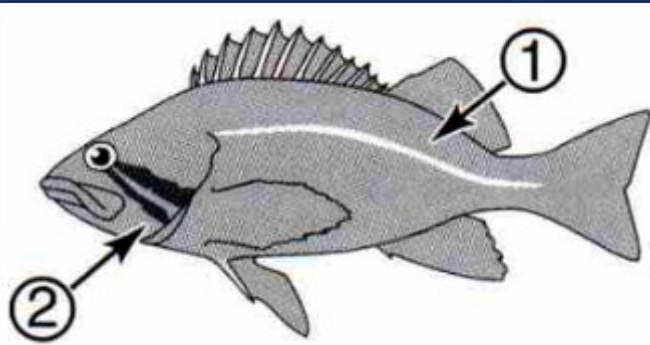
Canary Rockfish

Sebastes pinniger, SPIN



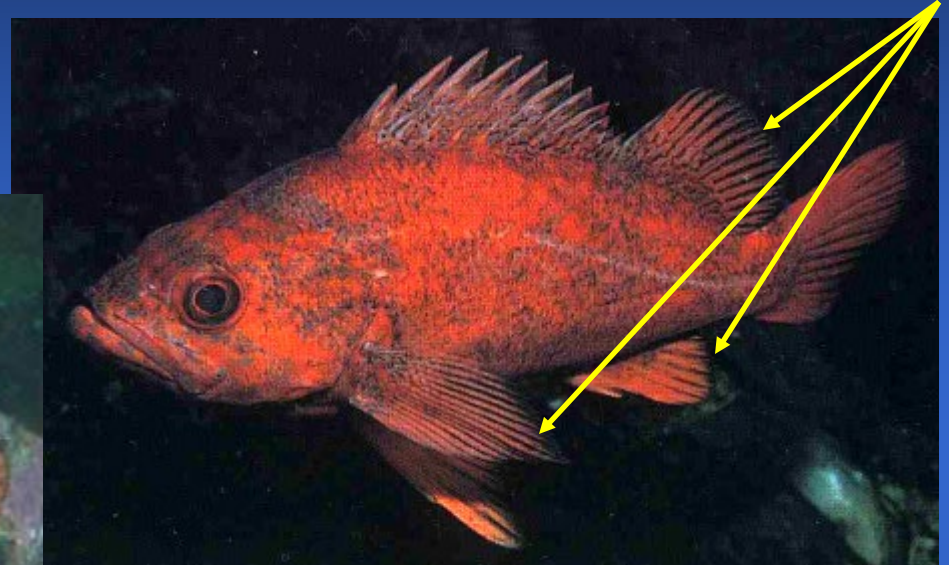
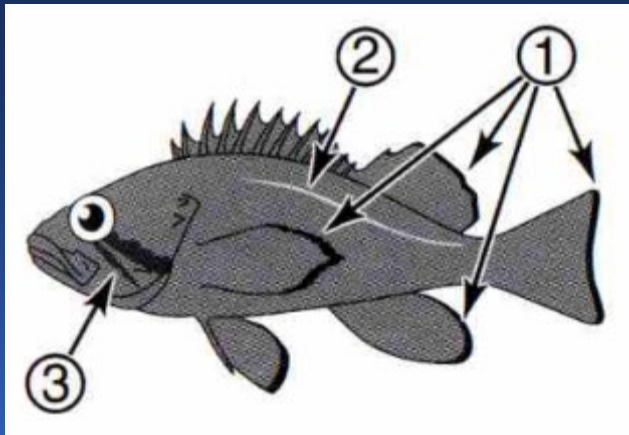
Canary Rockfish

Sebastes pinniger, SPIN



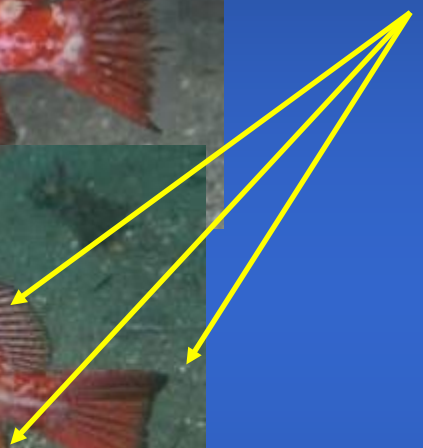
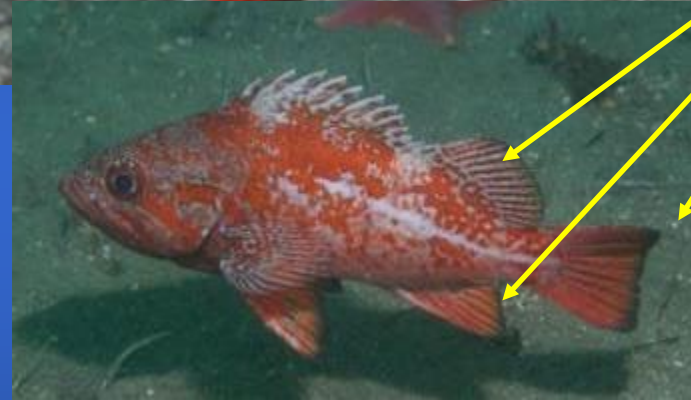
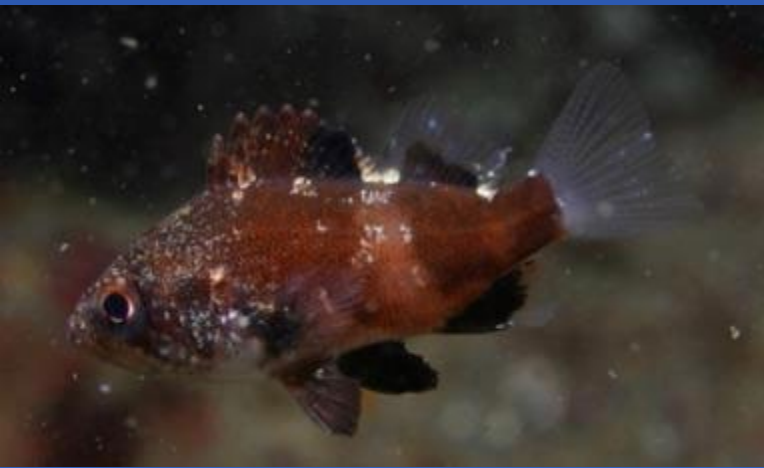
Vermilion Rockfish

Sebastes miniatus, SMIN



Vermilion Rockfish

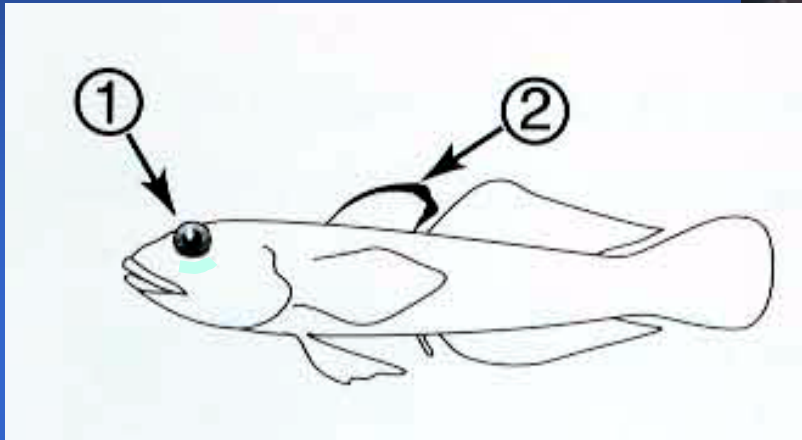
Sebastes miniatus, SMIN



Black-eyed Goby

Rhinogobiops nicholsii

RNIC



Compare and contrast

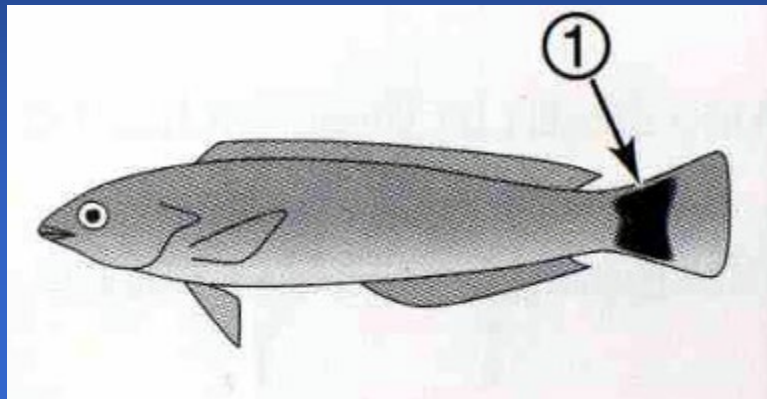


Rhynogobiops nicholsii



Bay Goby, *Lepidogobius lepidus*

Senorita
Oxyjulis californica
OAL



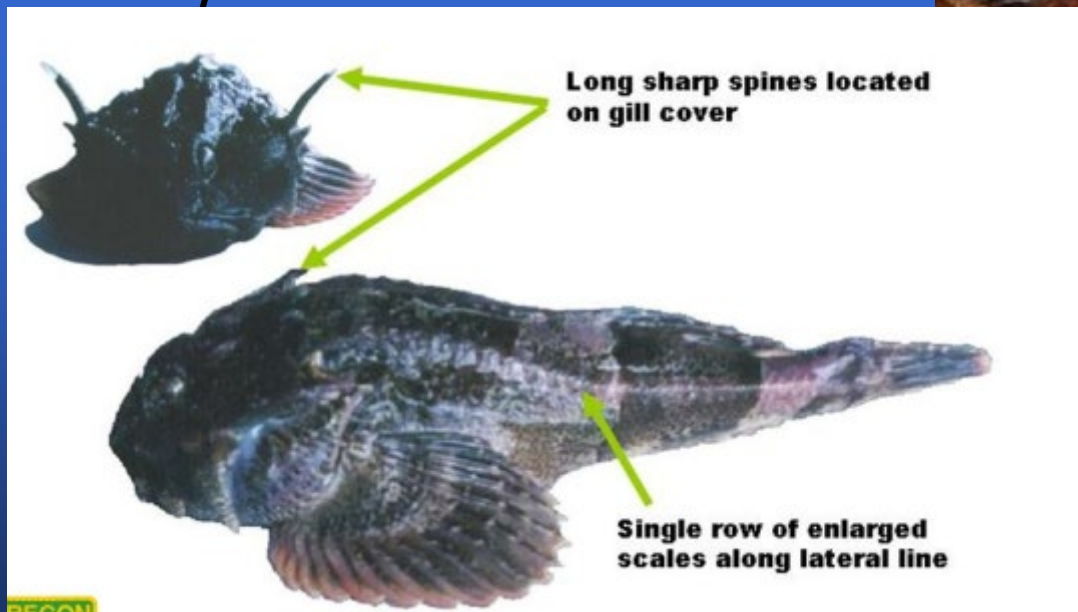
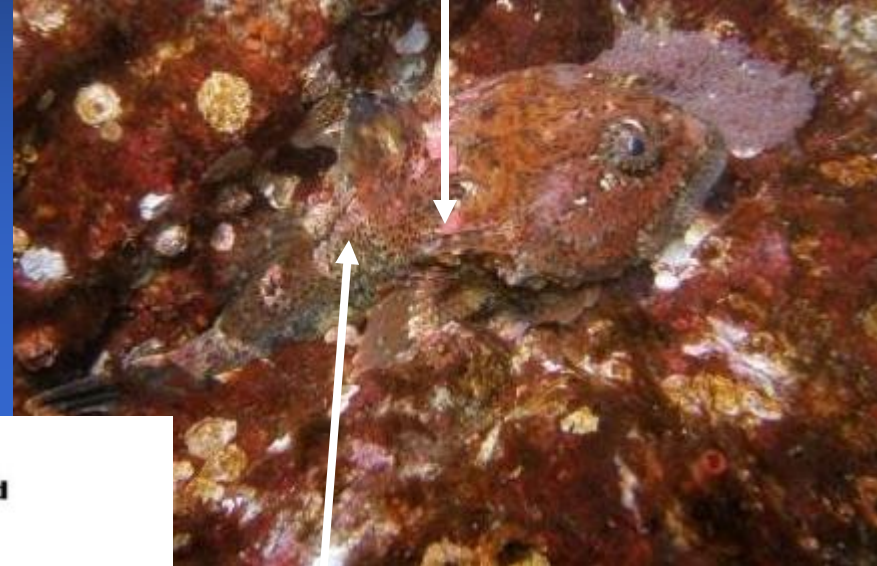
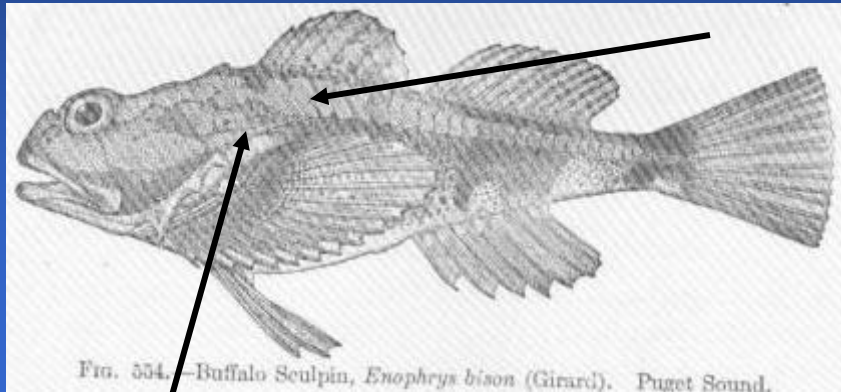
Cabezon

Scorpaenichthys marmoratus, SMAR



Buffalo Sculpin

Enophrys bison, EBIS

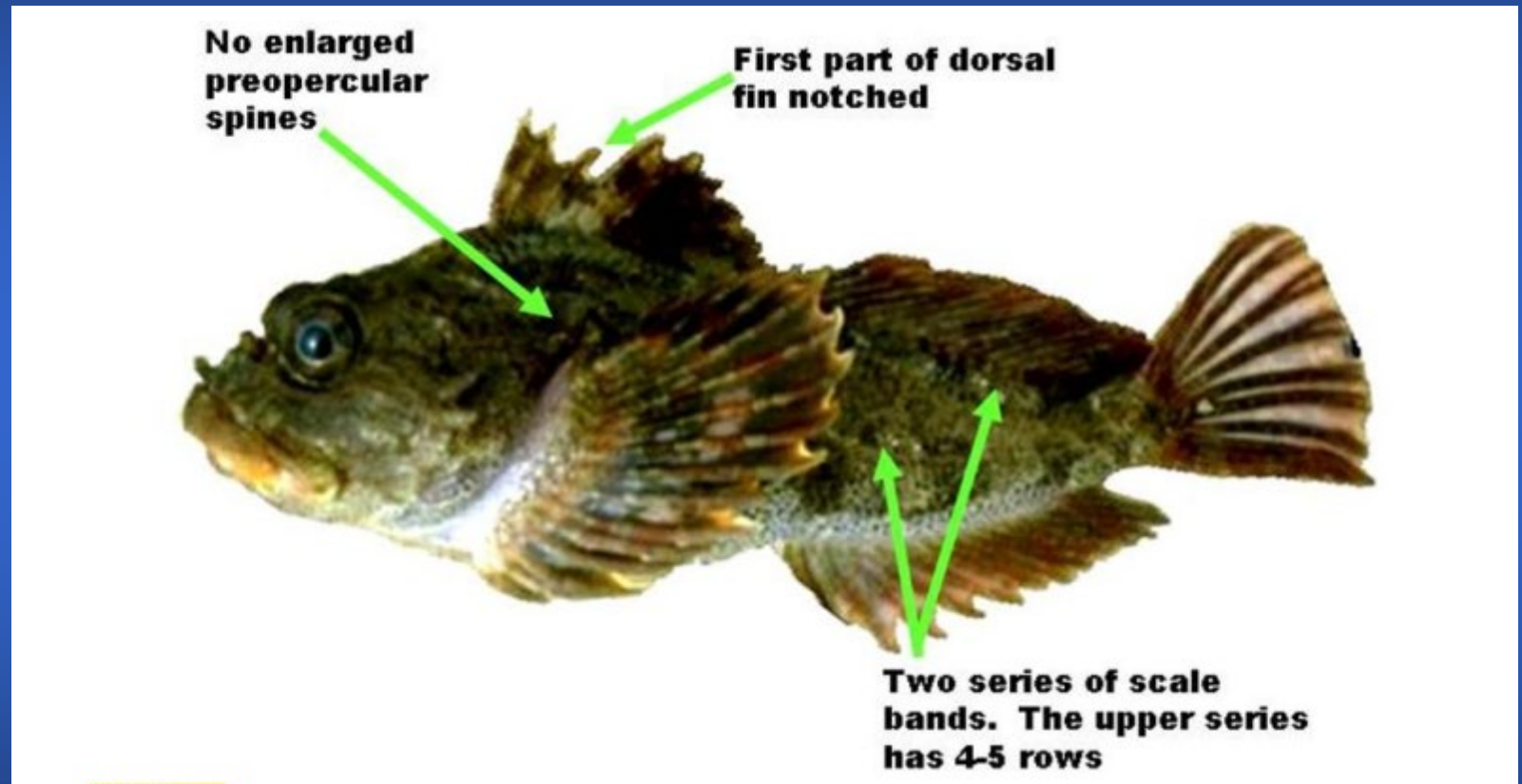


Max length=
37 cm

north-central
CA

Red Irish Lord

Hemilepidotus hemilepidotus, HHEM

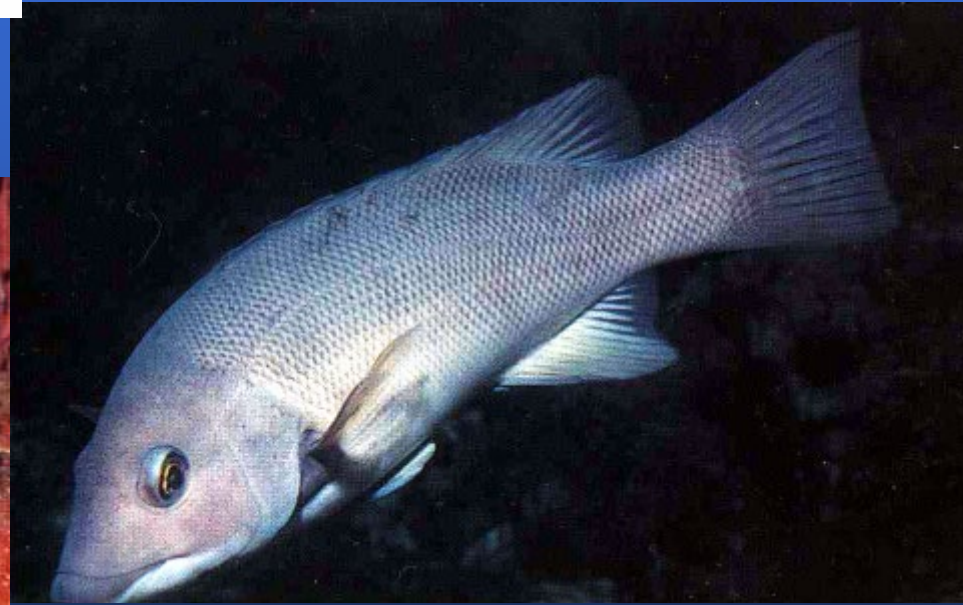
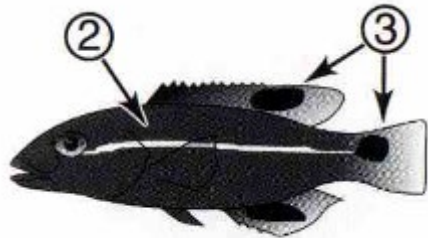
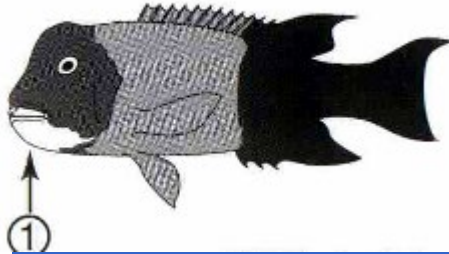
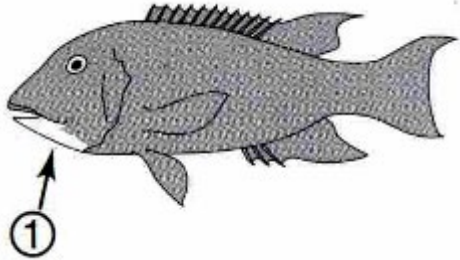


Max length= 51 cm

north-central CA

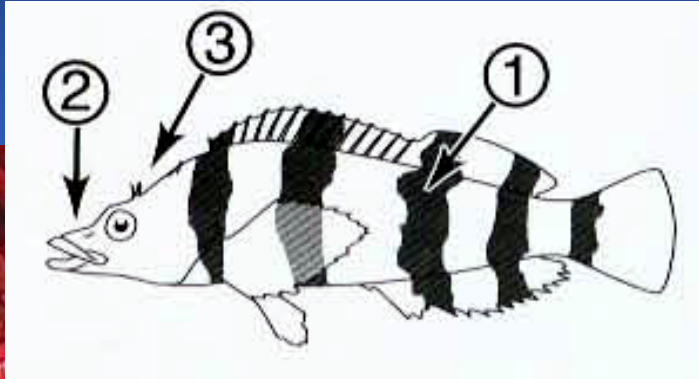
Sheephead

Bodianus pulcher, SPUL to BPUL



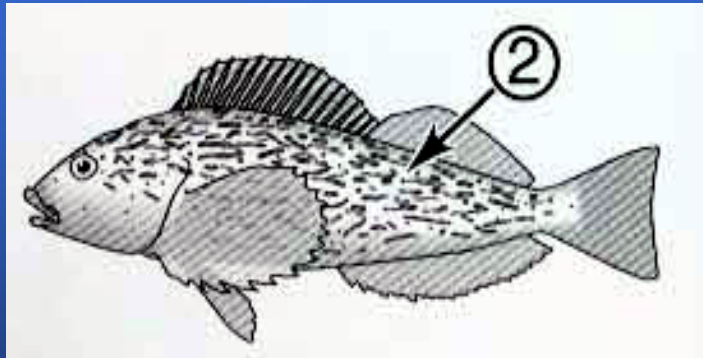
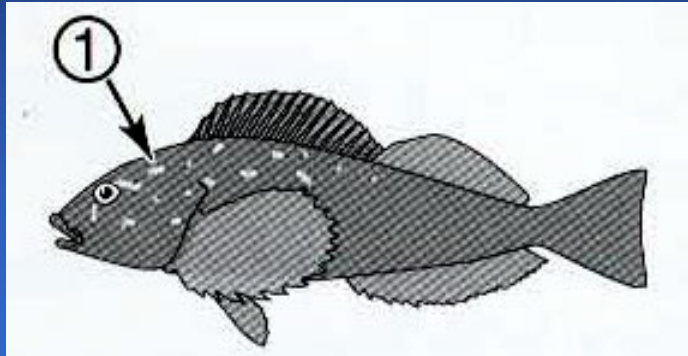
Painted Greenling

Oxylebius pictus, OPIC



Kelp Greenling

Hexagrammos decagrammus, HDEC



Kelp Greenling

Hexagrammos decagrammus, HDEC

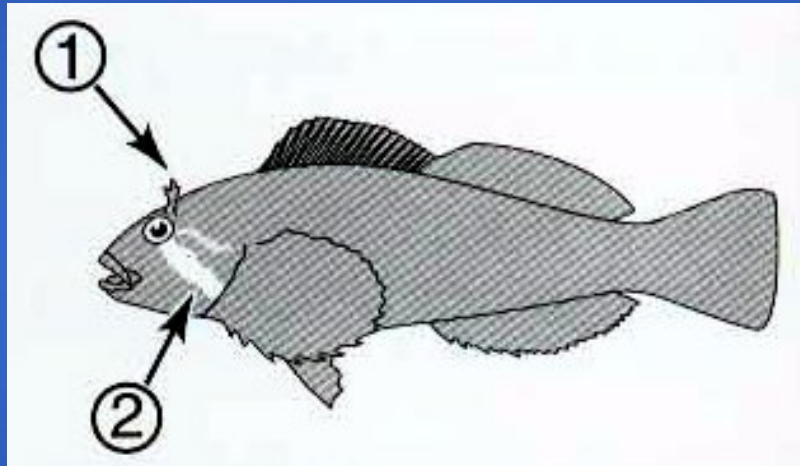


Kelp Greenling (juveniles) *Hexagrammos decagrammus*, HDEC



Rock Greenling

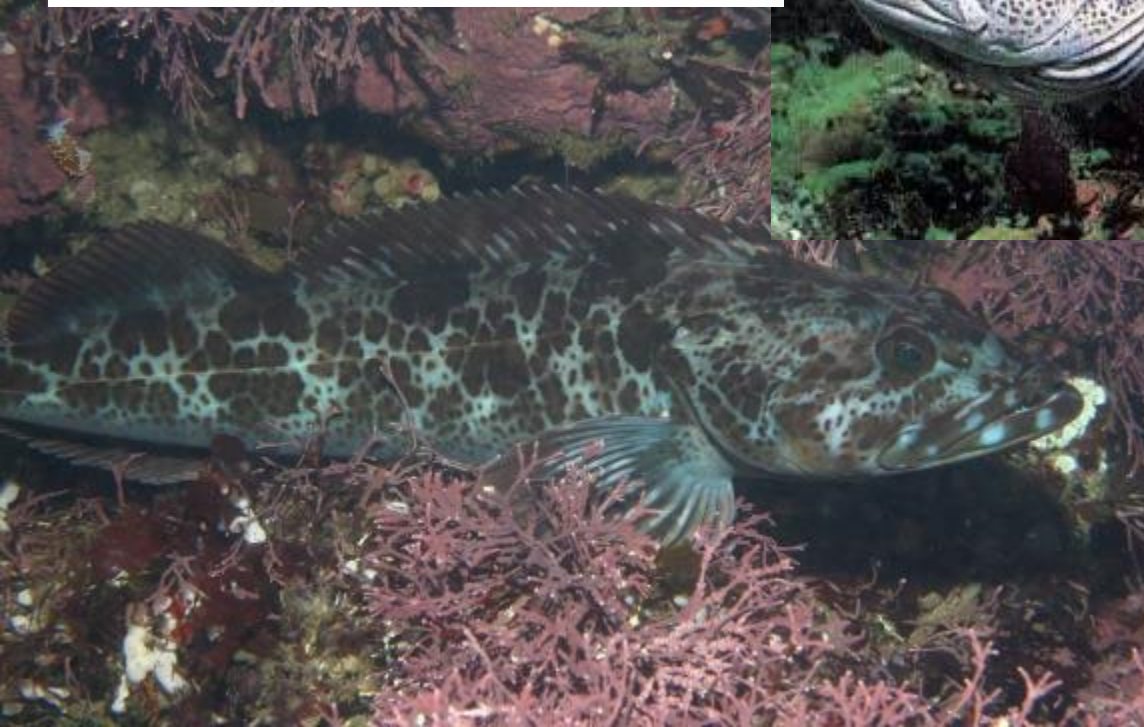
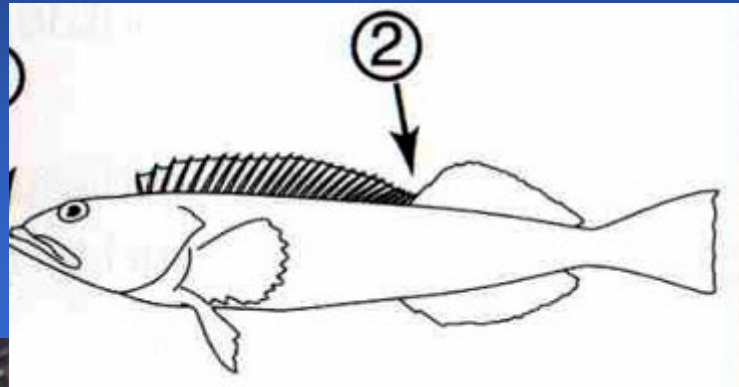
Hexagrammos superciliosus, HSUP



More common in north-central CA

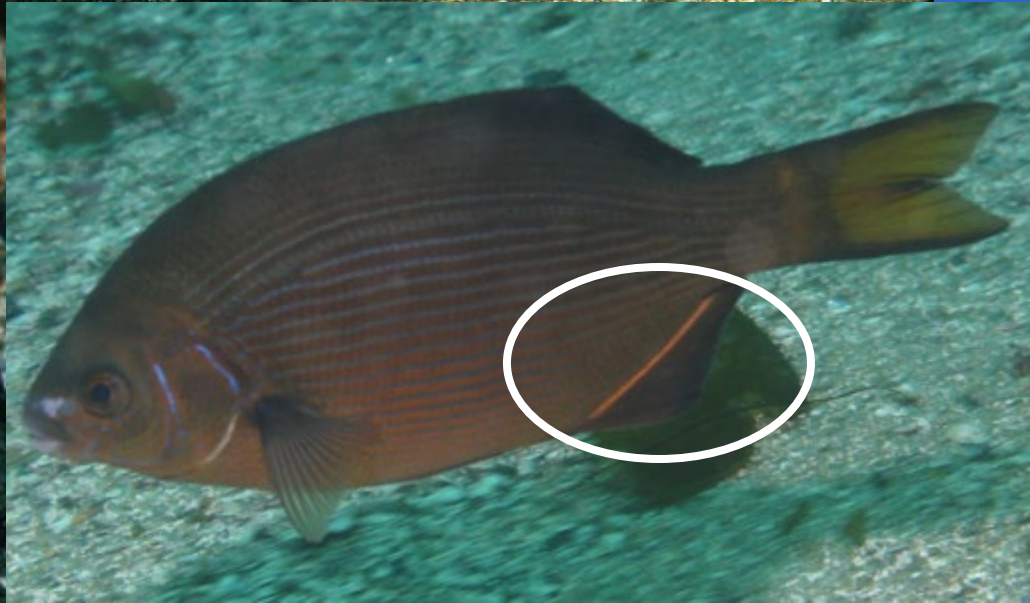
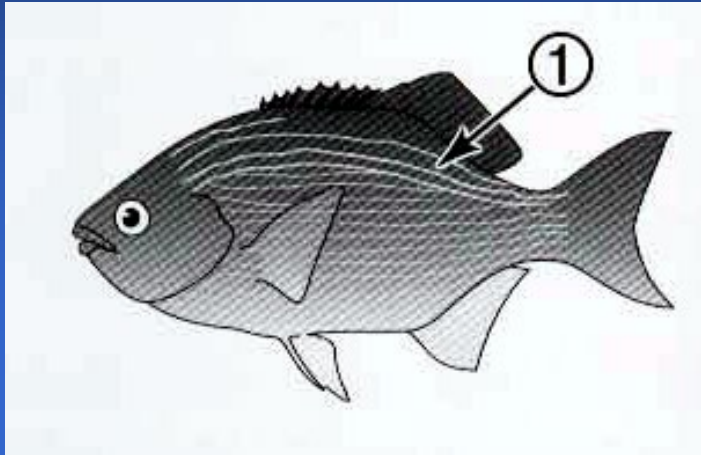
Lingcod

Ophiodon elongatus, OELO



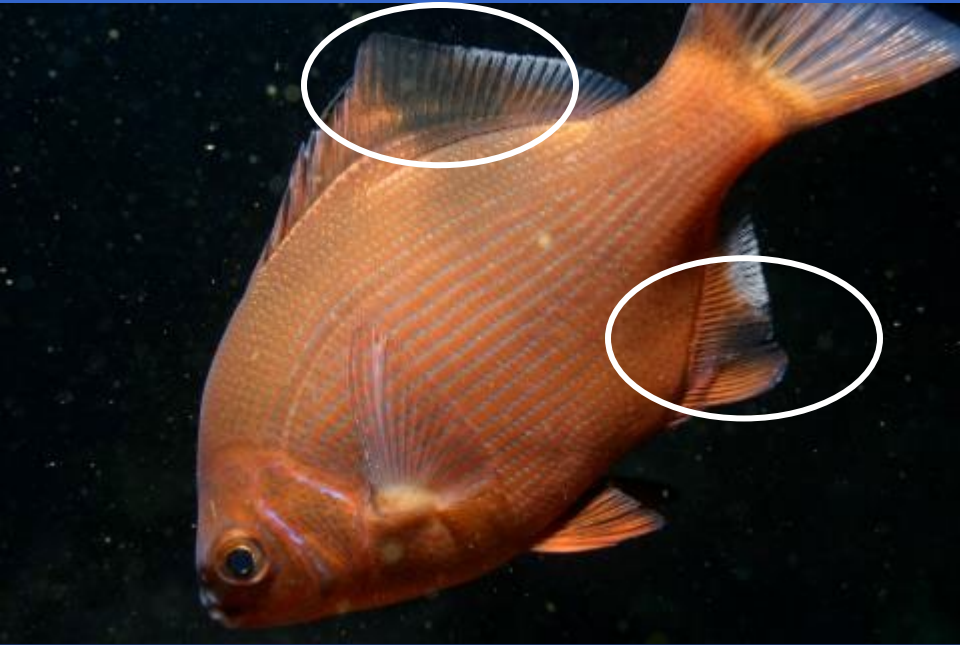
Striped Surfperch

Embiotoca lateralis, ELAT



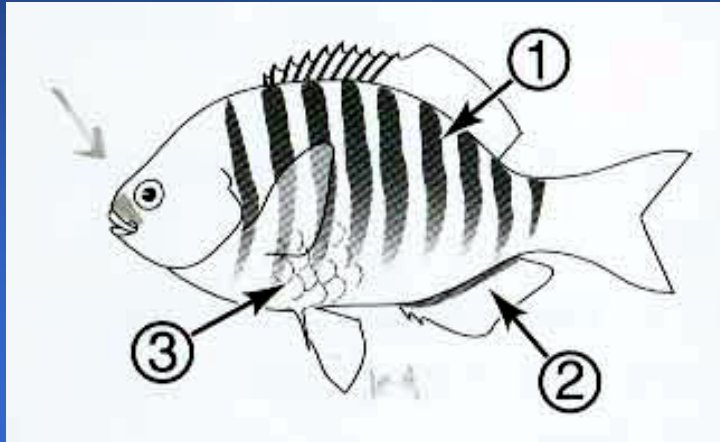
Striped Surfperch

Embiotoca lateralis, ELAT



Black Surfperch

Embiotoca jacksoni, EJAC

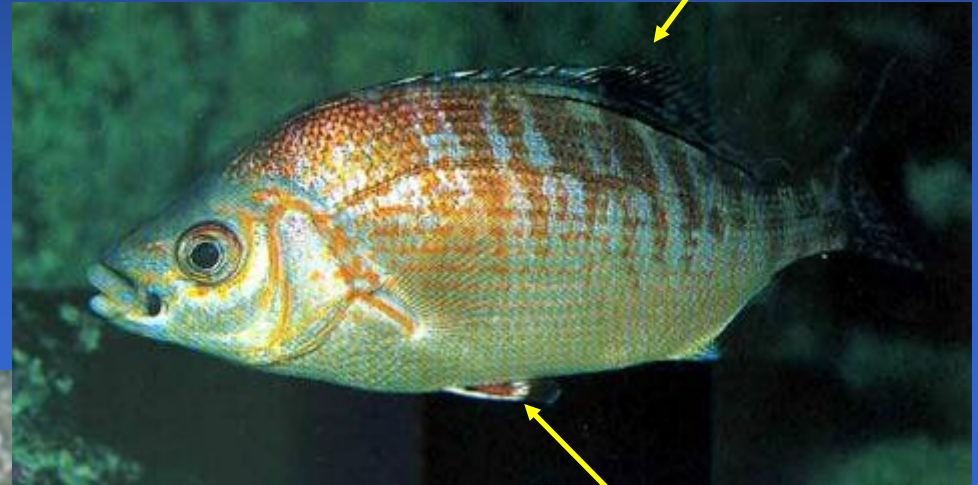
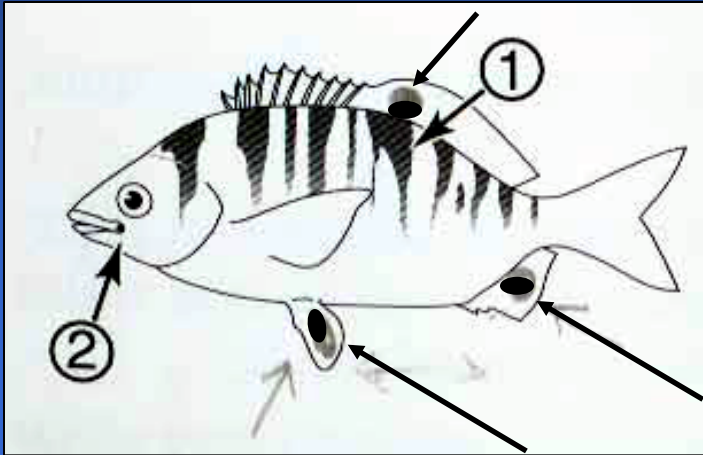


Black Surfperch (juveniles) *Embiotoca jacksoni*, EJAC



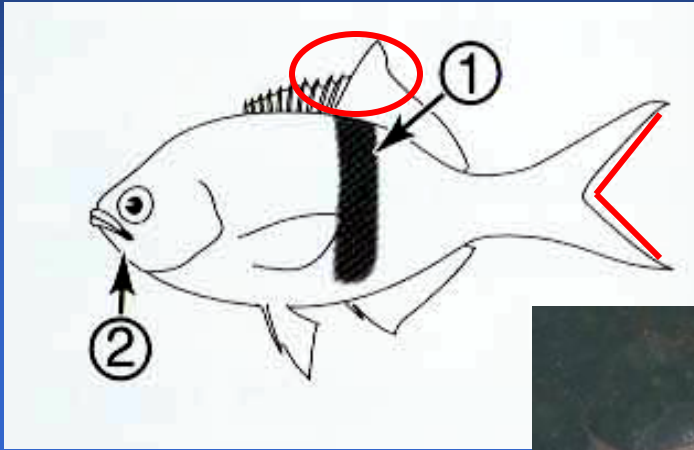
Rainbow Surfperch

Hypsurus caryi, HCAR



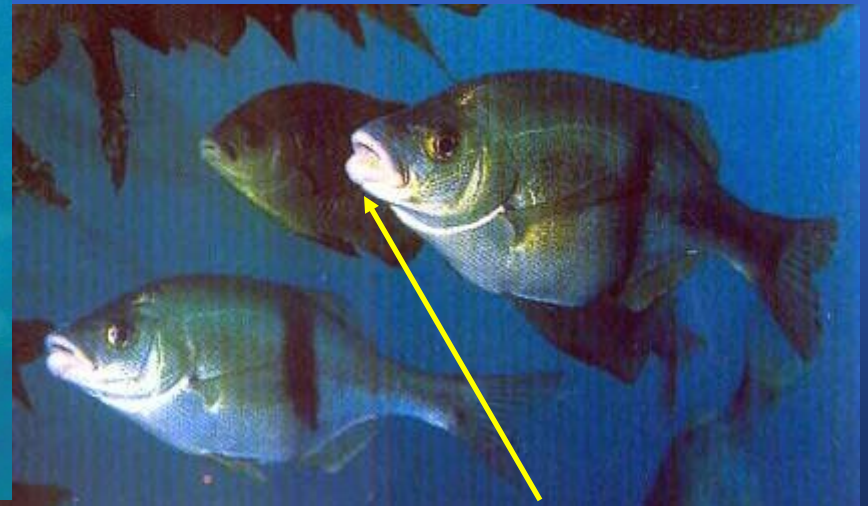
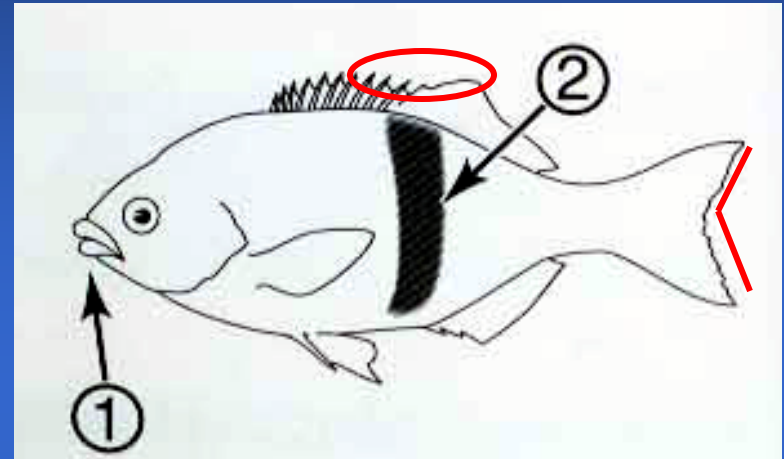
Pile Surfperch

Rhacochilus vacca, RVAC



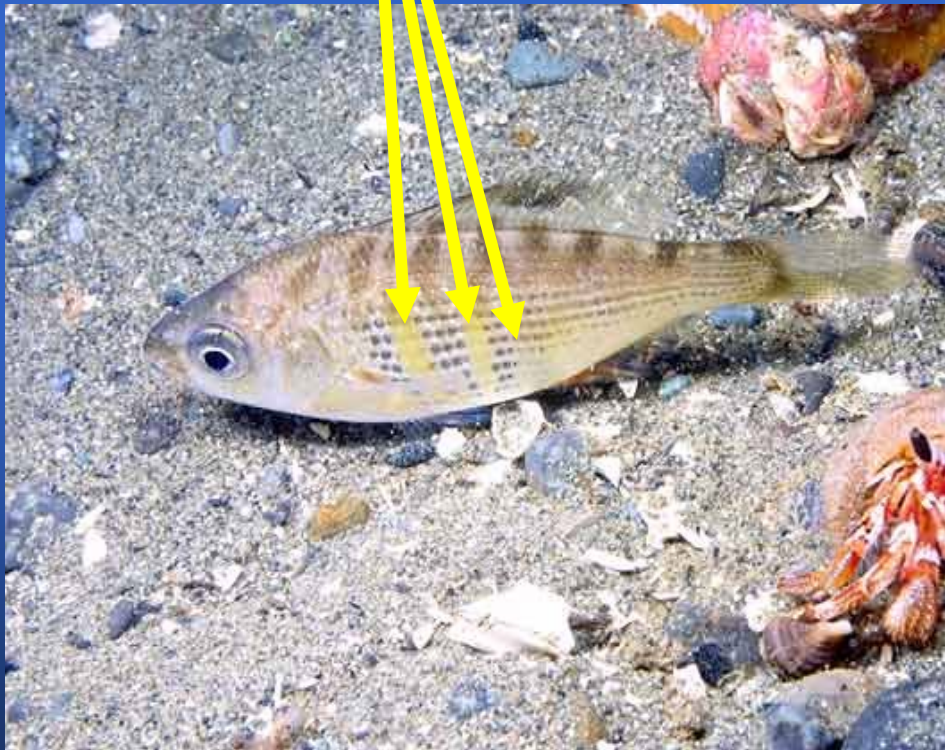
Rubberlip Surfperch

Rhacochilus toxotes, RTOX



Shiner Surfperch *Cymatogaster aggregata*, CAGG

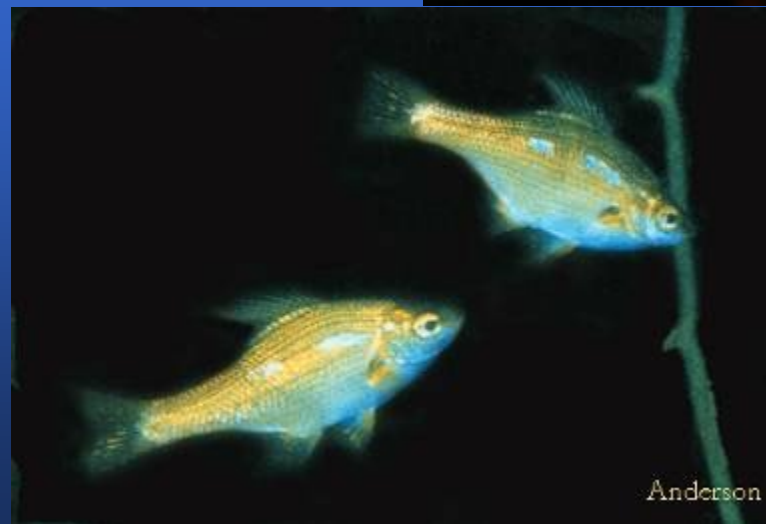
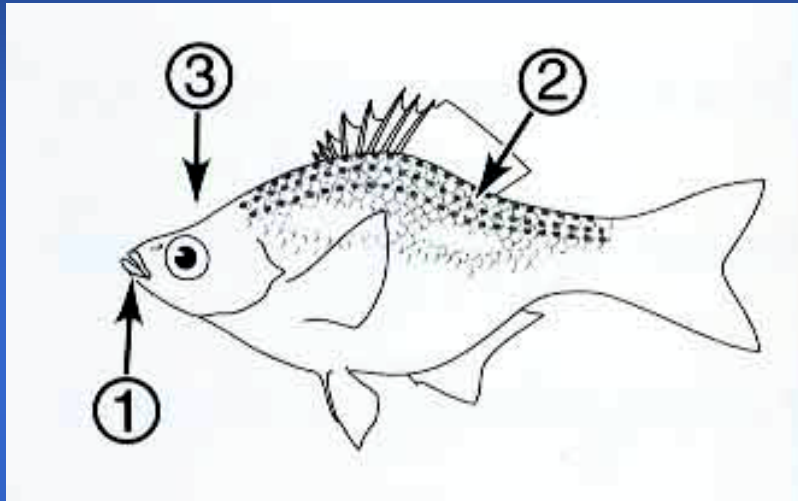
yellow bars



Very shallow depths

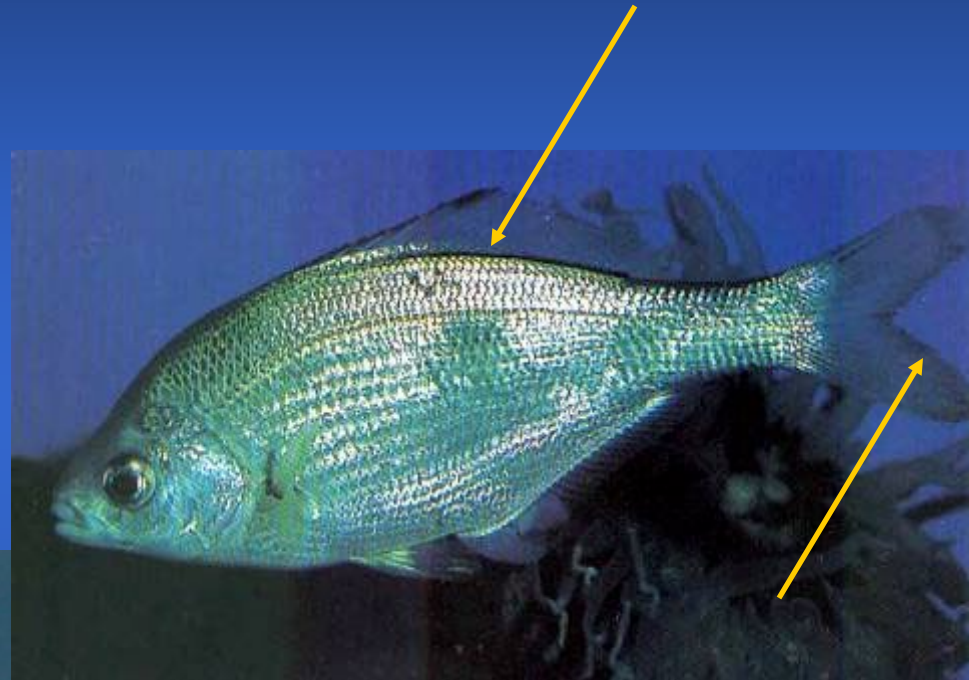
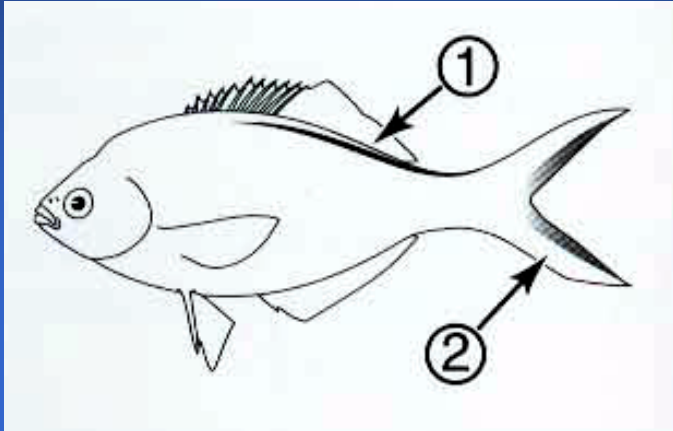
Kelp Surfperch

Brachyistius frenatus, BFRE



White Surfperch

Phanerodon furcatus, PFUR



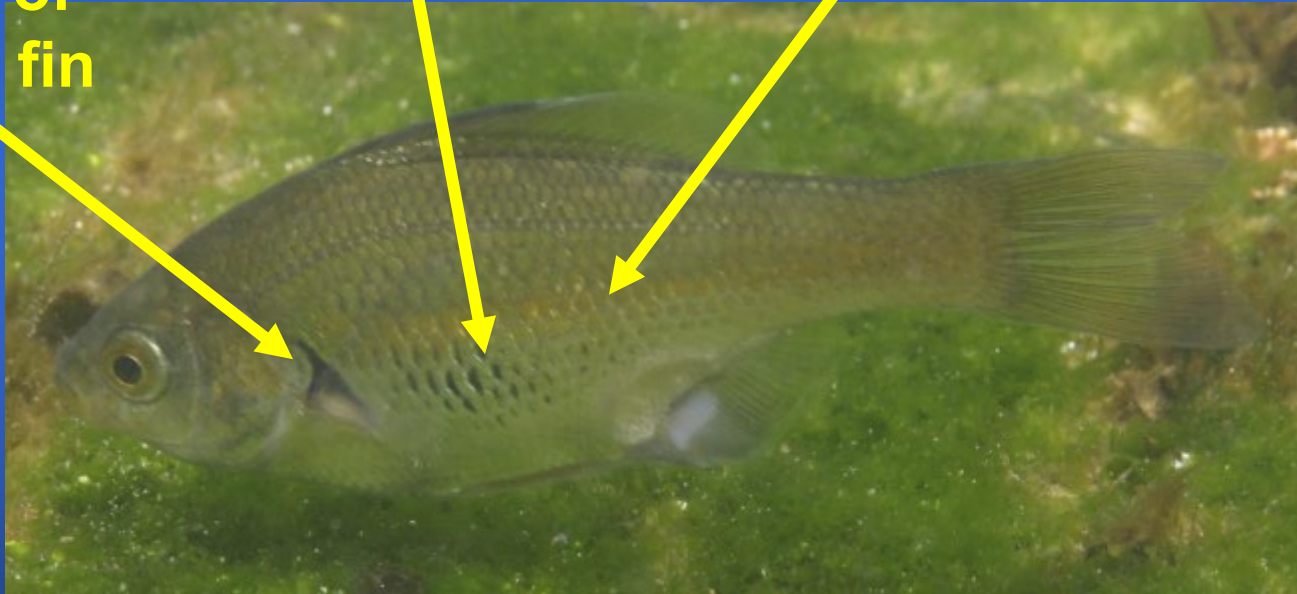
Reef Surfperch

Micrometus aurora, MAUR

NO yellow bars

Black triangle
at base of
pectoral fin

Orange stripe length of body



Like *Cymatogaster*, very shallow, length to 18 cm

Tubesnout
***Aulorhynchus flavidus*, AFLA**



Opaleye

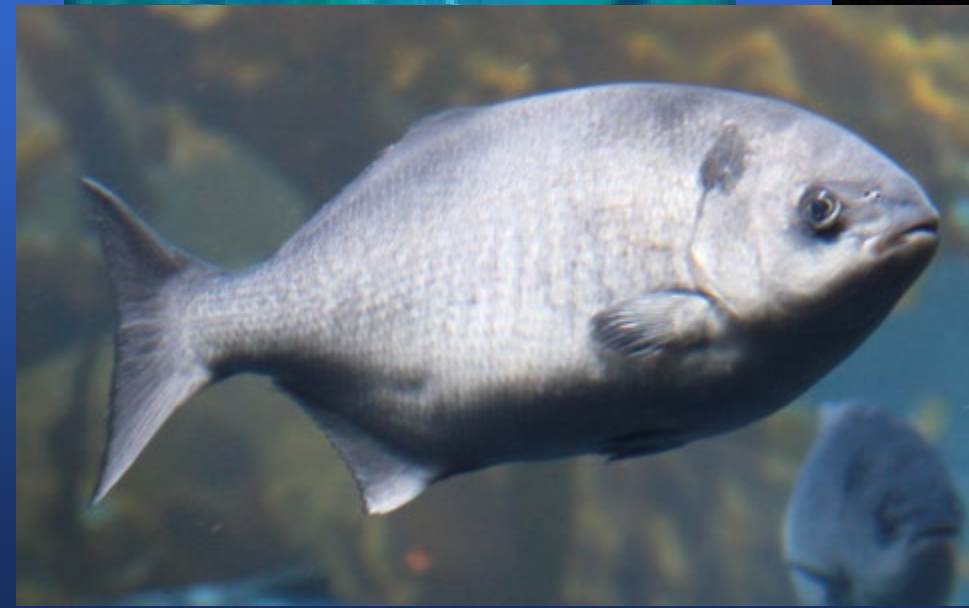
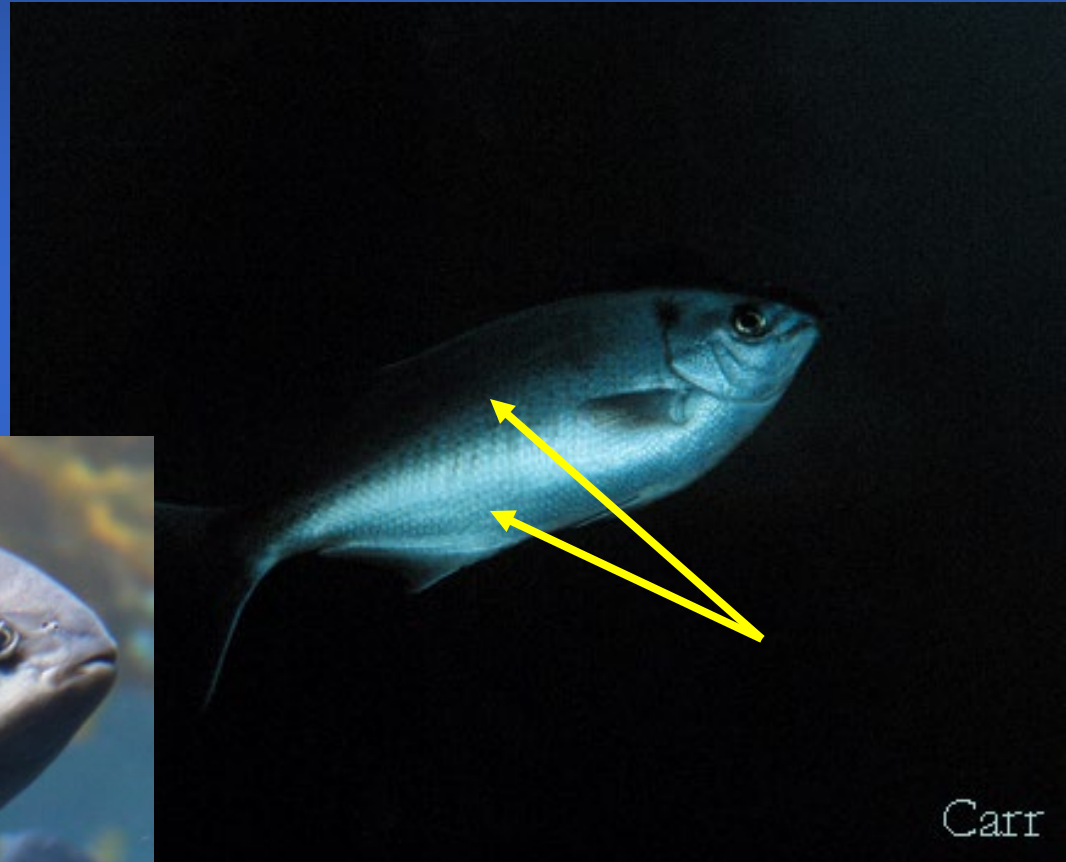
Girella nigricans, GNIG



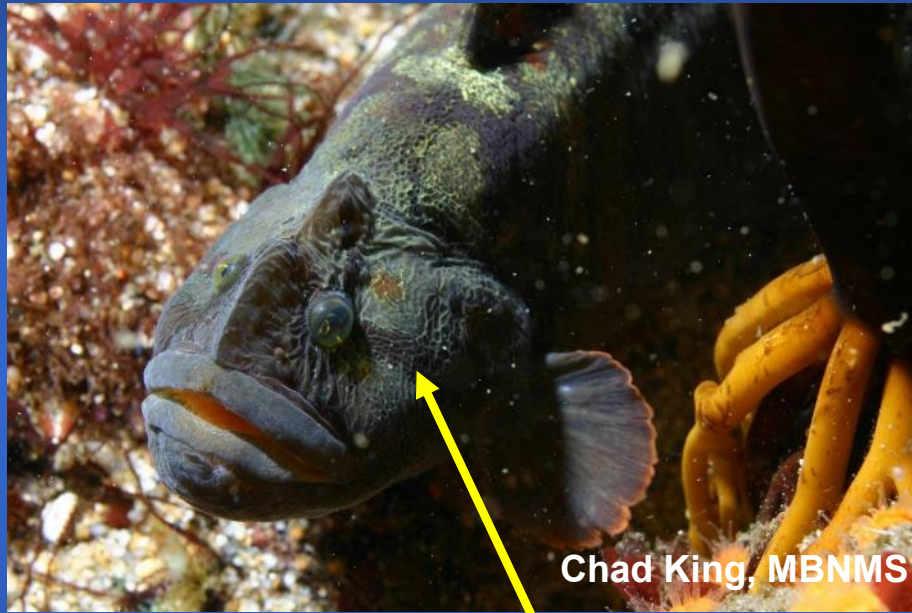
© Janna Nichols

Halfmoon

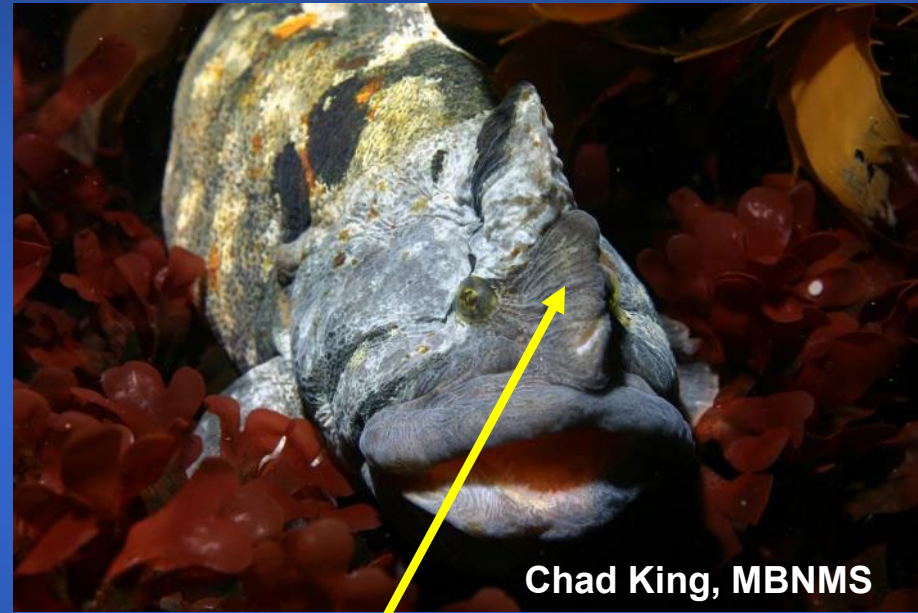
Medialuna californiensis, MCAL



Monkeyface prickleback (eel) *Cebidichthys violaceus*, CVIO



Dark stripe diagonal from eye



Raised "rostrum" between eyes

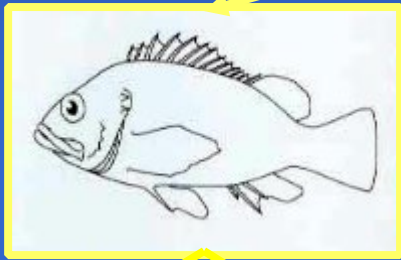
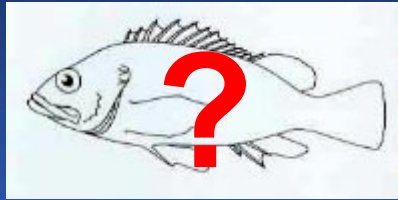
Wolfeel

Anarrhichthys ocellatus, AOCE

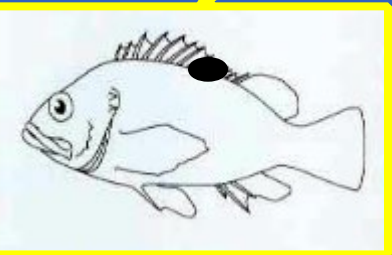


ugly

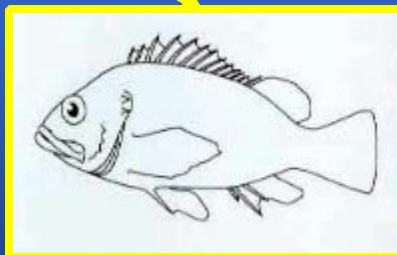
YOY identification flow chart



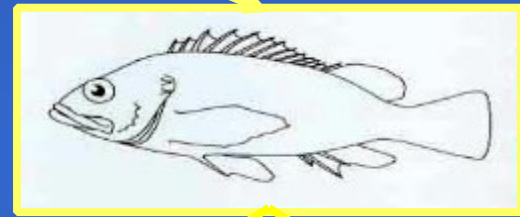
stubby bubbly



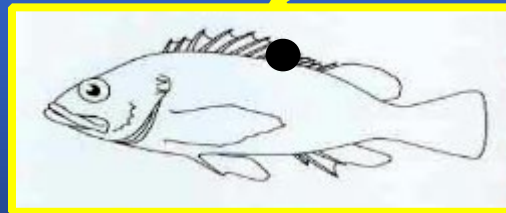
dorsal spot



not



elongate

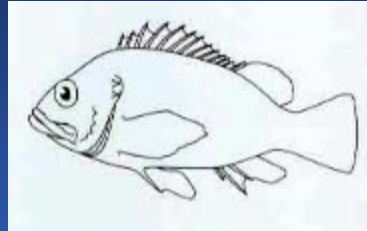


dorsal spot



not

deep-bodied juvenile rockfish

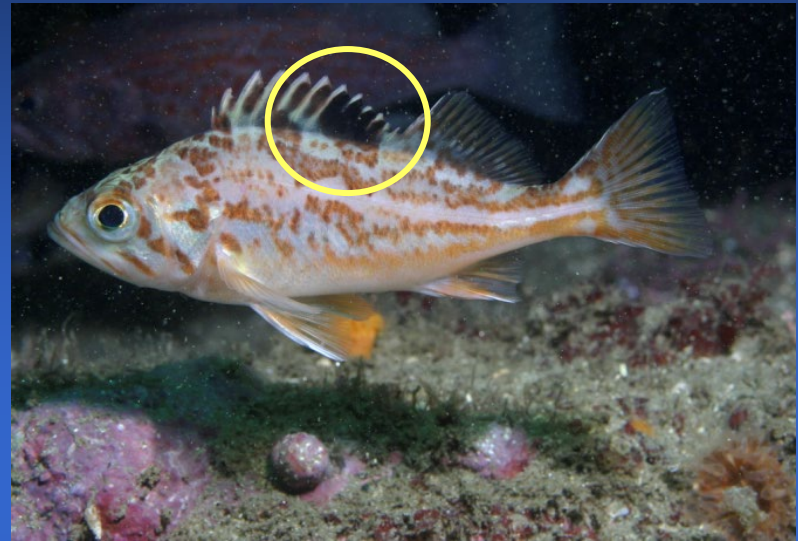
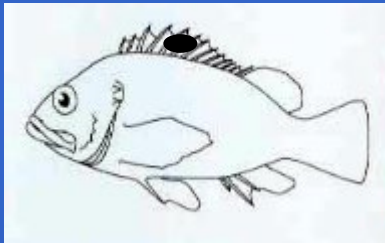


Figurski



deep bodied with dorsal spot

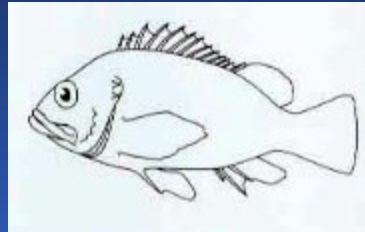
canary rockfish
Sebastes pinniger
SPIN



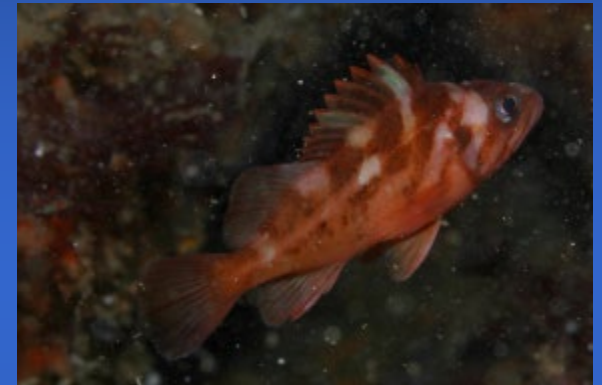
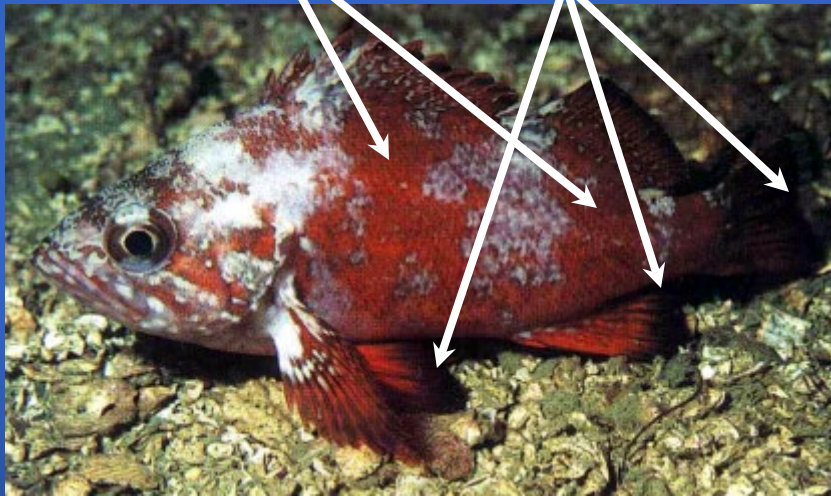
vermilion rockfish
Sebastes miniatus
SMIN



deep-bodied with no dorsal spot

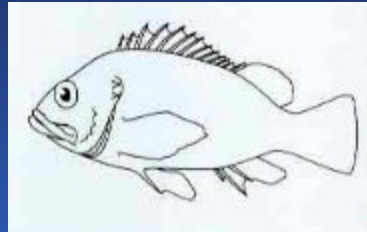


**maroon
bars** **black edge
fins**



on bottom near sand
vermilion rockfish
Sebastes miniatus
SMIN

deep-bodied with no dorsal spot



KGB(C)

copper rockfish

Sebastes caurinus

SCAU

brown – white barring



**gopher or black and
yellow rockfish**

GB



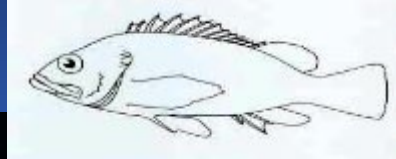
kelp rockfish

Sebastes atrovirens

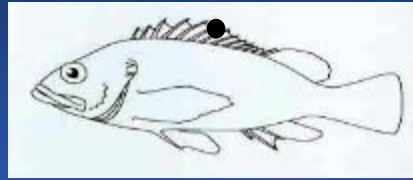
SATR



elongate-bodied juvenile rockfish



elongate-bodied with dorsal spot



blue with maroon speckles

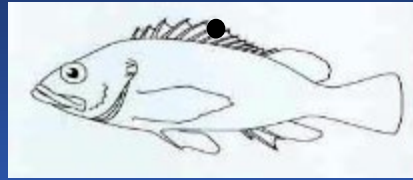


blue rockfish
Sebastes mystinus
SMYS

brown color



elongate-bodied with dorsal spot



brown

“uniform” brown

closely associated with giant kelp

black rockfish

Sebastes melanops

SMEL



counter shaded with white saddles

less associated with giant kelp

olive-yellowtail complex

OYT



OYTs on either side of a black YOY



elongate-bodied with no dorsal spot



brown saddles on
light shiny background



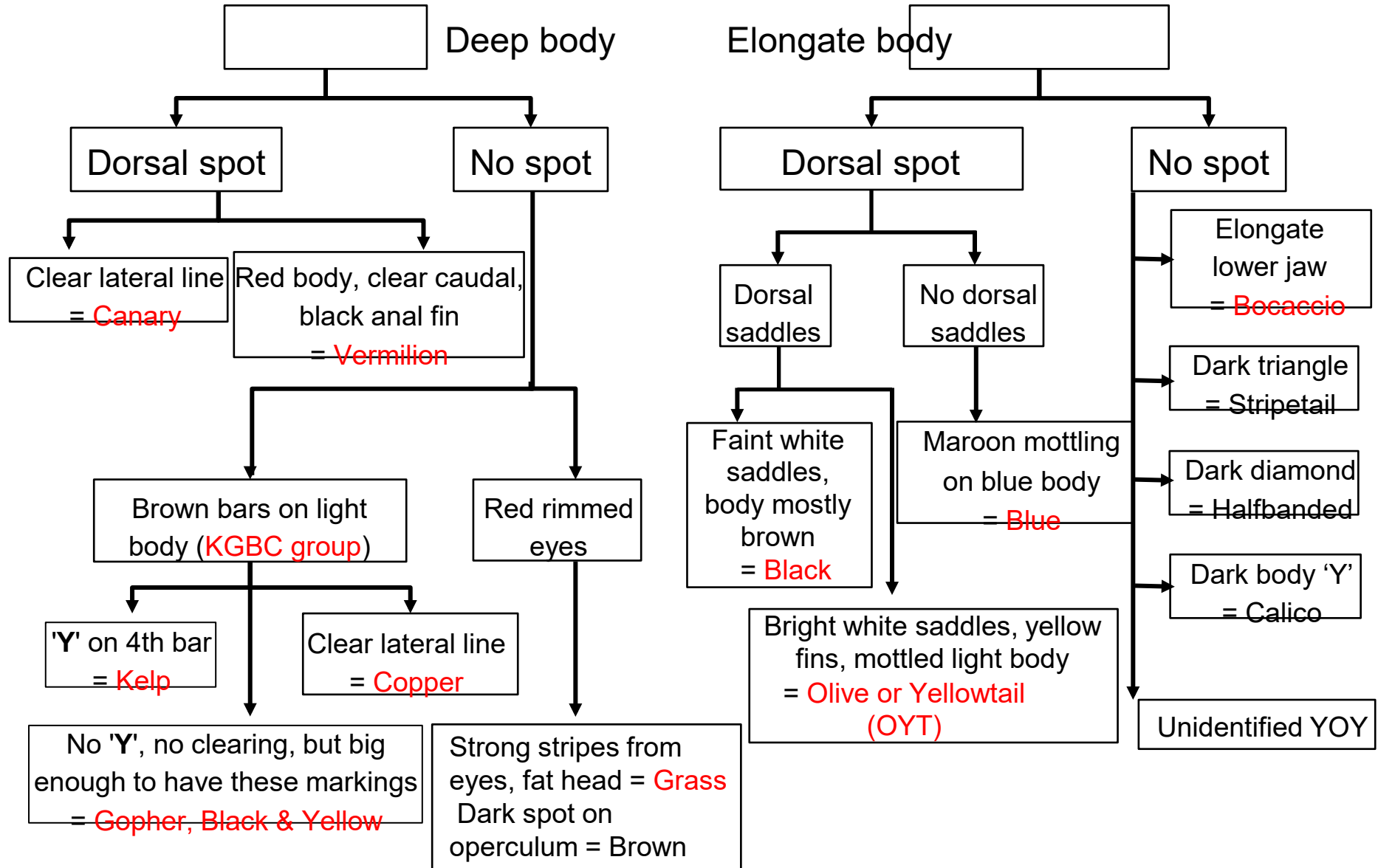
really long maxilla
light tan background
with dark brown mottling

bocaccio

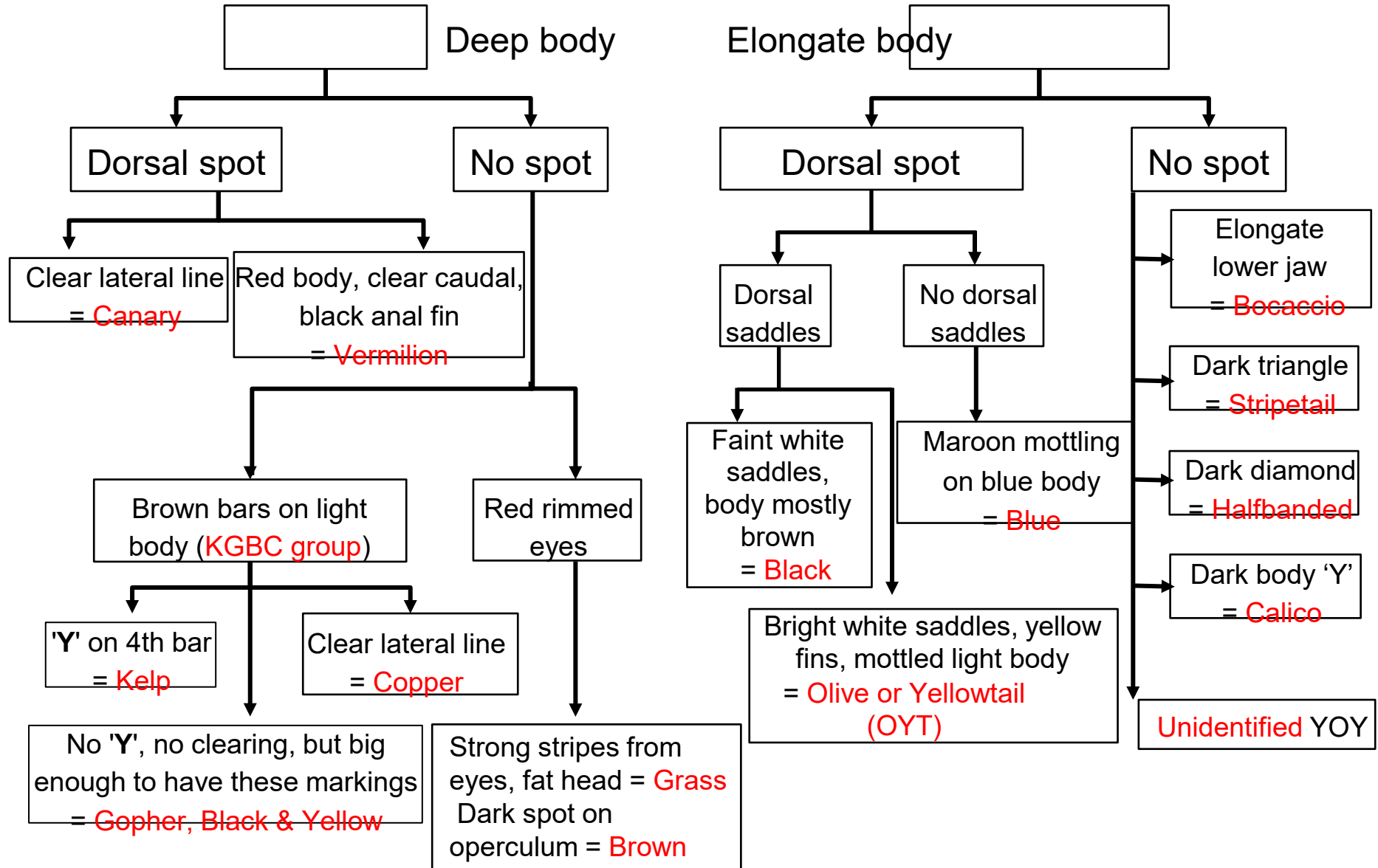
Sebastes paucispinis

SPAU

Juvenile rockfish ID guide for central CA kelp forests – “LOCALS”



Juvenile rockfish ID guide for central CA kelp forests



Juvenile rockfish ID guide for central CA kelp forests

Deep body YOY

Dorsal spot



Big spot, clear lateral line
= **Canary**



Red body, clear caudal
= **Vermilion**
(Dorsal spot quickly fades
w/growth)

No dorsal spot

Clearing on lateral line
= **Copper**



'Y' on 4th bar = **Kelp**



No 'Y', no clearing,
but big enough to have
= **Gopher, Black & Yellow**



Gopher



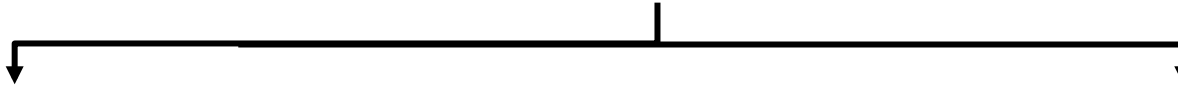
Black & Yellow

Juvenile rockfish ID guide for central CA kelp forests

Deep body YOY



No dorsal spot, Red eye



Dark, mottled, stripes from eyes,
big blunt head

Light, mottled, big brown spot on operculum
= **Brown**



Juvenile rockfish ID guide for central CA kelp forests

Elongate body

Dorsal spot



Maroon mottling = **Blue**



Faint white dorsal saddles,
mostly a solid brown body
= **Black**



Bright white dorsal saddles,
yellow fins
= **Olive or Yellowtail (aka OYT)**



Elongate lower jaw, brown body spots
= **Bocaccio**



Dark triangle
under second
dorsal fin
= **Stripetail**



Dark diamond mid-body
= **Halfbanded**



Golden eye, dark 'Y'
extending diagonally onto
dorsal fin
= **Calico**

Juvenile rockfish ID guide for central CA kelp forests

Elongate body: YOY black vs. blue rockfish



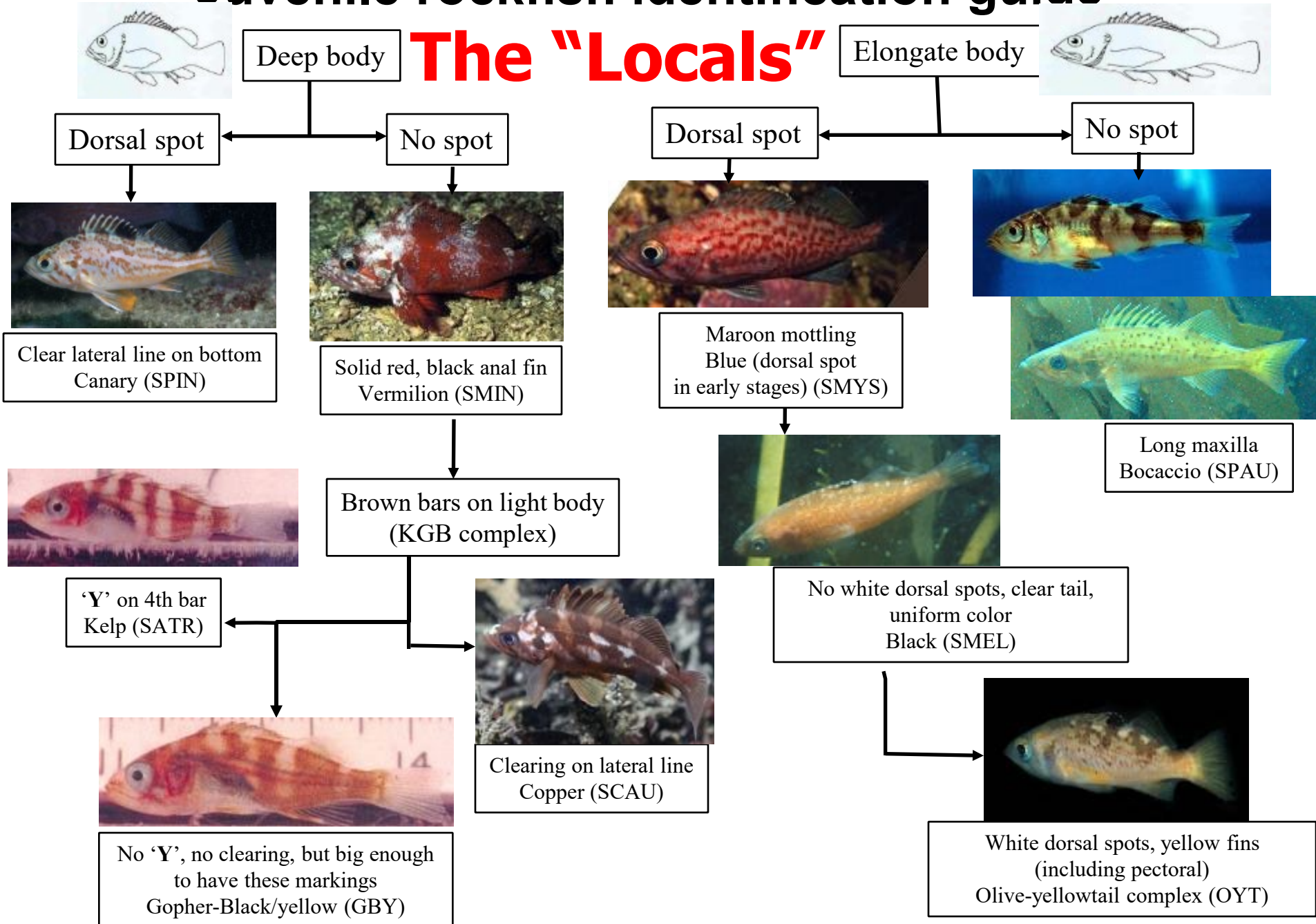
Not mottled,
mostly uniform golden-brown color,
weak dorsal white patches,
dark spot on dorsal fin
= **Black**

Mottled maroon on light blue,
weak black spot on dorsal,
= **Blue**



Juvenile rockfish identification guide

The "Locals"



Juvenile rockfish ID guide for central CA kelp forests

The "Out-of-Towners"

associate with bottom

Brown rockfish - *S. auriculatus*

- no dorsal spot
- red eye
- spot on operculum



Calico rockfish - *S. dalli*

- diagonal posterior directed bar
- white/dark bars on dorsal



Juvenile rockfish ID guide for central CA kelp forests

The "Out-of-Towners"

aggregate in water column

Stripetail rockfish - *S. saxicola*

- no dorsal spot
- inverted triangle



Halfbanded rockfish - *S. semicinctus*

- no dorsal spot
- dark diamond



Juvenile rockfish ID guide for central CA kelp forests

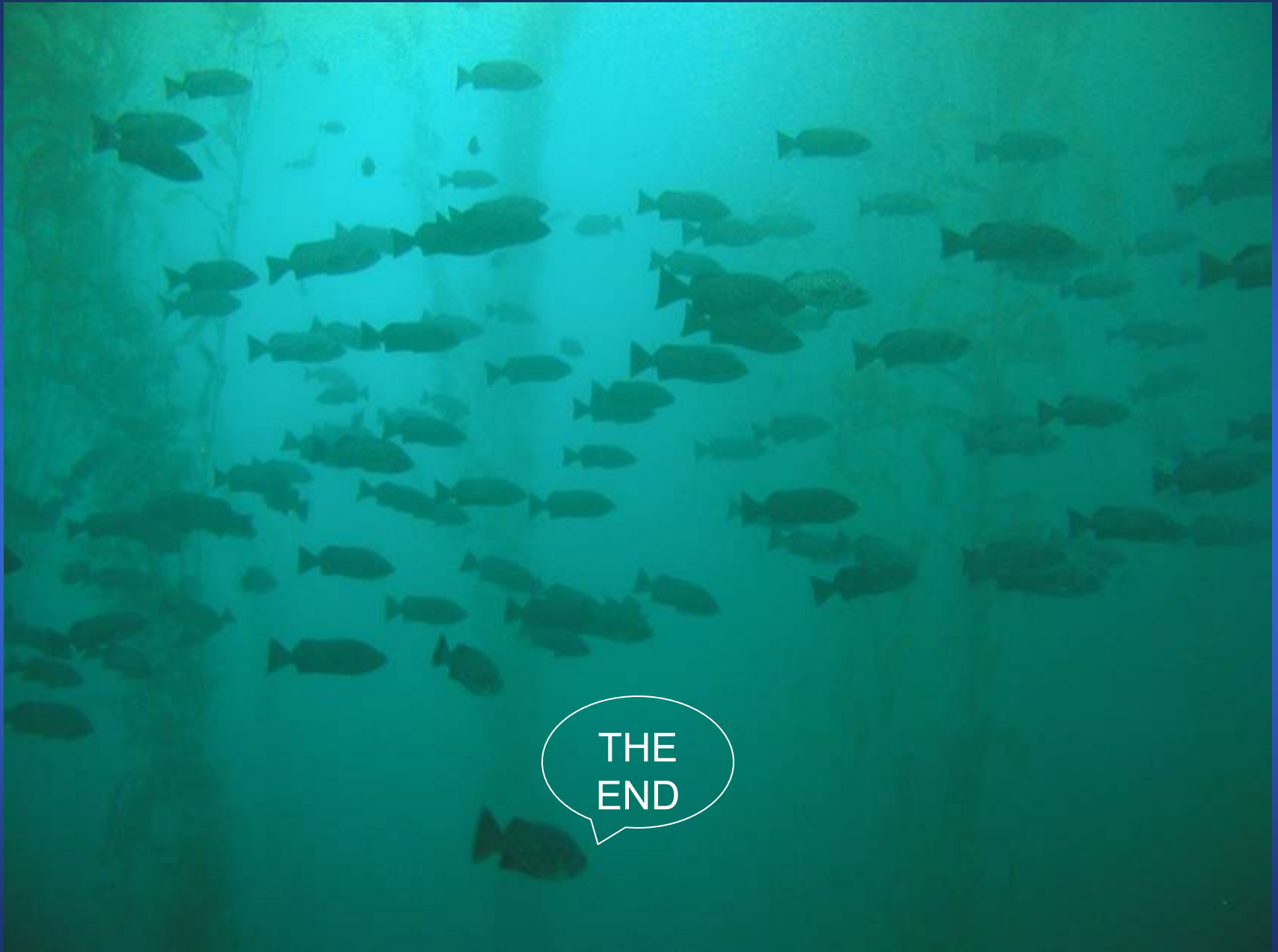
The "Out-of-Towners"

aggregate near bottom

Squarespot rockfish - *S. hopkinsi*

- no dorsal spot
- inverted triangle





KGB(C) YOYs





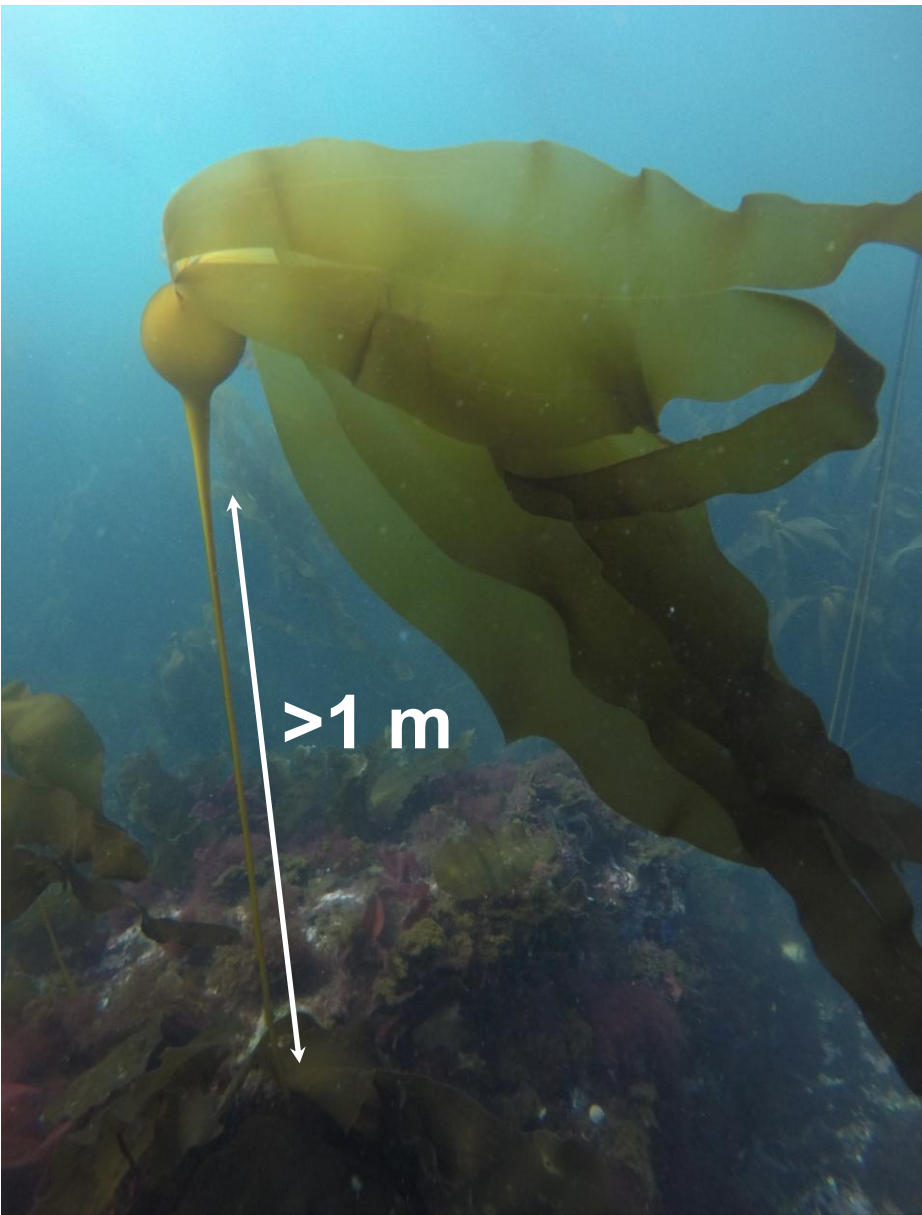
PISCO
Swath Algae 2026

Swath algae data sheet

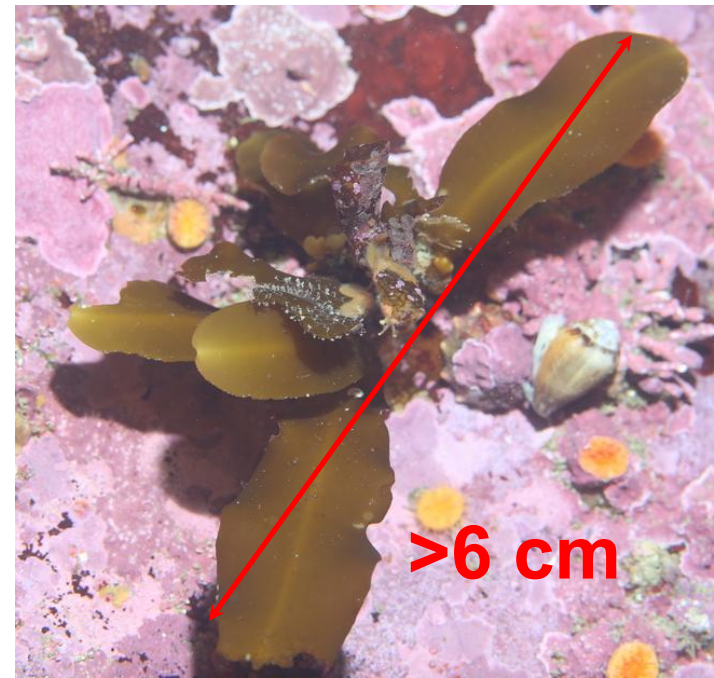
SITE:		DATE:		HEADING OUT:		OBSERVER:	
UPCOAST DOWNCOAST		TRANSECT #: 1 2		ACT. DEPTH:		BUDDY:	
		TARG. DEPTH: S M D					
		0-10 m		10-20 m			
(>1 m stipe length. Count stipes at 1 m.)	Macrocystis pyrifera	Count stipes >1 m					
	Nereocystis (circle super bundles)						
>30 cm stipe length	Pterygophora	Count stipes >30 cm					
	Eisenia arborea						
	Pleurophycus sp.						
	Laminaria setchellii						
Count any	Stephanocystis (>6 cm dia)	Count if diameter/width meets criterion					
	Laminaria farlowii (>10 cm width)						
	Costaria costata (>10 cm width)						
Count any	Alaria marginata						
	Undaria pinnatifida						

Count *Sargassum horneri*

Swath Surveys: adult algae sizing rules



<i>Macrocystis</i>	stipe(s) >1 m
<i>Nereocystis</i>	stipe >1 m
<i>Pterygophora</i>	stipe >30 cm
<i>Laminaria setchellii</i>	stipe >30 cm
<i>Pleurophycus</i>	stipe >30 cm
<i>Eisenia</i>	stipe >30 cm
<i>Stephanocystis</i>	>6 cm diameter
<i>Laminaria farlowii</i>	>10 cm width
<i>Costaria</i>	>10 cm width
<i>Alaria</i>	no restrictions

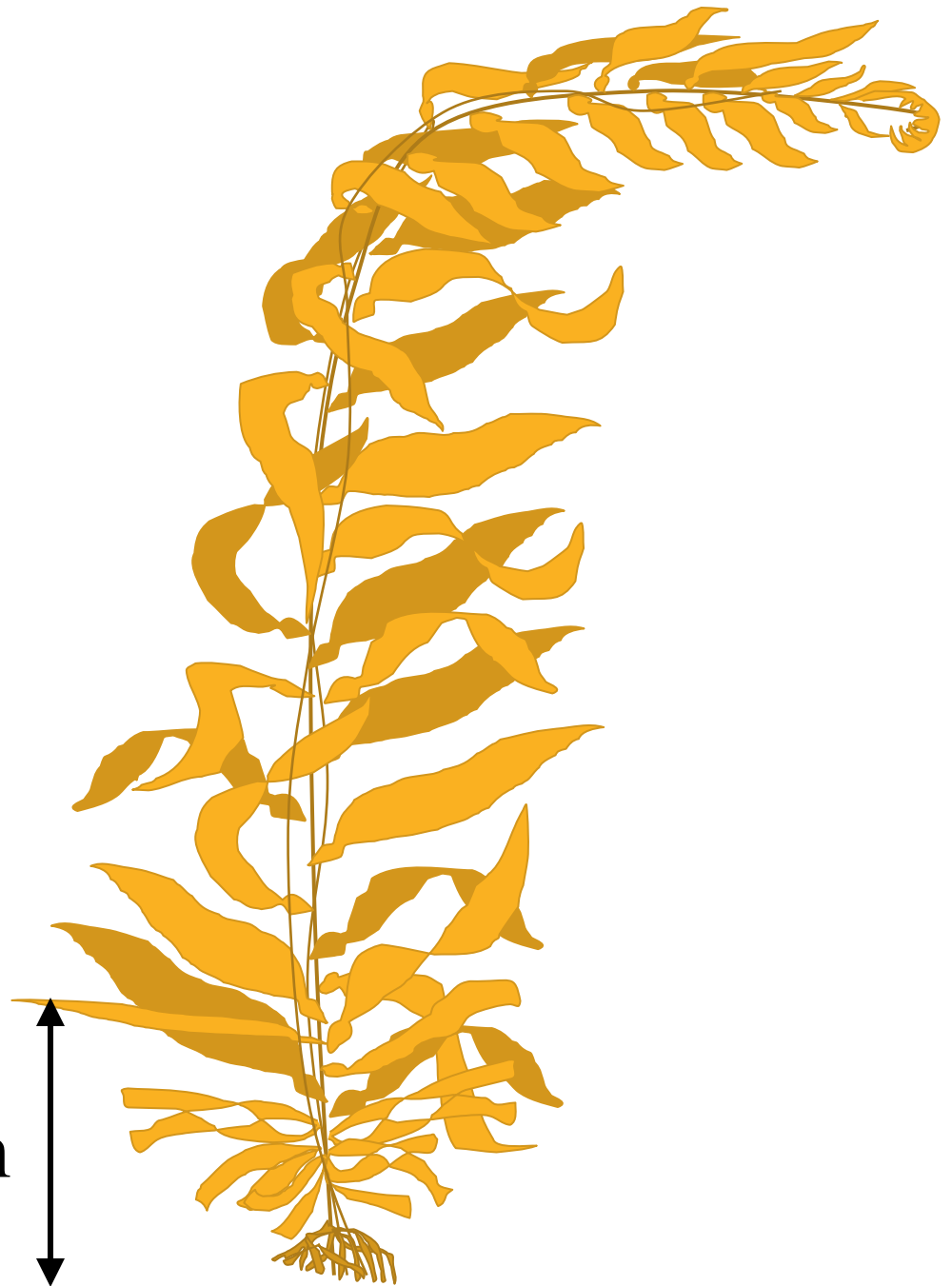




When counting stipes
of *Macrocystis*,
begin counting at...

1 m above holdfast

1 m



Count stipes of
Macrocystis 1 m
above holdfast



Macrocystis pyrifera

- Count all giant kelp >1 m tall



Nereocystis luetkeana



Figurski





How
many
Nereis
are
there?

Nereocystis luetkeana

- >1 m stipe length to count
- Single, long stipe ending with a large pneumatocyst



Pterygophora californica

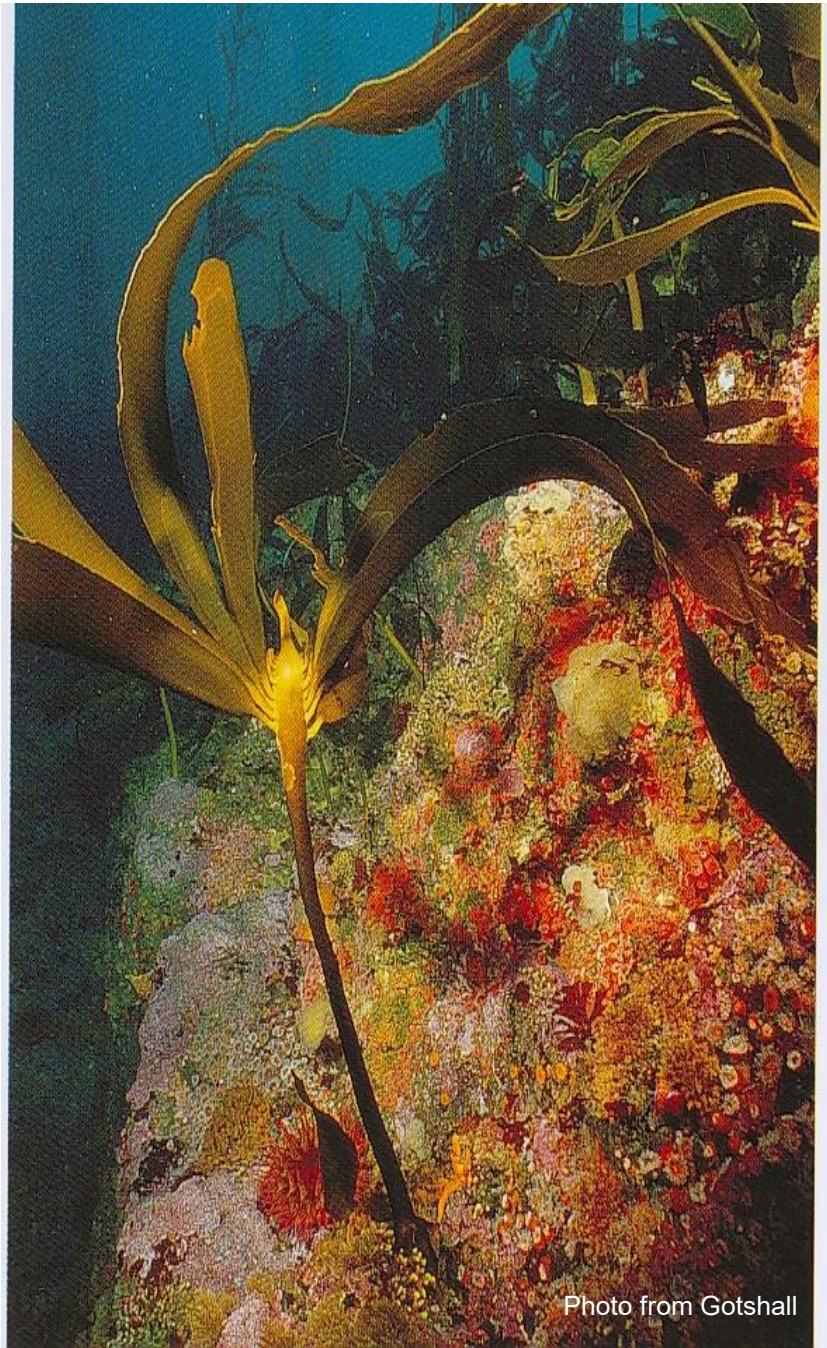
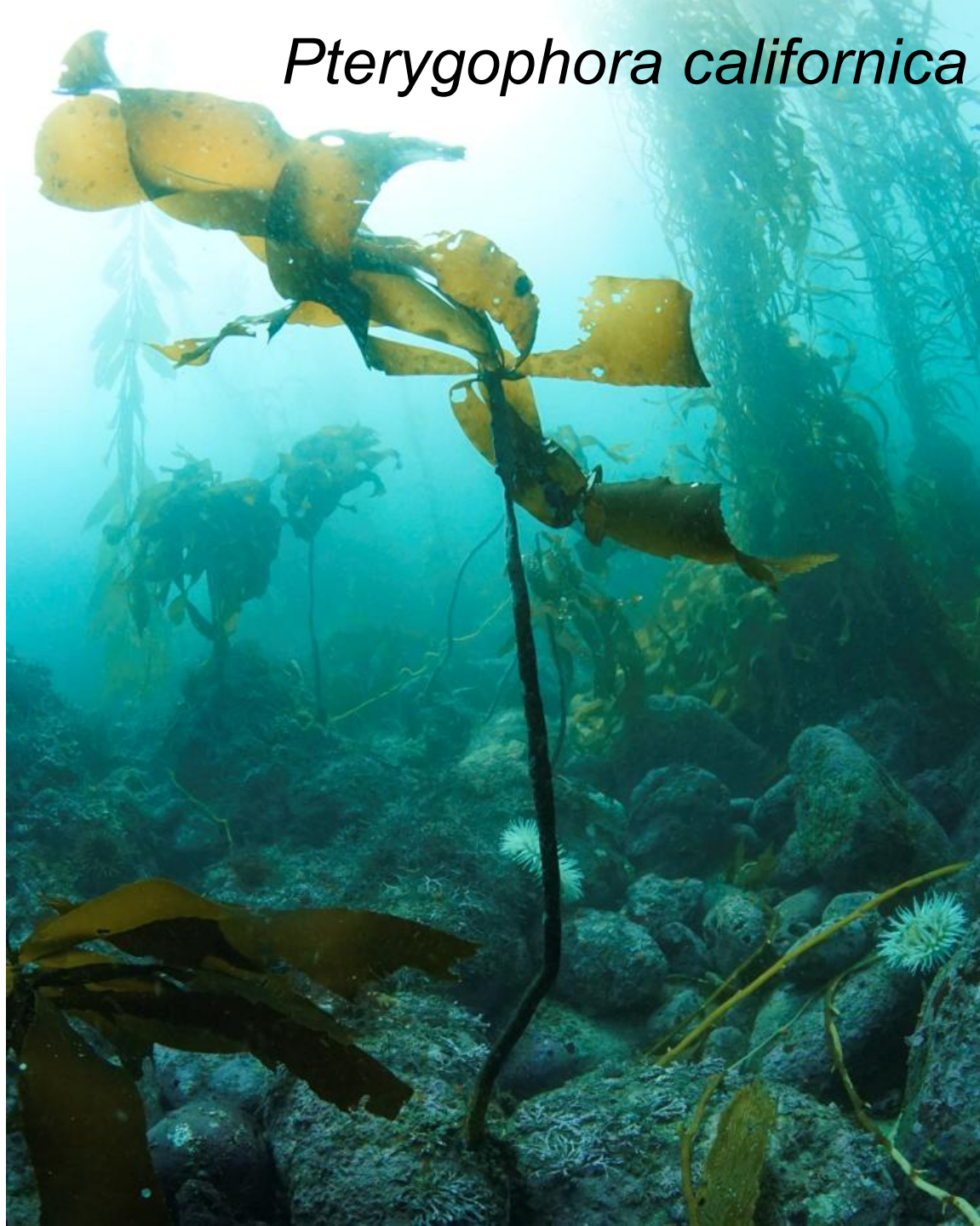


Photo from Gotshall



*Pterygophora
californica*

Pterygophora californica



Pterygophora californica



Pterygophora californica

- Very sturdy, round woody stipe
- Stipe terminus is flattened and has several blades sticking out on either side; **pinnate**
- Apical blade
- Blade margins smooth
- Count all *Pterygophora* >30 cm stipe length



Eisenia arborea



Eisenia arborea



Eisenia arborea



Juveniles of

Pterygophora californica

Eisenia arborea

Eisenia arborea

- Very thick, flexible stipe that **bifurcates** (Y-shape)
- Blades at tips of two short branches
- Blade margins serrated
- Count all *Eisenia* >30 cm stipe length



Pleurophycus gardneri



Adult *Pleurophycus gardneri*



Juvenile *Pleurophycus gardneri*





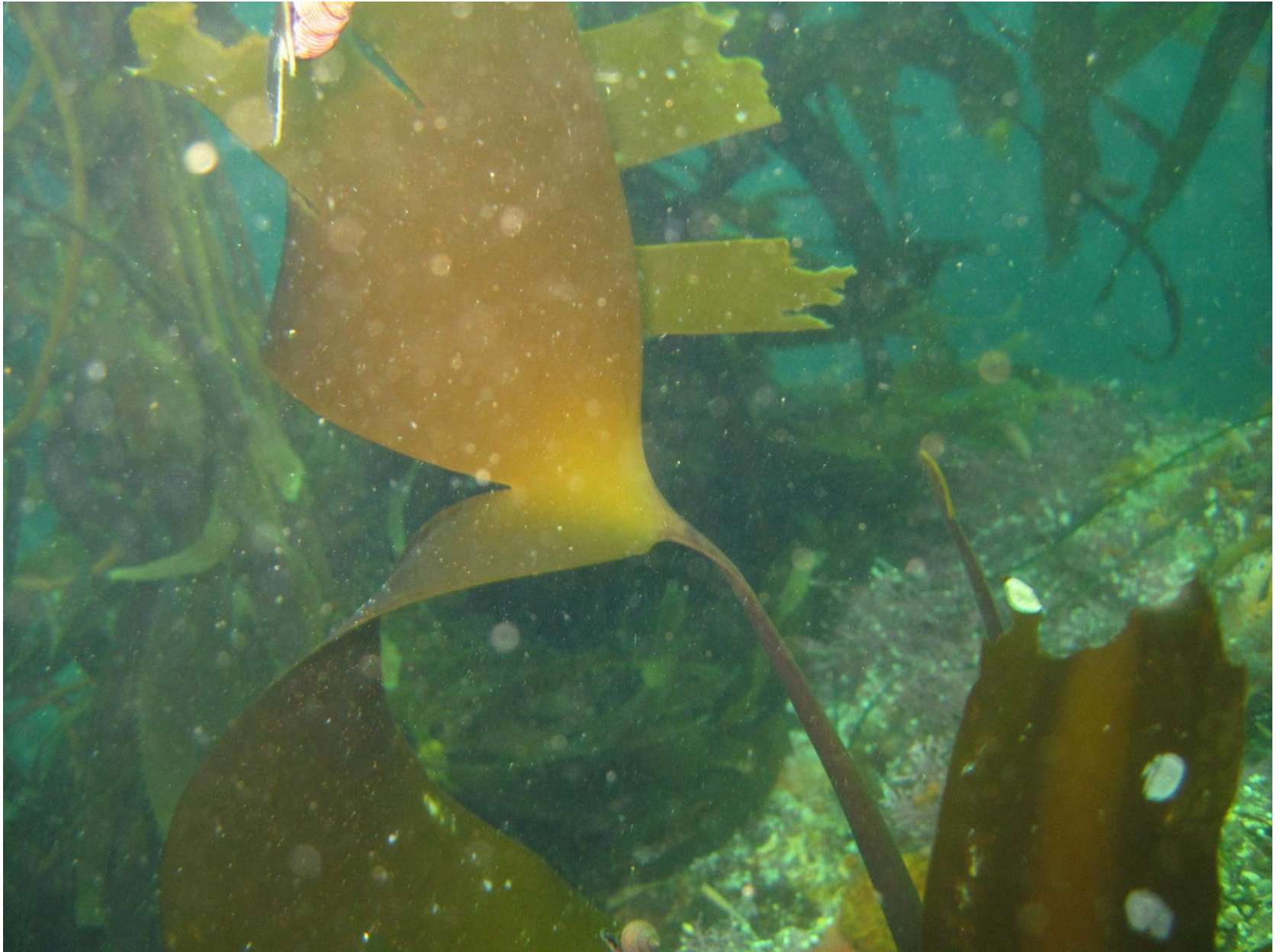
Pleurophycus gardneri

- More common in Big Sur
- Stipe similar to *Laminaria setchellii*
- Broad (to 4 cm), smooth midrib
- Wavy on either side of midrib
- Count if stipe >30 cm

Laminaria setchellii



Laminaria setchellii

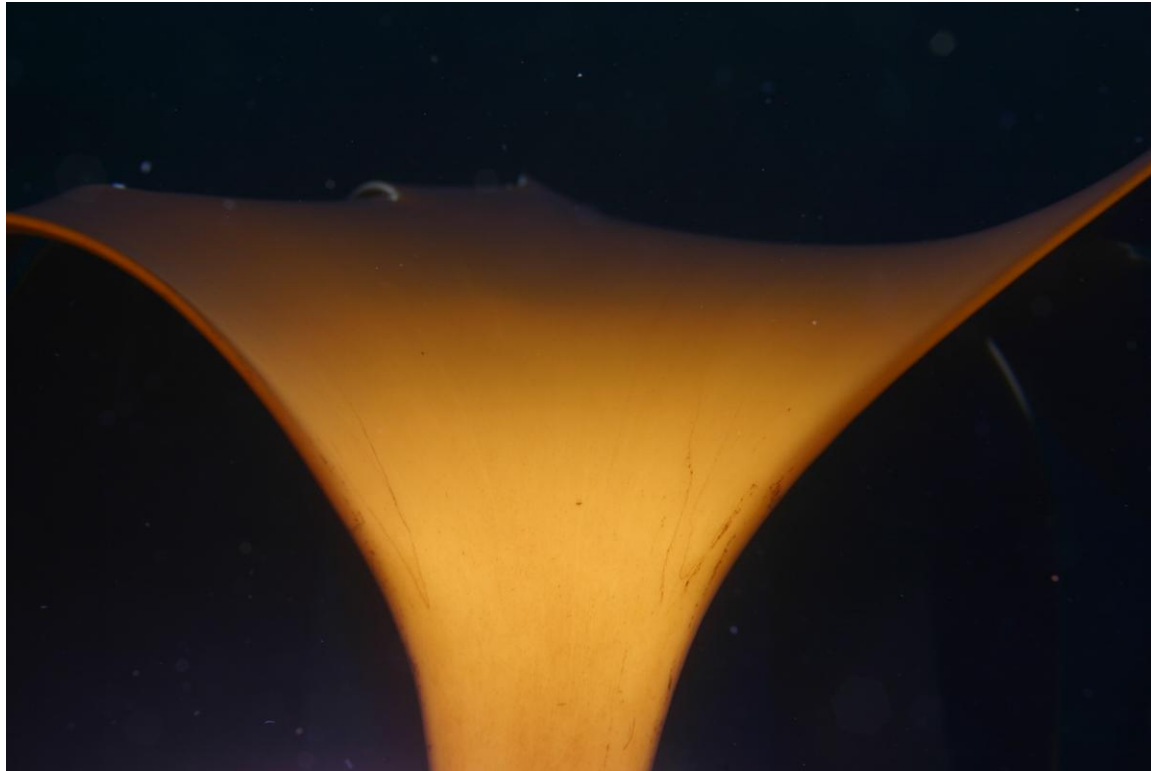


Laminaria setchellii

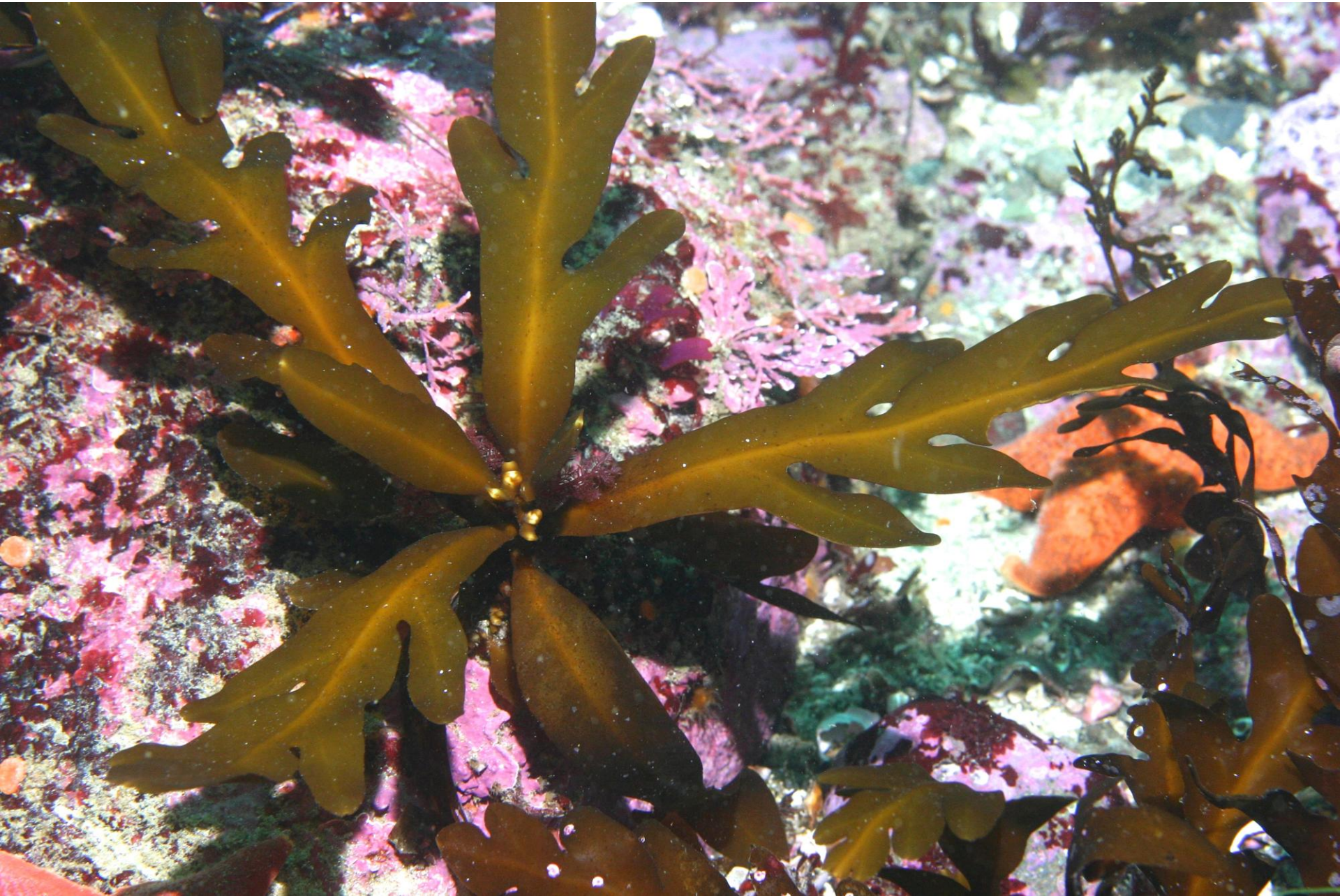


Laminaria setchellii

- Slender, flexible stipe
- Frond is long, wide and tears in several places
- Count all *Laminaria* >30 cm stipe length



Stephanocystis (nee *Cystoseira*) *osmundacea*: >6 cm diameter



Stephanocystis osmundacea: reproductive growth





*Stephanocystis
osmundacea*

Reproductive
growth can reach
surface and form a
canopy.

Will often foul your
gear, so be careful.

Stephanocystis osmundacea

- Reproductive in summer, produces long chain bladders
- Must be >6 cm in diameter
- For proper count, grab basally to separate individuals



Laminaria farlowii

Ragsac



Laminaria farlowii at Siren 2018

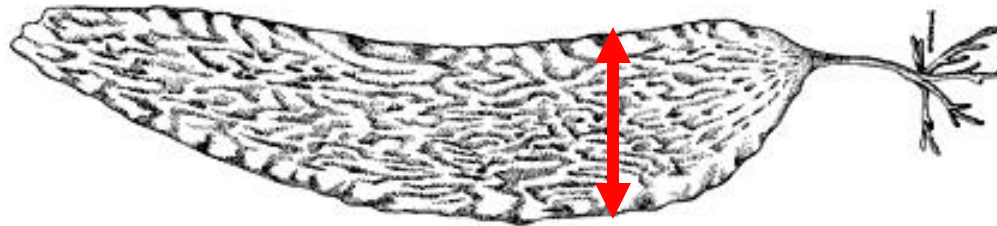


Laminaria farlowii
at Otter Cove 2019



Laminaria farlowii

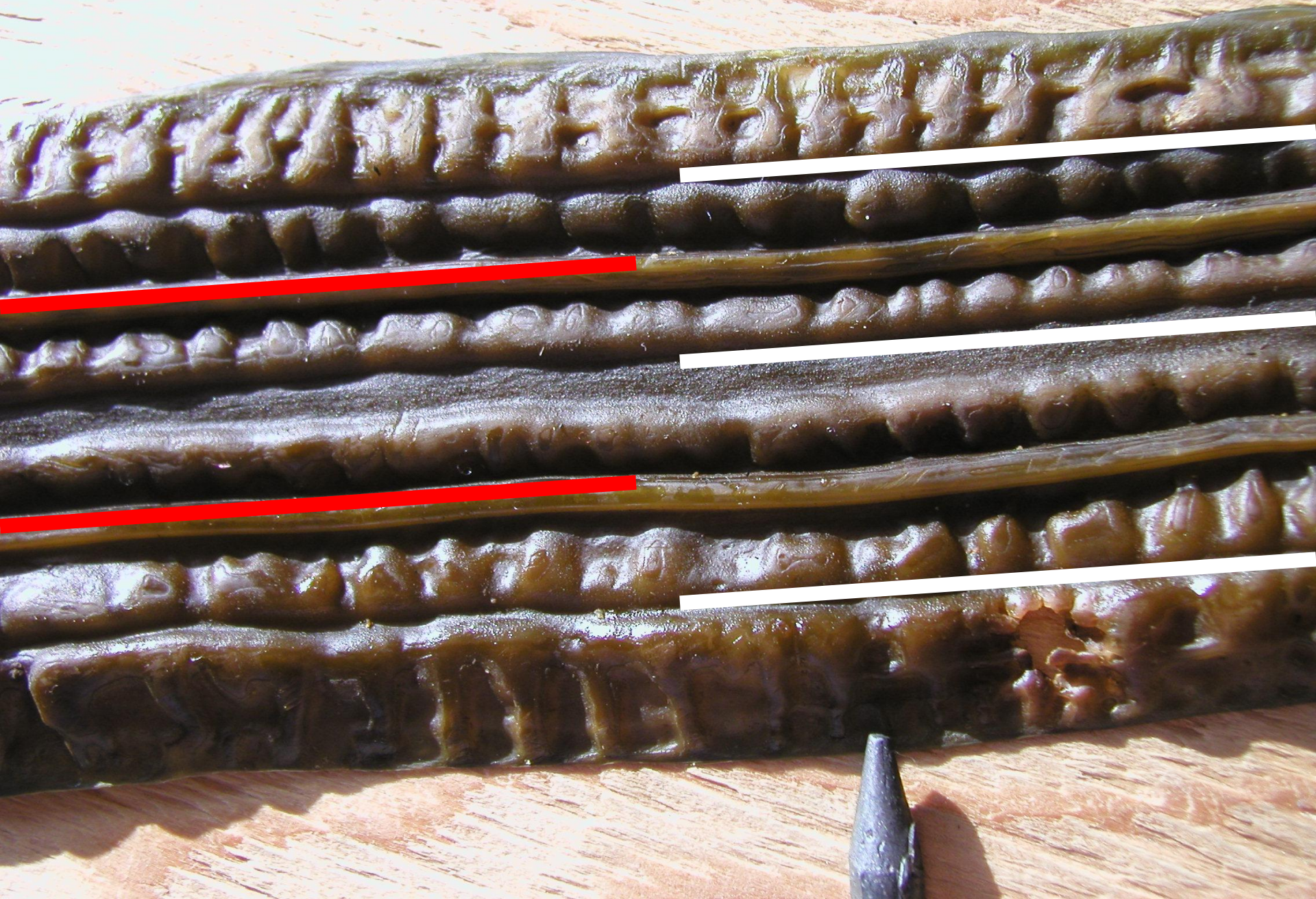
- Has an extremely short stipe with long, very wide blade
- Blade must be >10 cm wide for alga to be counted
- Recently seen at Siren PISCO site



Costaria costata



Costaria costata

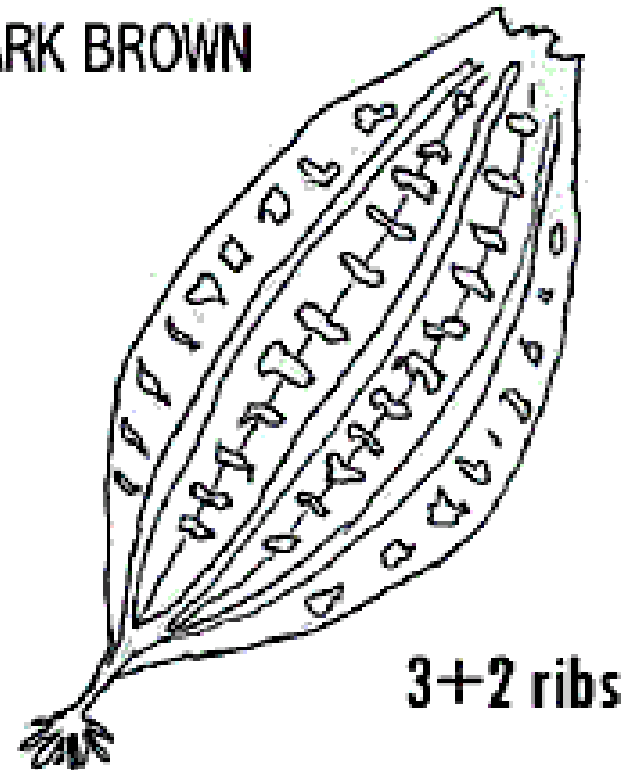


Costaria costata

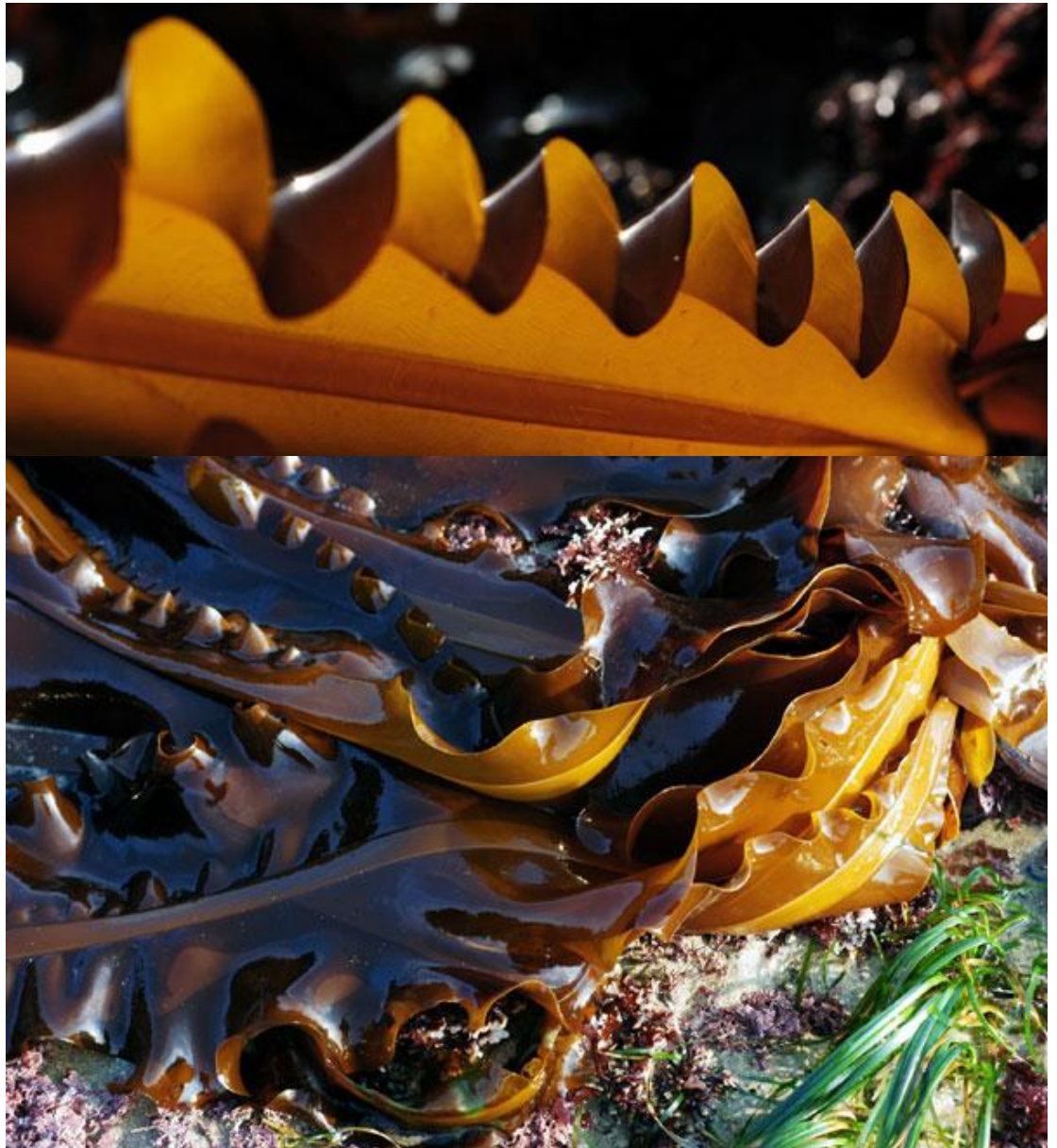
- Large blade (up to 2 m long) with short but thick stipe
- Five raised ribs; two on one side, three on the other
- Count if width >10 cm



DARK BROWN



Alaria marginata





Alaria marginata



Alaria marginata



Alaria marginata and sporophylls

Alaria marginata

- Usually low intertidal and very shallow subtidal
- Short stipe with very long blade, wavy margins
- Obvious midrib
- No restrictions, count any observed

Adult *Undaria pinnatifida*



Undaria pinnatifida



Undaria pinnatifida



Juvenile *Undaria pinnatifida*



Undaria pinnatifida

- When reproductive, it has a very large and distinct sporophyll at base (looks like a pine cone)
- At end of dive, pull specimen off bottom and place in bag, noting location on tape and notify leader of dive team

Sargassum horneri (= *S. filicinum*)

Recruit

< 5 cm tall



Immature

> 5 cm tall

no conceptacles



Mature

cylindrical
conceptacles



Fertile

conceptacles
“fuzzy”
(exuding
eggs/embryos)

Senescent

decomposing, losing
buoyancy, spent
receptacles





Sargassum horneri
Breakwater June 2020



PHILLIP COLLA
OCEANLIGHT.COM

Sargassum horneri



Sargassum horneri



“Chain bladder” like a rattle snake

Stephanocystis osmundacea



PISCO
Swath Inverts 2026



Patiria miniata (formerly *Asterina miniata*)

Bat star, very abundant at many sites, highly variable in color and pattern. Typically has 5 rays, but can be found with more or less.



Lonhart/SIMoN
MBNMS NOAA

Patiria miniata
Bat star (formerly *Asterina miniata*)



Lonhart/SIMoN
MBNMS NOAA

Juvenile *Dermasterias imbricata*
Leather star
Very smooth, five rays, mottled aboral surface



Adult *Dermasterias imbricata*

Leather star

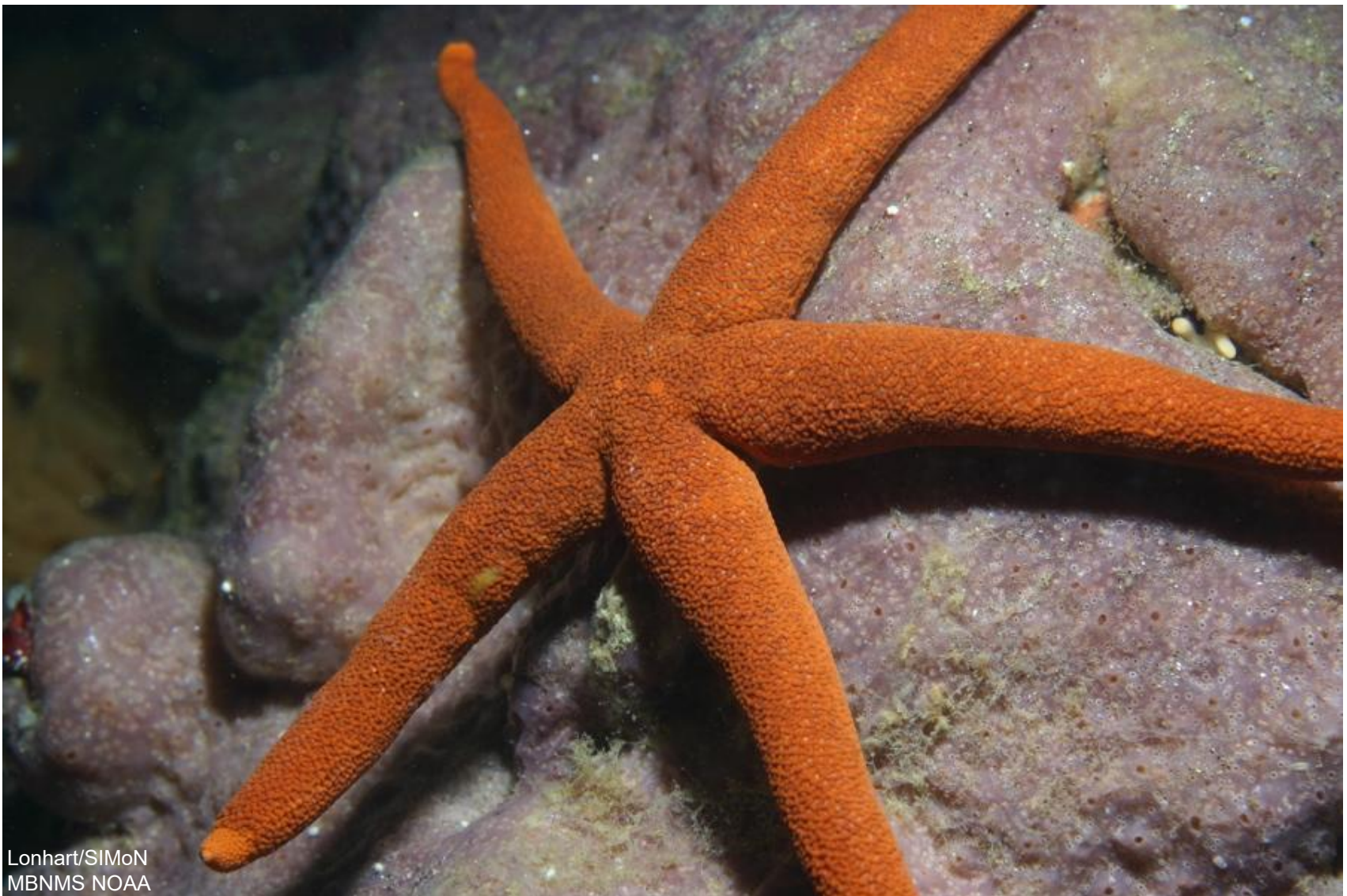
Very smooth, five rays, mottled aboral surface



©Lonhart

Henricia spp. Blood stars

Long, tapered rays, orange or red, patterned aboral surface looks like a series of overlapping ringlets. Usually 5 rays.



Henricia spp. Blood star

Long, tapered rays, orange or red, patterned aboral surface similar to ringlets. Usually 5 rays. (*H. sanguinolenta*?)



Lonhart/SIMoN
MBNMS NOAA

Henricia spp. Blood star

Long, tapered rays, orange or red, patterned aboral surface similar to ringlets. Usually 5 rays.



Mediaster aequalis

Orange star with five rays, large marginal plates, very flattened.
Confused with *Patiria miniata*.



Mediaster aequalis

Orange star with five rays, large marginal plates, very flattened. Can be mistaken for *Patiria miniata*



Pycnopodia helianthoides

Sunflower star

Very large, >20 rays, very soft and flexible, purple or orange



Lonhart/SIMoN
MBNMS NOAA

Pycnopodia helianthoides

Sunflower star

Very large, >20 rays, very soft and flexible, purple or orange



Lonhart/SIMoN
MBNMS NOAA

Pycnopodia helianthoides

Sunflower star

Very large, >20 rays, very soft and flexible, purple or orange



Pycnopodia helianthoides
Sunflower star

Since Fall 2013, only juveniles observed in kelp beds



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Pisaster giganteus
Giant-spined star
Spines circled with blue ring, thick rays



Lonhart/SIMoN
MBNMS NOAA

Pisaster giganteus
Giant-spined star
Spines circled with blue ring, thick rays



Lonhart/SIMoN
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Pisaster giganteus
Giant-spined star
Spines circled with blue ring, thick rays



Pisaster giganteus

Giant-spined star

Spines circled with blue ring, thick rays



© SCOTT GABARA

Giant-spined star
Spines (white or purple) circled with blue ring



Lonhart/SIMoN
MBNMS NOAA

Pisaster giganteus (tan) and *Pisaster ochraceus* (purple)
Giant-spined and ochre stars

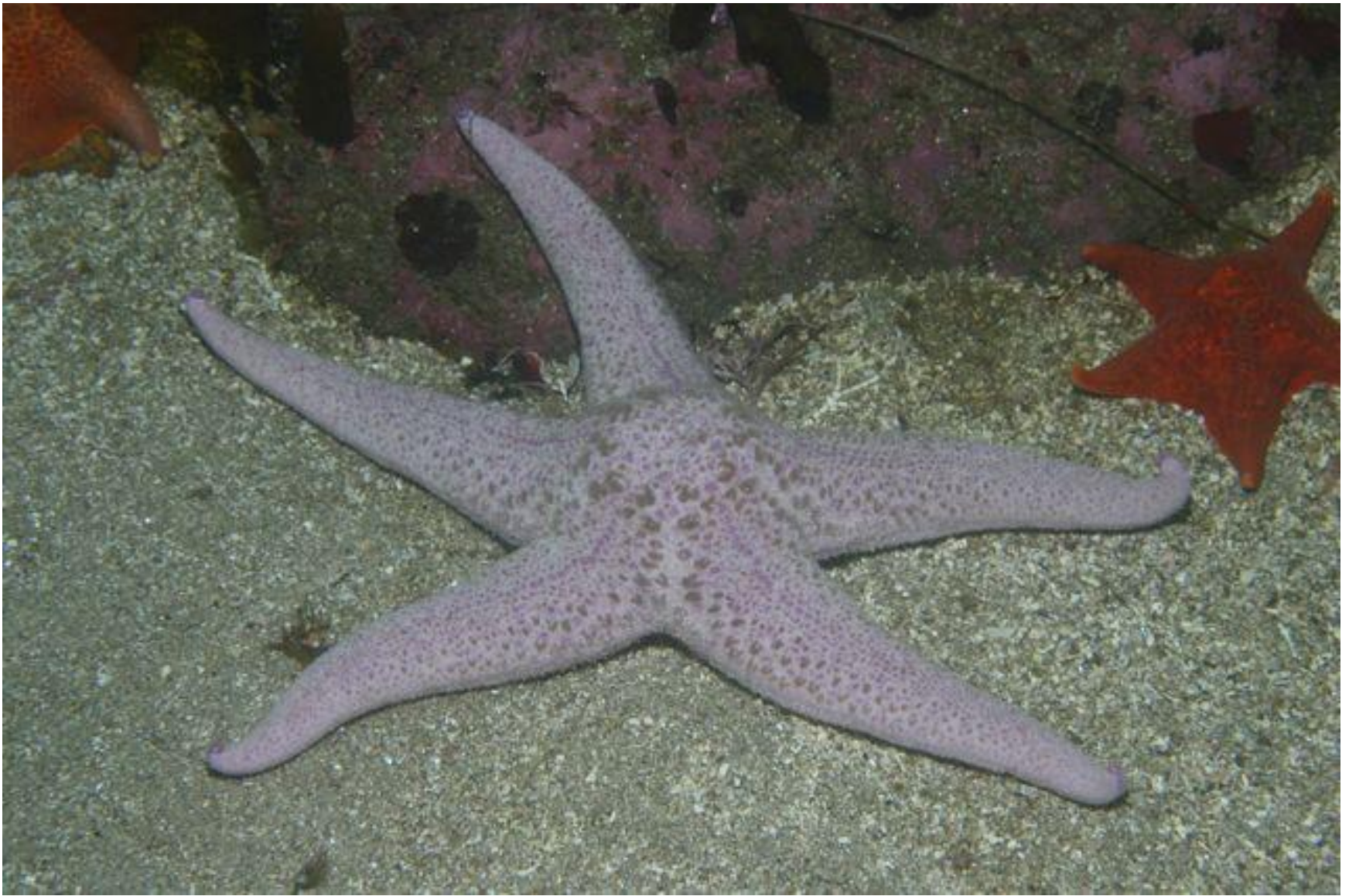


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Pisaster ochraceus

Ochre star

Orange, tan or purple color; five rays, white stubby spines



Pisaster brevispinus

Short-spined star

Large, pale pink in color, often on sand, thick rays



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MBNMS NOAA

Orthasterias koehleri
Northern rainbow star

Mottled red, orange and yellow, large, long thick rays



Lonhart/SIMoN
MBNMS NOAA

Urticina lofotensis

White-spotted rose anemone

Red column with white dots, large



©Lonhart

Urticina piscivora
Fish-eating anemone
Solid red column, white or red tentacles



Lonhart/SIMoN
MBNMS NOAA

Urticina piscivora
Fish-eating anemone
Solid red column, white or
red tentacles



Lonhart/SIMoN
MBNMS NOAA



Lonhart/SIMoN
MBNMS NOAA

Anthopleura sola

Solitary anemone or Sunburst anemone

Strong radiating lines on the oral disk, often debris on the column



Other *Urticina*: *Urtibrina clandestina*?
Stubby rose anemone
If in sand, then stubby tentacles



King/SIMoN
MBNMS NOAA

Other *Urticina*: *Urtibrina rimicola*?

Stubby rose anemone

If on reef (shallow), then longer tentacles, bumpy pale-pink column



Other *Urticina*: *Urtibrina rimicola*?

Stubby rose anemone

If on reef (shallow), then longer tentacles, bumpy pale-pink column



Lonhart/SIMoN
MBNMS NOAA

Other *Urticina*: *Urticina grebelneyi*
Painted anemone
Mottled green and red column, smooth



Lonhart/SIMoN
MBNMS NOAA

Other *Urticina*: *Urticina grebelneyi*
Painted anemone
Mottled red and green column, smooth

2020 update on “*Urticina*” species

- Work by the Sanamyans has re-organized anemones we label as “*Urticina*”, and before that as “*Tealia*”
- Sanamyan web site: <http://actiniaria.com/>
- N. P. Sanamyan & K. E. Sanamyan (2006) The genera *Urticina* and *Cribrinopsis* (Anthozoa: Actiniaria) from the north-western Pacific. Journal of Natural History, 40:7-8, 359-393, DOI: 10.1080/00222930600703532
- Sanamyan NP, Sanamyan KE, McDaniel N (2013) Two new shallow water sea anemones of the family Actiniidae (Cnidaria: Anthozoa: Actinaria) from British Columbia (NE Pacific). Invertebrate Zoology 10(2):199-216
- 2020 book of Matua Island in Russian.
- Photos from central CA. Prepared by Steve Lonhart, NOAA MBNMS.

Currently: *Urticina timuri* Formerly: *U. piscivora*, and then *U. crassicornis*



Currently: *Urticina grebelnyi* Formerly: *Urticina crassicornis*



Currently: *Urtibrina clandestina* Formerly: *Urticina coriacea*



Currently: *Urtibrina rimicola*? Formerly: *Urticina* “coriacea”



Currently: *Urticina columbiana*

Formerly: *Urticina columbiana*



Currently: *Cribrinopsis albopunctata* Formerly: *Urticina lofotensis*



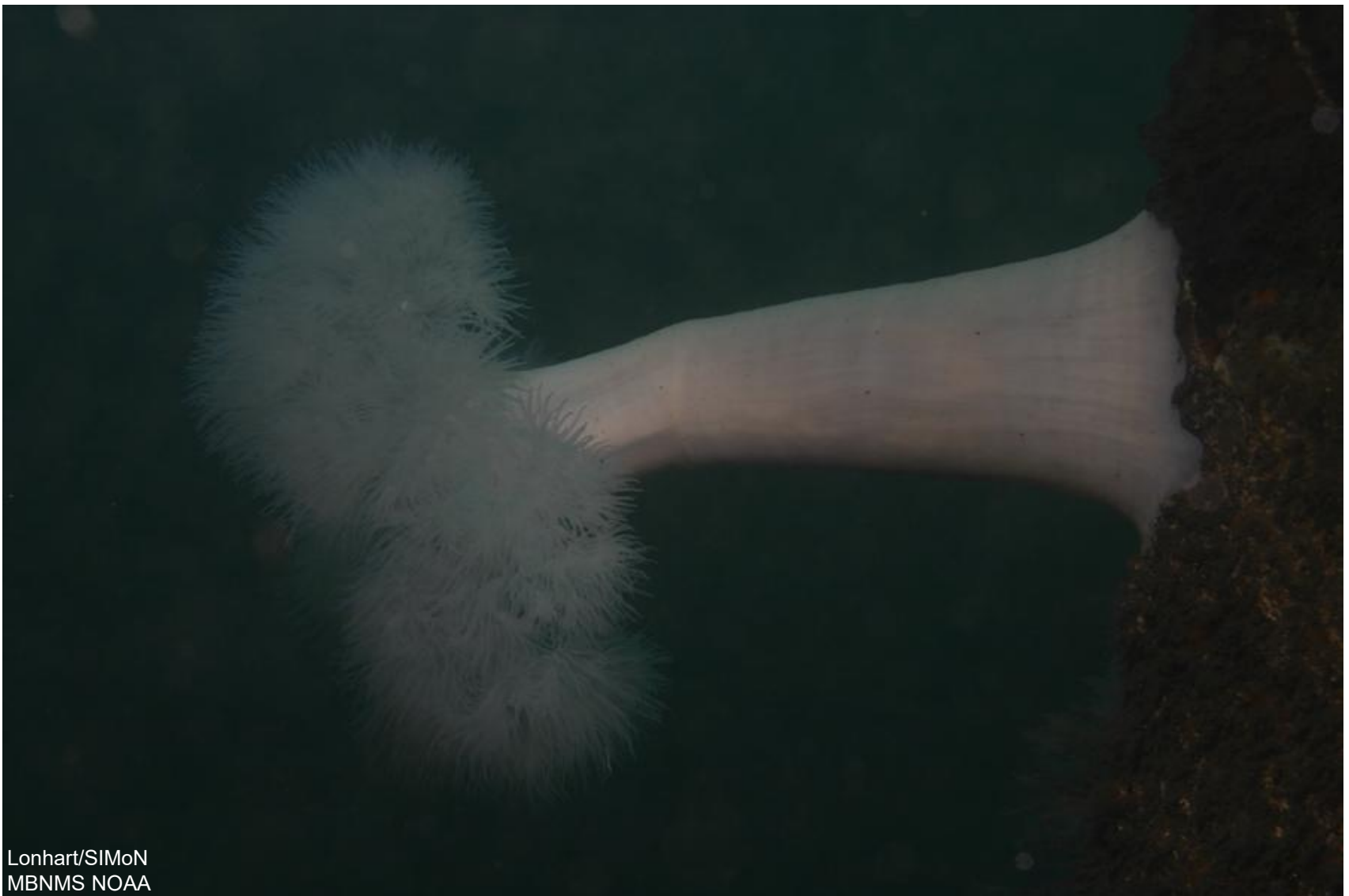


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MBNMS NOAA

Write in: *Anthopleura xanthogrammica*

Large green anemone

Green oral disk, radiating lines absent or very faint, incomplete



Lonhart/SIMoN
MBNMS NOAA

Metridium farcimen (formerly *Metridium giganteum*)
Giant metridium
White or light yellow column, white tentacles, big



Lonhart/SIMoN
MBNMS NOAA

Cucumaria miniata
Embedded cucumber
Orange body and tentacles



Lonhart/SIMoN
MBNMS NOAA

Cucumaria miniata
Embedded cucumber
Orange body and tentacles



Lonhart/SIMoN
MBNMS NOAA

Cucumaria miniata
Embedded cucumber
Orange body and tentacles



Lonhart/SIMoN
MBNMS NOAA

Apostichopus californicus

Spiky cucumber

Papillae look like thorns but are fleshy and flexible, black stubble absent



Apostichopus californicus

Spiky cucumber

Papillae look like thorns but are fleshy and flexible, black stubble absent



Lonhart/SIMoN
MBNMS NOAA

Apostichopus californicus

Spiky cucumber

Papillae look like thorns but are fleshy and flexible, black stubble absent



Lonhart/SIMoN
MBNMS NOAA

Apostichopus parvimensis

Warty cucumber

A few large papillae, many small, black stubble present



Lonhart/SIMoN
MBNMS NOAA

Apostichopus parvimensis

Warty cucumber

A few large papillae, many small, black stubble present



Apostichopus parvimensis

Warty cucumber

A few large papillae, many small, black stubble present



Lonhart/SIMoN
MBNMS NOAA

“Cancer” spp. Cancer crabs
This is *Romaleon antennarium*--purple spots on ventral surface



Lonhart/SIMoN
MBNMS NOAA

“Cancer” spp. Cancer crabs
Juvenile *Romaleon antennarium*--very hairy when young



©Lonhart

“Cancer” spp. Cancer crabs
Juvenile *Metacarcinus gracilis* -- Graceful cancer crab



“Cancer” spp. Cancer crabs
Juvenile *Metacarcinus magister*– Dungeness crab



Pugettia producta

Northern kelp crab

Smooth clean carapace, often on kelp, color matches alga it is near



Pugettia producta

Northern kelp crab

Golden brown or red, smooth clean carapace, often on kelp



Pugettia richii & *P. gracilis*

Spider crab

Red, bumpy carapace, often decorated with algae, anterior spines



Pugettia richii & *P. gracilis*

Spider crab

Red, bumpy carapace, often decorated with algae, anterior spines



©Lonhart

Pugettia richii & *P. gracilis*

Spider crab

Red, bumpy carapace, often decorated with algae, anterior spines

Pugettia richii has
white-tipped claws





Pugettia gracilis has orange-tipped claws with blue at base

A female *Pugettia gracilis* (one rostral horn is broken). Carapace width about 2.5 cm



Lonhart/SIMoN
MBNMS NOAA

Loxorhynchus crispatus

Adult Moss or Masking crab

Very camouflaged when young, carapace covered with epibionts



Pederson/MBNMS

Loxorhynchus crispatus Juvenile Moss crab
Very camouflaged when young



Lonhart/SIMoN
MBNMS NOAA

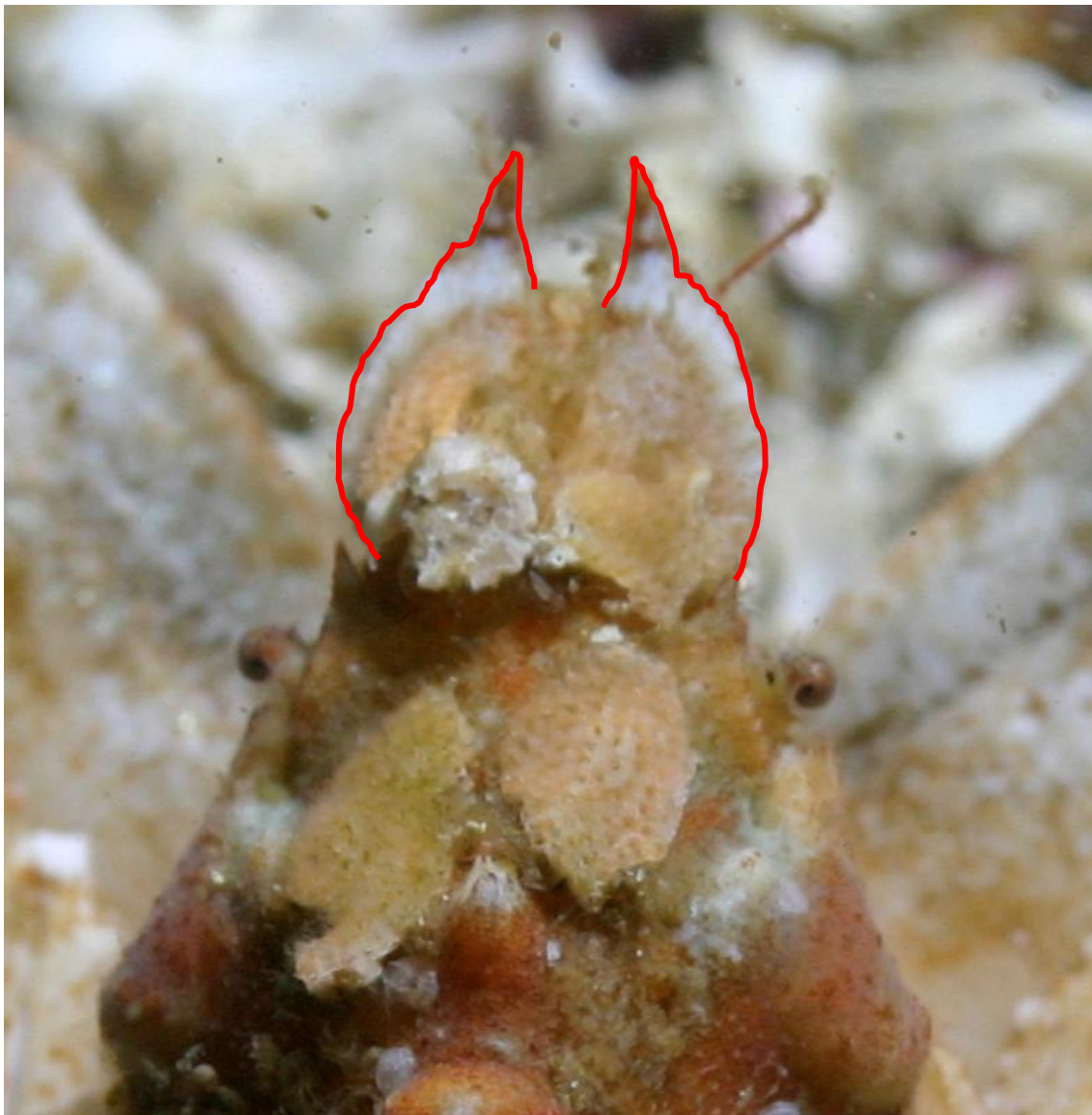
Scyra acutifrons Sharp-nose crab

Heavily decorated, large, spade-like rostrum, can be confused with
juvenile *Loxorhynchus*



Scyra acutifrons Sharp-nose crab

Heavily decorated, large, spade-like rostrum, can be confused with
juvenile *Loxorhynchus*



Scyra acutifrons Sharp-nose crab

Heavily decorated, large, spade-like rostrum, can be confused with
juvenile *Loxorhynchus*



Lonhart/SIMoN
MBNMS NOAA

Pugettia foliata (formerly *Mimulus*)

Foliate kelp crab

Large chelipeds, broad wings on carapace like a moth



Pugettia foliata (formerly *Mimulus*)
Foliate kelp crab
Large chelipeds, carapace rectangular



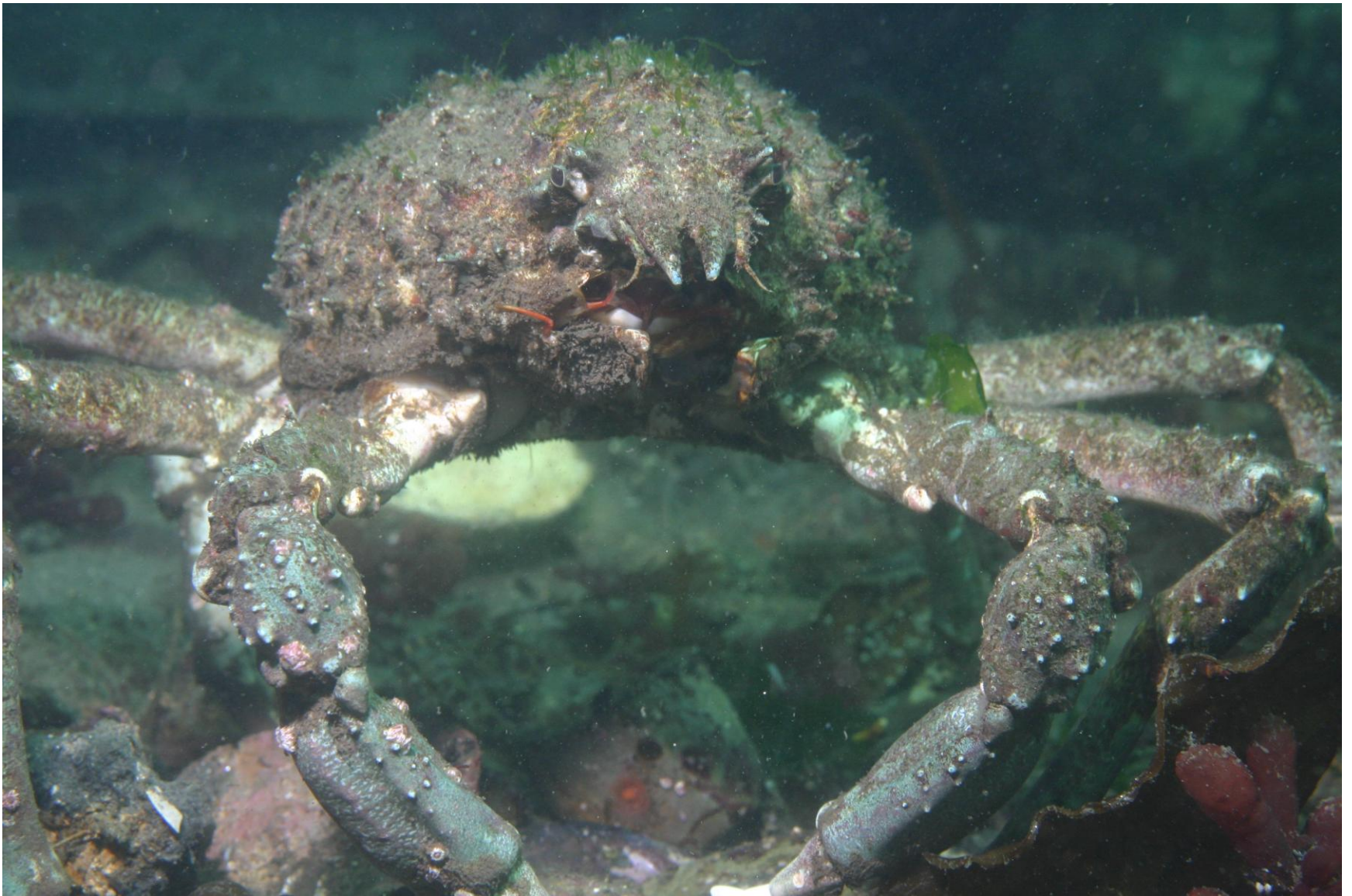
Pugettia foliata (formerly *Mimulus*)
Foliate kelp crab
Large chelipeds, carapace color variable



Loxorhynchus grandis

Adult Sheep crab

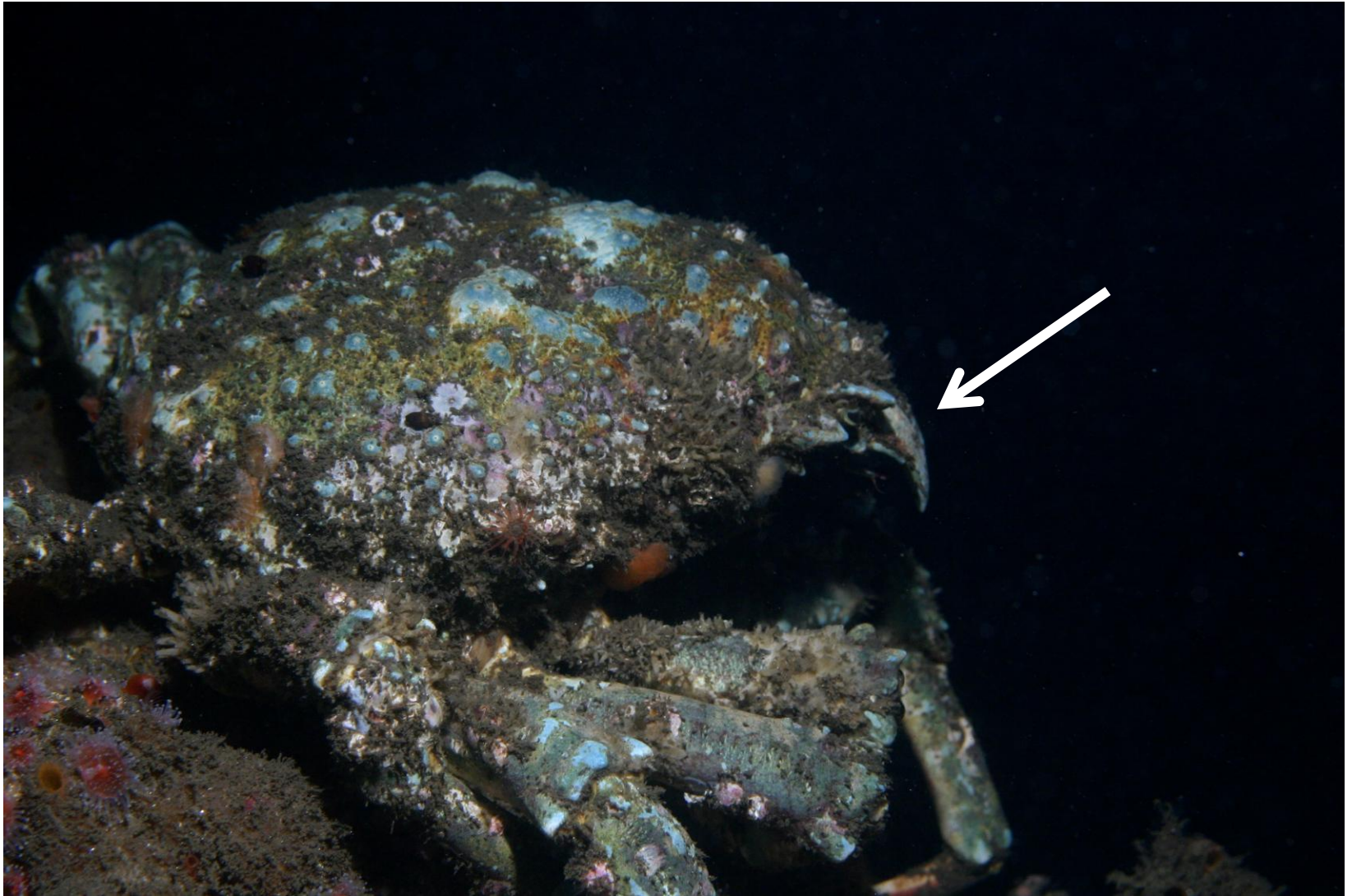
Very large, downward-hooked rostral spines; white bumps



Loxorhynchus grandis

Sheep crab

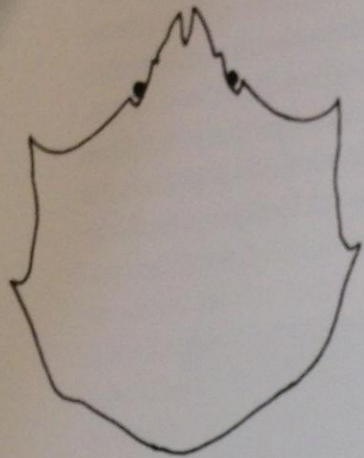
Relatively clean but very bumpy carapace



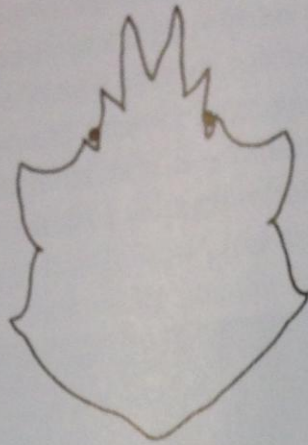
Loxorhynchus grandis

Sheep crab

Very large, downward-hooked rostral spines, bumpy carapace



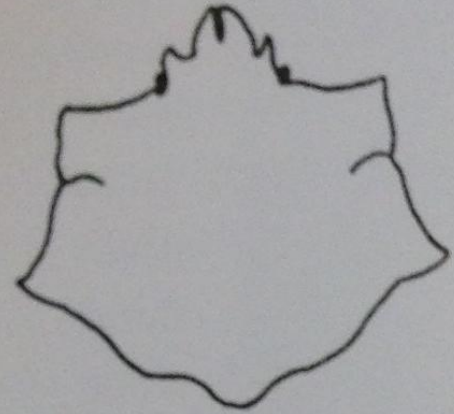
Pugettia producta



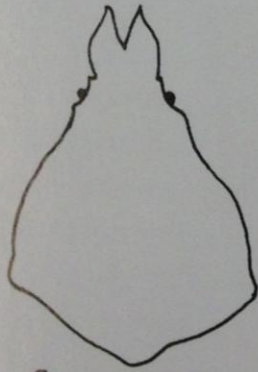
Pugettia gracilis



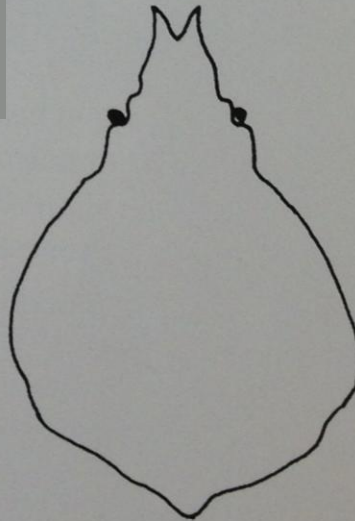
Pugettia richii



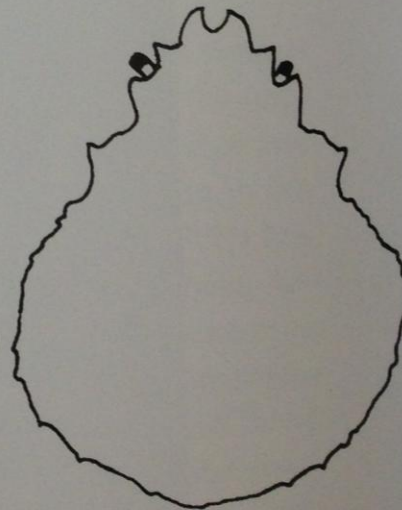
Pugettia foliata



Scyra acutifrons



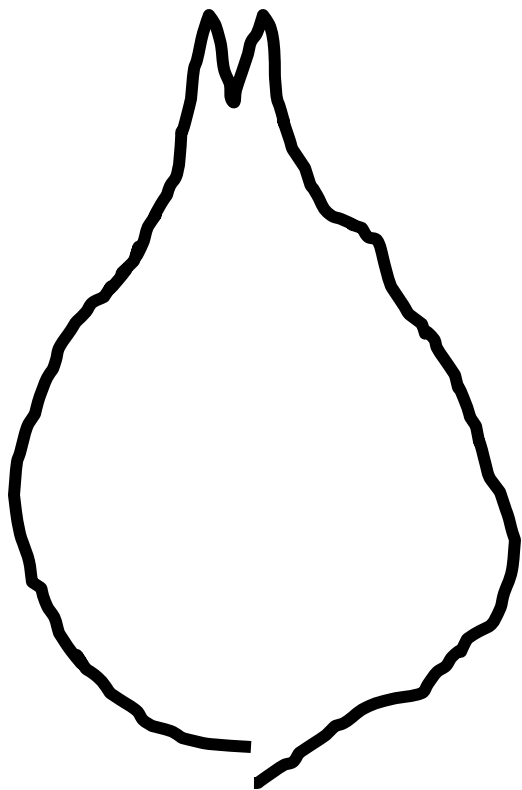
Loxorhynchus crispatus



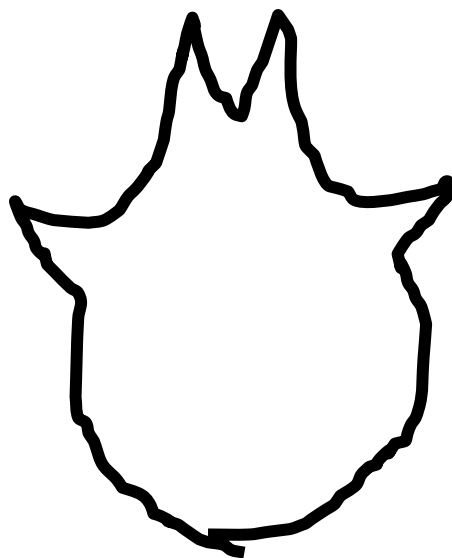
Loxorhynchus grandis

ipes

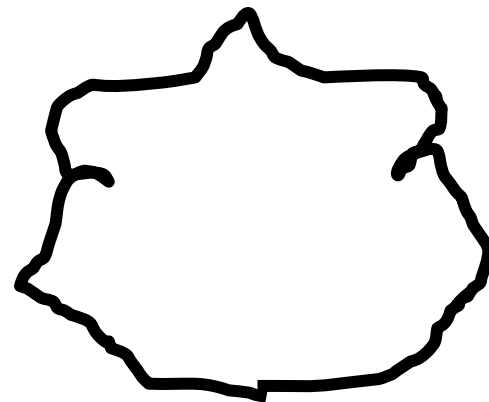
of Pacific coast spider crabs (Family Majidae).



Loxorhynchus/Scyra



Pugettia richii



Pugettia foliata



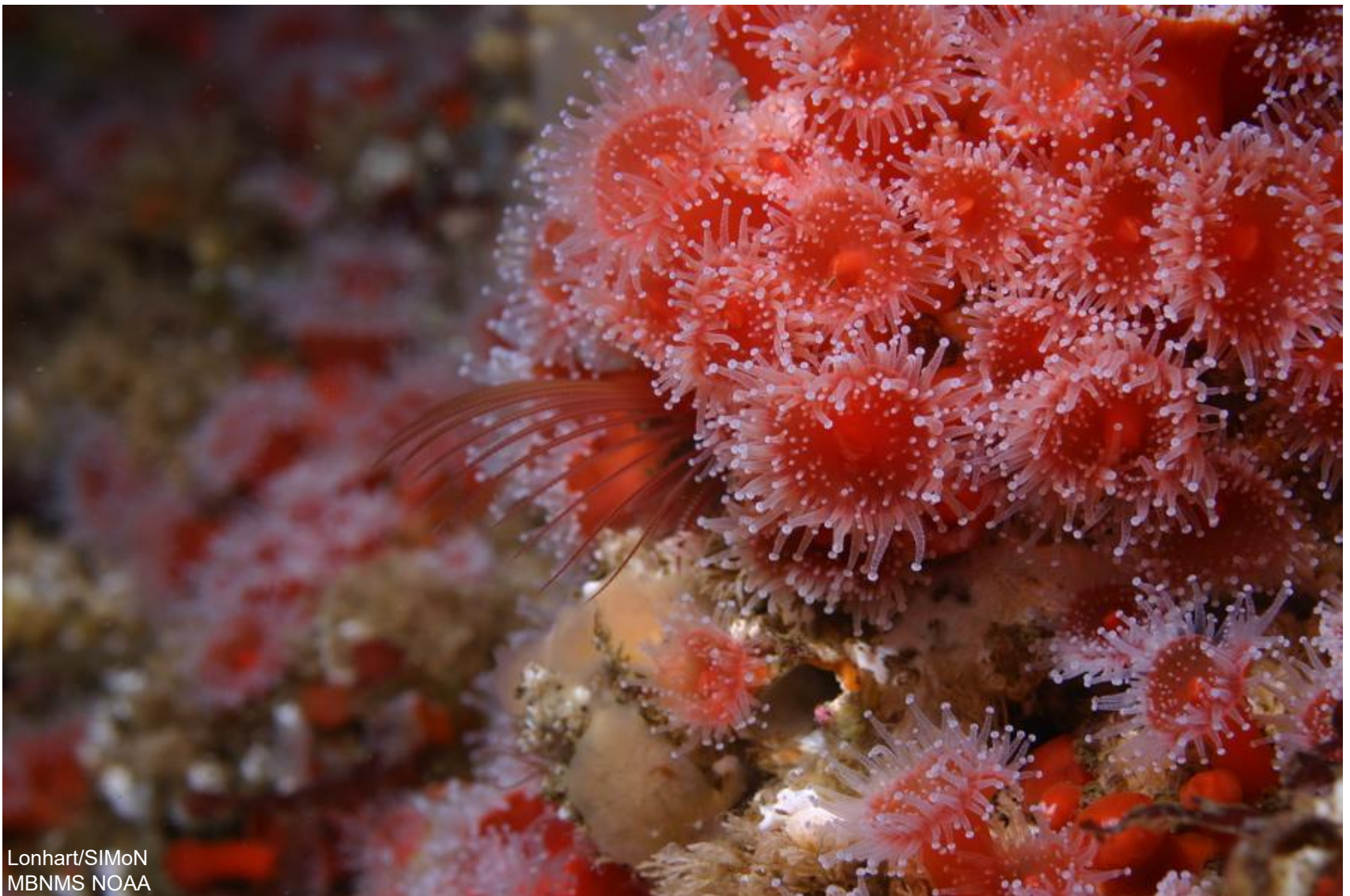
Lonhart/SIMoN
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Balanus nubilus Giant Acorn Barnacle

Filter feeder. It is a common inhabitant of vertical rock walls on offshore pinnacles that receive high water flow.



Balanus nubilus Giant Acorn Barnacle
Largest of the barnacles, orange “lips” often very visible.



Balanus nubilus Giant Acorn Barnacle

The test (shell) of *B. nubilus* is usually covered with other invertebrates.



Cryptochiton stelleri

Gumboot chiton

Deep red color as adult, mottled as juvenile



©Lonhart

Cryptochiton stelleri
Juvenile Gumboot chiton
Deep red color as adult, mottled as juvenile



Lonhart/SIMoN
MBNMS NOAA

Crassadoma gigantea
Giant Pacific rock scallop

One valve attached, highly ribbed, many marginal eyes, up to 12 cm
in diameter



Lonhart/SIMoN
MBNMS NOAA

Crassadoma gigantea
Giant Pacific rock scallop
Green mantle (margin) is male, orange is female



Crassadoma gigantea

Giant Pacific rock scallop

Green mantle (margin) is male, orange is female



Megathura crenulata
Giant keyhole limpet
Solid black or cream with dark lines



Megathura crenulata
Giant keyhole limpet
Solid black or cream with dark lines



©Lonhart

Megathura crenulata
Giant keyhole limpet
Solid black or cream with dark lines



Lonhart/SIMoN
MBNMS NOAA

Pomaulax gibberosus

Red turban snail

Reddish shell but often overgrown, operculum is smooth and calcareous



Pomaulax gibberosus

Red turban snail

Reddish shell but often overgrown, operculum is smooth and calcareous



Pomaulax gibberosus

Red turban snail

Reddish shell but often overgrown, operculum is smooth and calcareous



©Lonhart

Pomaulax gibberosus (on right)

Red turban snail

Reddish shell but often overgrown, operculum is smooth and calcareous



Lonhart/SIMoN
MBNMS NOAA

Kelletia kelletii

Adult Kellet's whelk

Natural shell color white with brown lines, usually covered with green and pink algae, yellow foot with black lines and white spots, large



Kelletia kelletii Juvenile Kellet's whelk

Natural shell color white with brown lines, usually covered with green and pink algae, yellow foot with black lines and white spots, large



Female laying
egg cases

©Lonhart

Kelletia kelletii

Adult Female Kellet's whelk

Natural shell color white with brown lines, usually covered with green and pink algae, yellow foot with black lines and white spots, large



Ceratostoma foliatum Leafy hornmouth

Three varices (wings), tooth at aperture, white shell with brown banding if not encrusted with epibionts



Lonhart/SIMoN
MBNMS NOAA

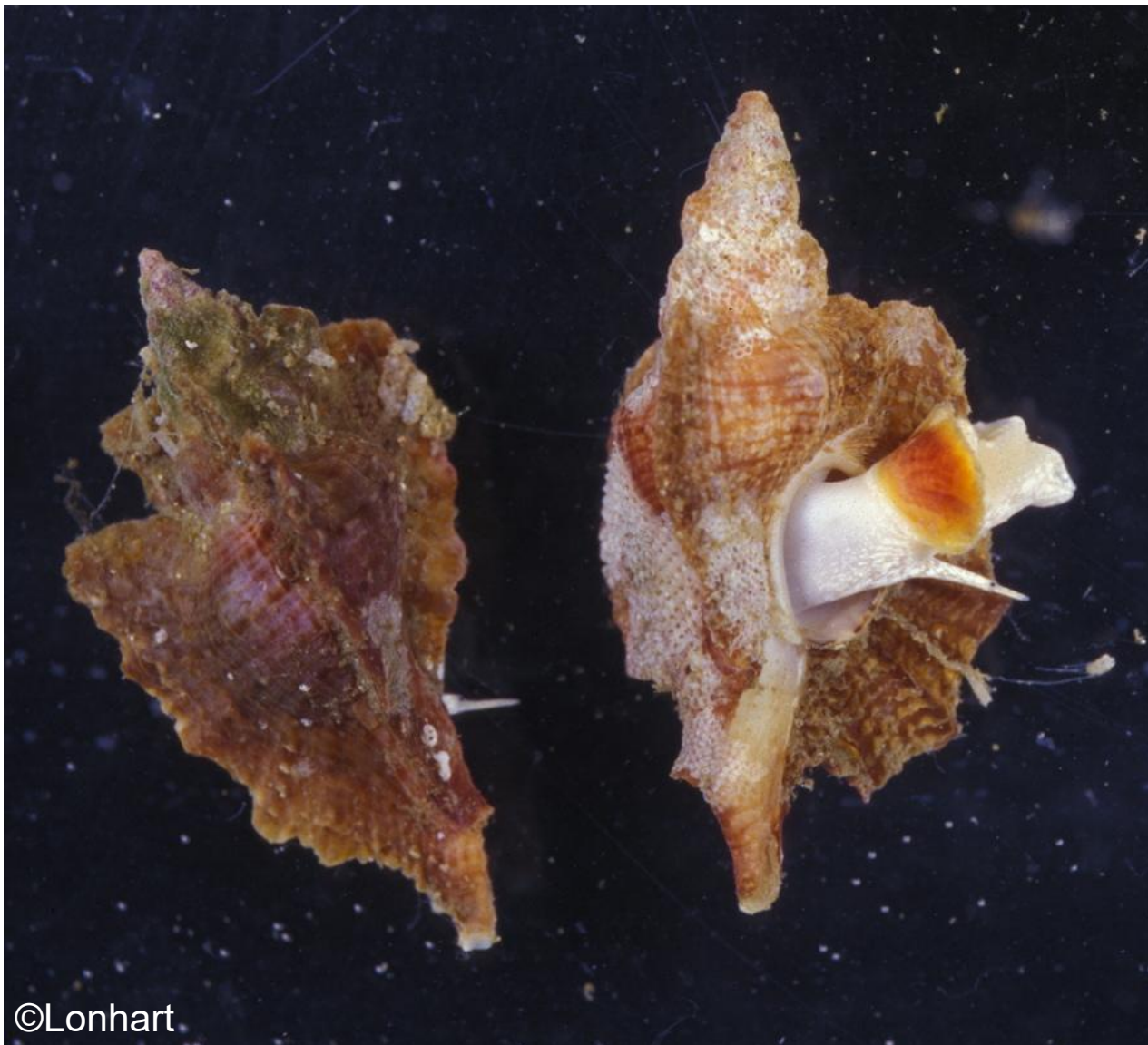
Ceratostoma foliatum Leafy hornmouth

Three varices (wings), tooth at aperture, white shell with brown banding if not encrusted with epibionts

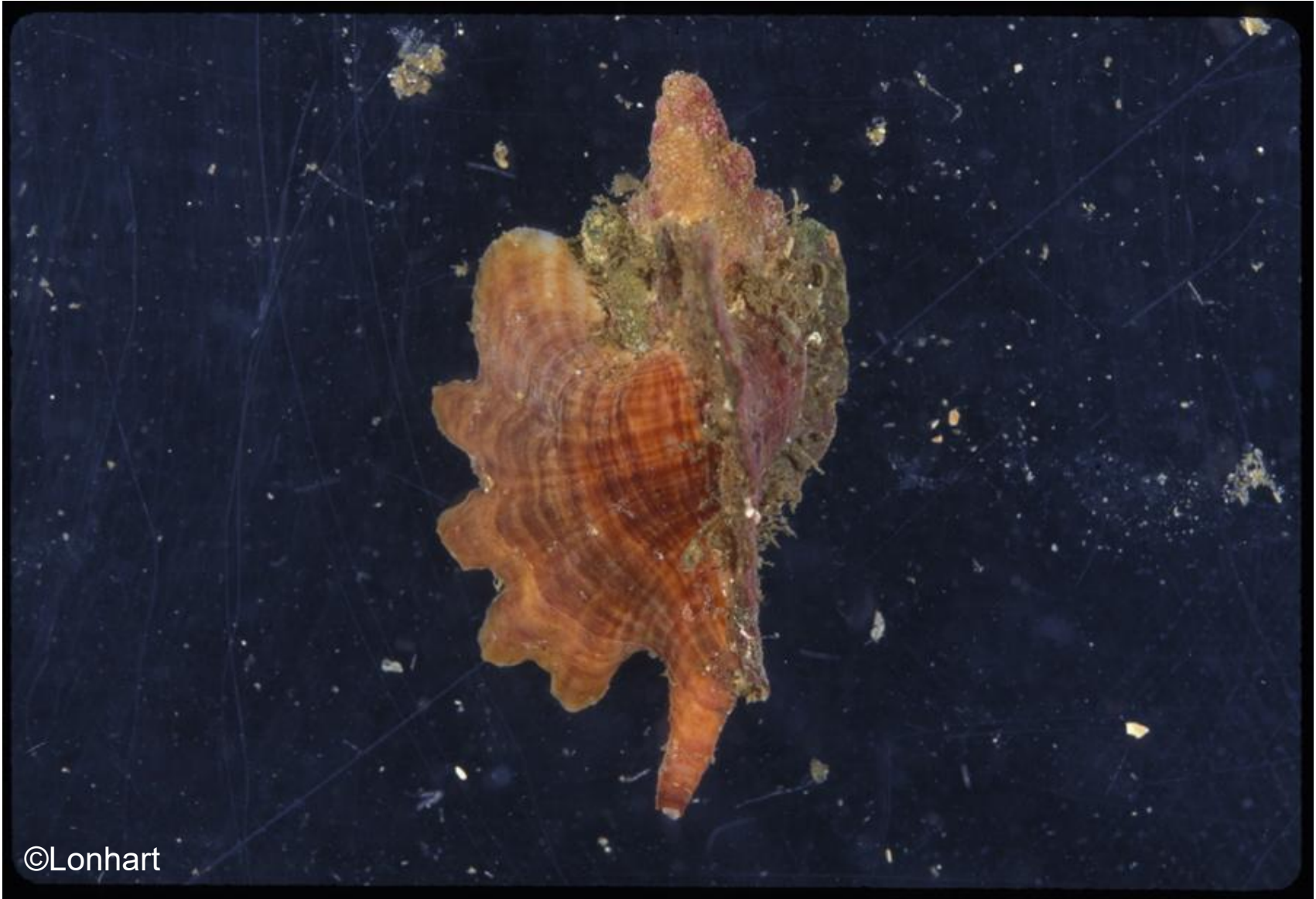


©Lonhart

Ceratostoma foliatum Juvenile Leafy hornmouth
Three varices (wings), tooth at aperture, white shell with brown
banding, old tooth evident between lower brown bands



Pteropurpura macroptera
NOT *Ceratostoma*, much smaller and no tooth.



Pteropurpura macroptera

NOT *Ceratostoma*, much smaller and no tooth. New varex (i.e. a new “wing” on left) with no epibiotic overgrowth on it yet.



Lonhart/SIMoN
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Tethya californiana
Orange puffball sponge
Solitary or in clumps, can be partially overgrown



Lonhart/SIMoN
MBNMS NOAA

Tethya californiana
Orange puffball sponge
Solitary or in clumps, can be partially overgrown



Lonhart/SIMoN
MBNMS NOAA

Styela montereyensis
Stalked tunicate
Can be smooth or covered with epibionts



Styela montereyensis

Stalked tunicate

Can be smooth or covered with epibionts



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Stylaster californicus
California hydrocoral



Lonhart/SIMoN
MBNMS NOAA

Stylaster californicus
California hydrocoral



Pederson/MBNMS

Red abalone *Haliotis rufescens*

Frequency:	most common
Lip color:	red
Mantle color:	black and ash with alternating bands, sometimes solid black
Tentacles:	solid black



Haliotis rufescens Red abalone
Note black tentacles emerging from tremata



Red abalone *Haliotis rufescens*

Frequency: most common

Lip color: red

Mantle color: black and ash alternating bands, sometimes solid black

Tentacles: solid black



Pinto abalone *Haliotis kamtschatkana*

Frequency:	uncommon
Lip color:	none
Mantle color:	mottled pale yellow to dark brown, orange/gold highlights
Tentacles:	tremata bright yellow-green; epipodial yellow with brown bands

Pinto abalone





Lonhart/SIMoN
MBNMS NOAA

Haliotis kamtschatkana Pinto abalone
Epipodium bumpy, pebbled



Haliotis kamtschatkana Pinto abalone
Epipodium “mottled pale yellow to dark brown”, excurrent opening
tentacles (tremata) are bright yellow



Haliotis kamtschatkana Pinto abalone

Epipodium “mottled pale yellow to dark brown”, epipodial tentacles
yellow-brown, sometimes greenish



Flat abalone *Haliotis walallensis*

Frequency:	uncommon
Lip color:	red
Mantle color:	cream background with dark brown mottling
Tentacles:	tremata dark brown; epipodial dark brown



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Haliotis walallensis

Flat abalone



Lonhart/SIMoN
MBNMS NOAA

Haliotis walallensis

Flat abalone



Lonhart/SIMoN
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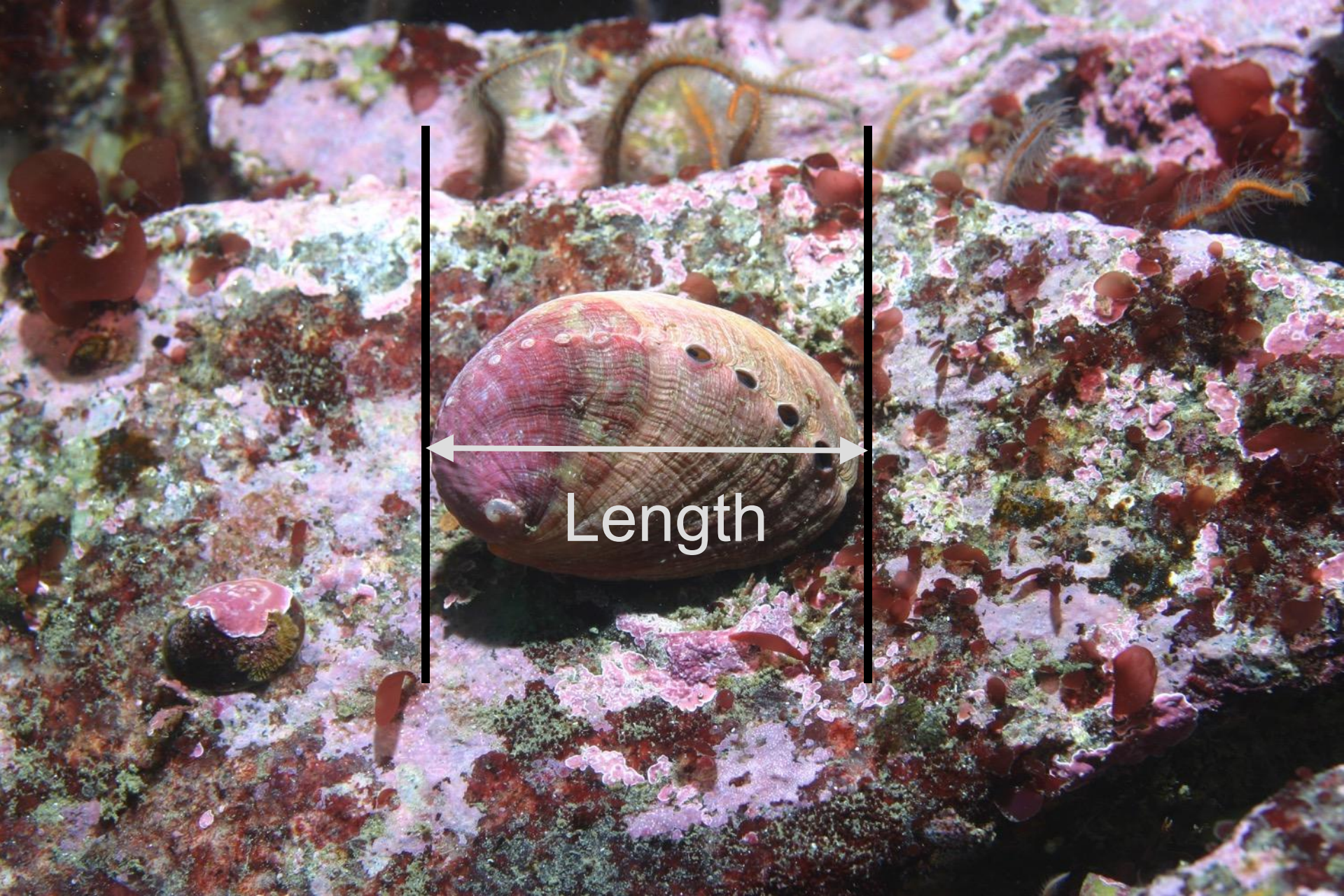
Haliotis walallensis

Flat abalone



Lonhart/SIMoN
MBNMS NOAA

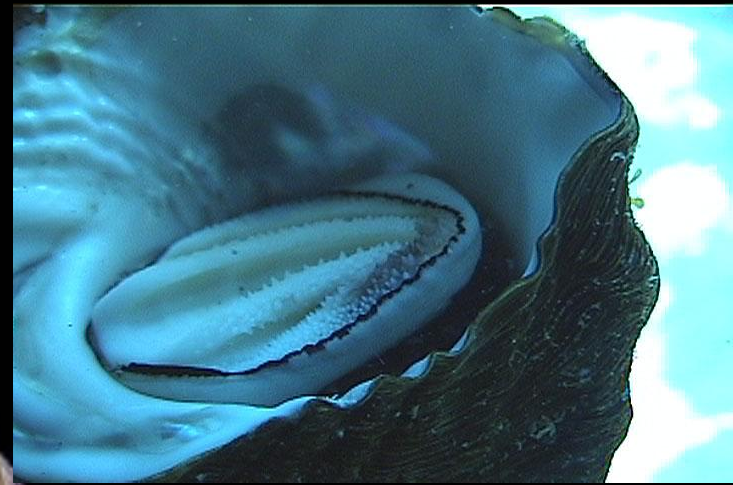
Haliotis walallensis Flat abalone
Epipodium bumpy, pebbled



Greatest shell length for abalone, measure ALL

Wavy turban snail

Megastreaa undosa





Neobernaya spadicea

Chestnut cowry

Golden-brown top, very smooth, uncommon in central CA



Lonhart/SIMoN
MBNMS NOAA

Neobernaya spadicea

Chestnut cowry

Golden-brown top, very smooth, uncommon in central CA



California sea hare

Burgundy red with black mottling, up to size of football, called a sea “hare” due to large “ears”

Aplysia californica



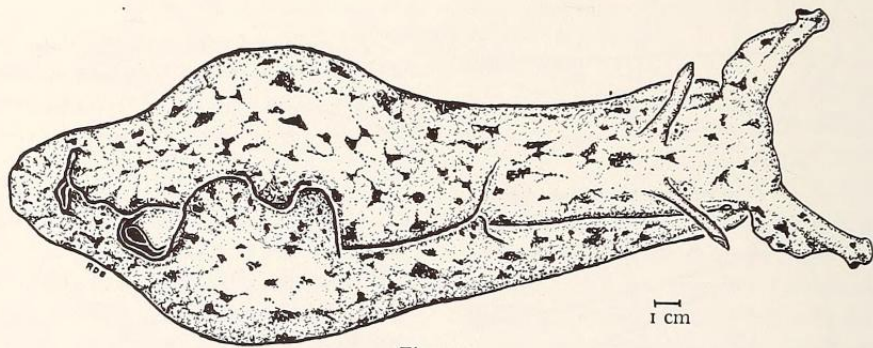


Figure 5

Aplysia californica from Elkhorn Slough, California
dorsal aspect, from life

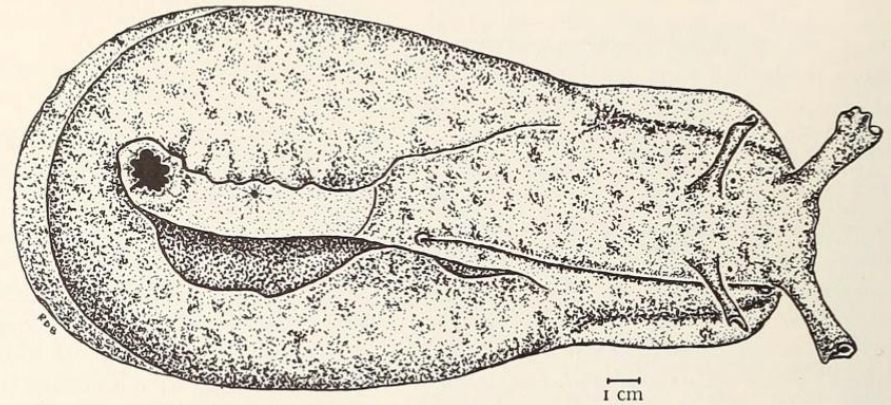


Figure 7

Aplysia vaccaria, dorsal aspect, from life

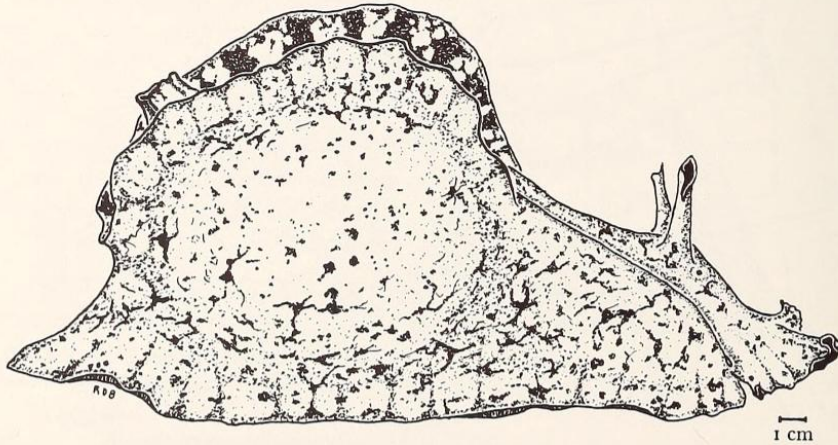


Figure 6

Aplysia californica from Elkhorn Slough, California
right lateral aspect, from life

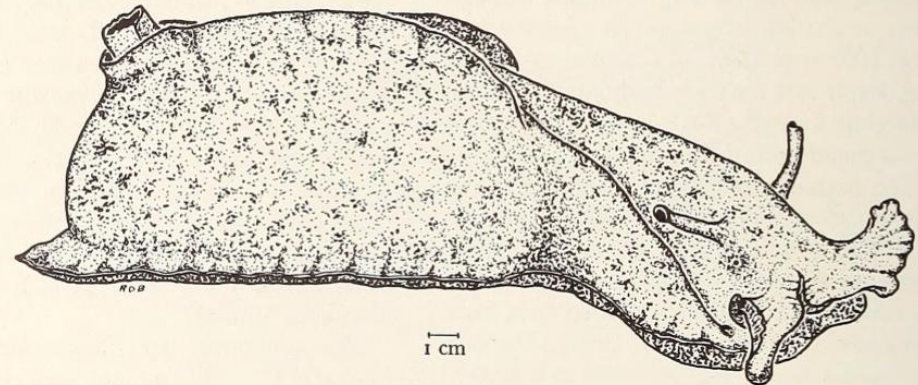


Figure 8

Aplysia vaccaria, right lateral aspect, from life



Eernisse 2010

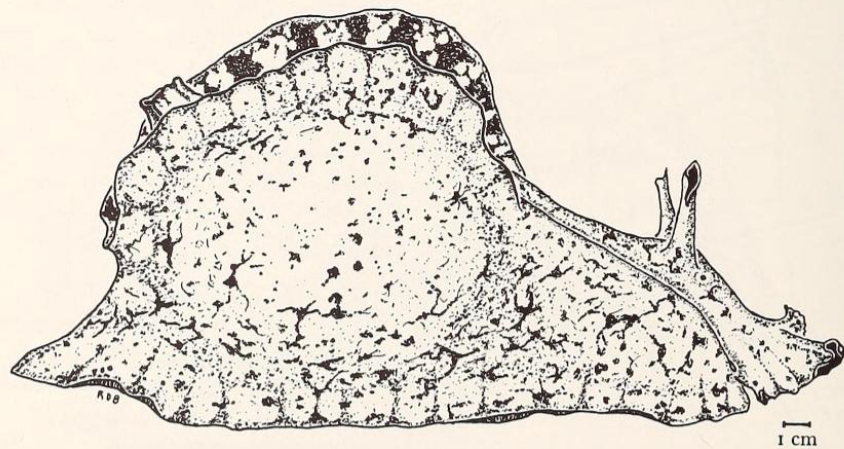


Figure 6

Aplysia californica from Elkhorn Slough, California
right lateral aspect, from life

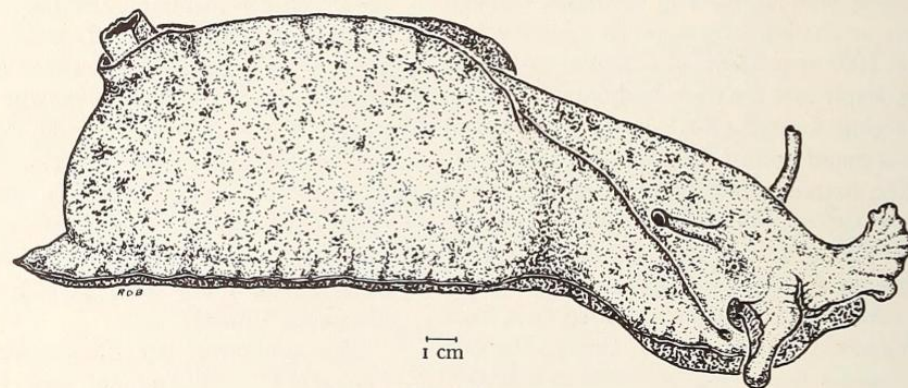


Figure 8

Aplysia vaccaria, right lateral aspect, from life

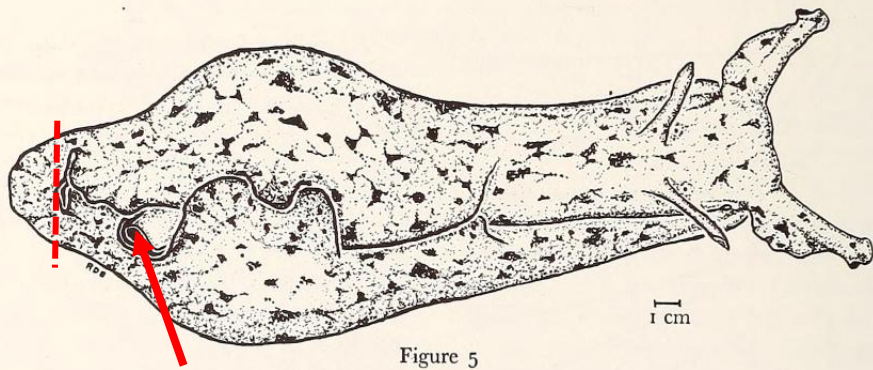


Figure 5

Aplysia californica from Elkhorn Slough, California
dorsal aspect, from life

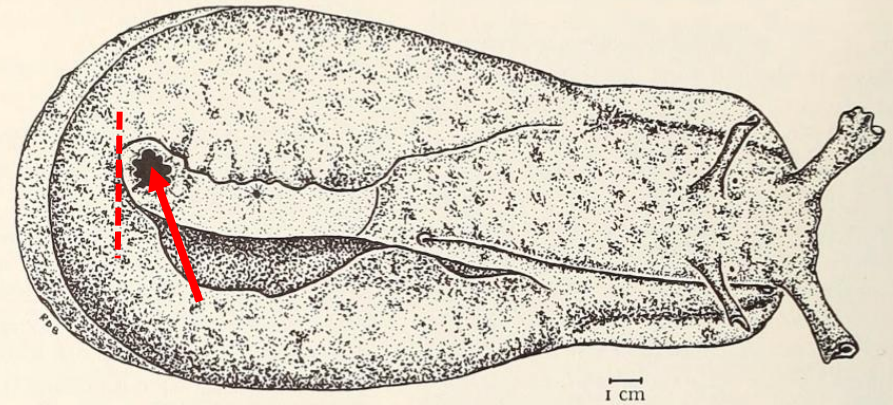
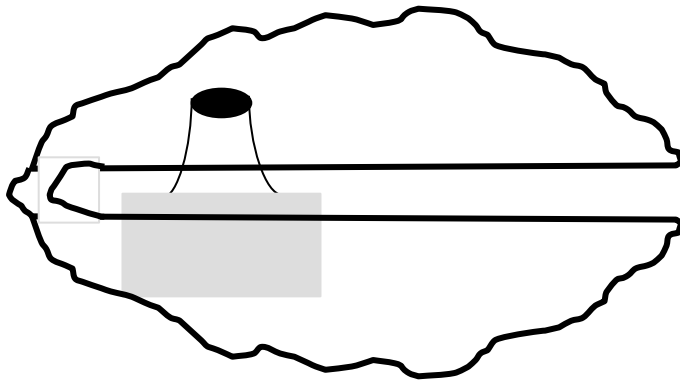
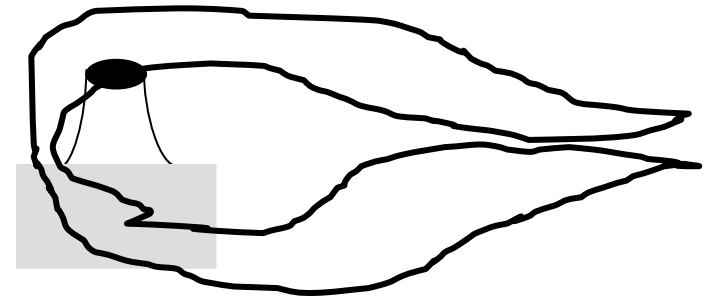


Figure 7

Aplysia vaccaria, dorsal aspect, from life



Parapodia separate,
not joined immediately posterior
to exhalant siphon. *A. californica*



Parapodia joined immediately posterior
to exhalant siphon. *A. vaccaria*



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Dendronotus iris (not *Aplysia*!)

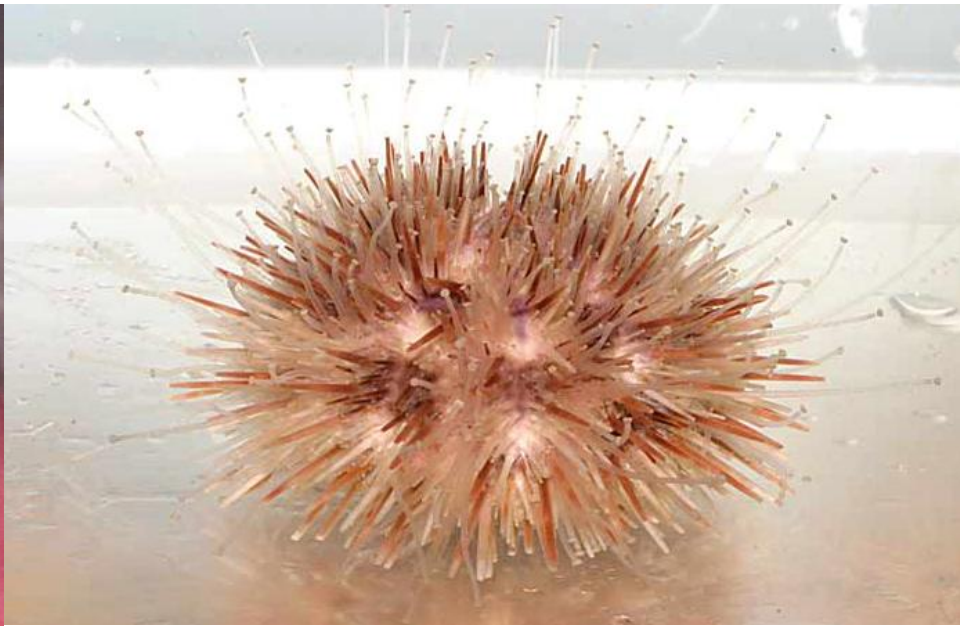
Burgundy red, no mottling, many branched cerata, up to 15 cm long

White urchin

***Lytechinus*
*pictus***

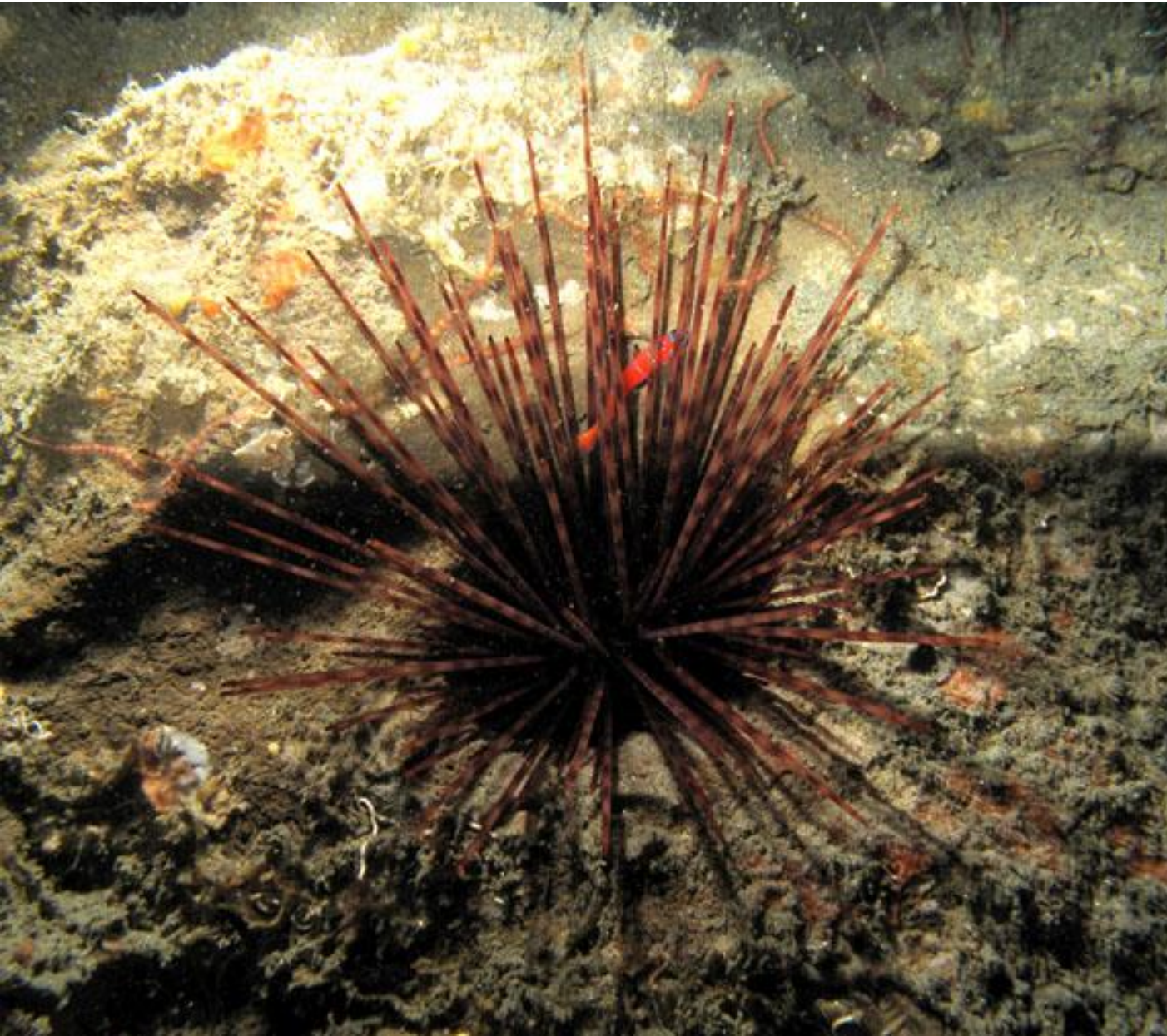


White urchin...



...has brown lines

Crowned urchin



Herb Gruenhagen

7/3/2009

La Jolla Shores

North Wall

65 feet

Crowned Sea Urchin

Centrostephanus coronatus

Bluebanded Goby

Lythrypnus dalli

Canon G10

Dual Ys-110 strobes



Arbacia stellata

Starry urchin

Baja CA to Peru

1997-98 occurred at northern Channel Islands; Blob 2015



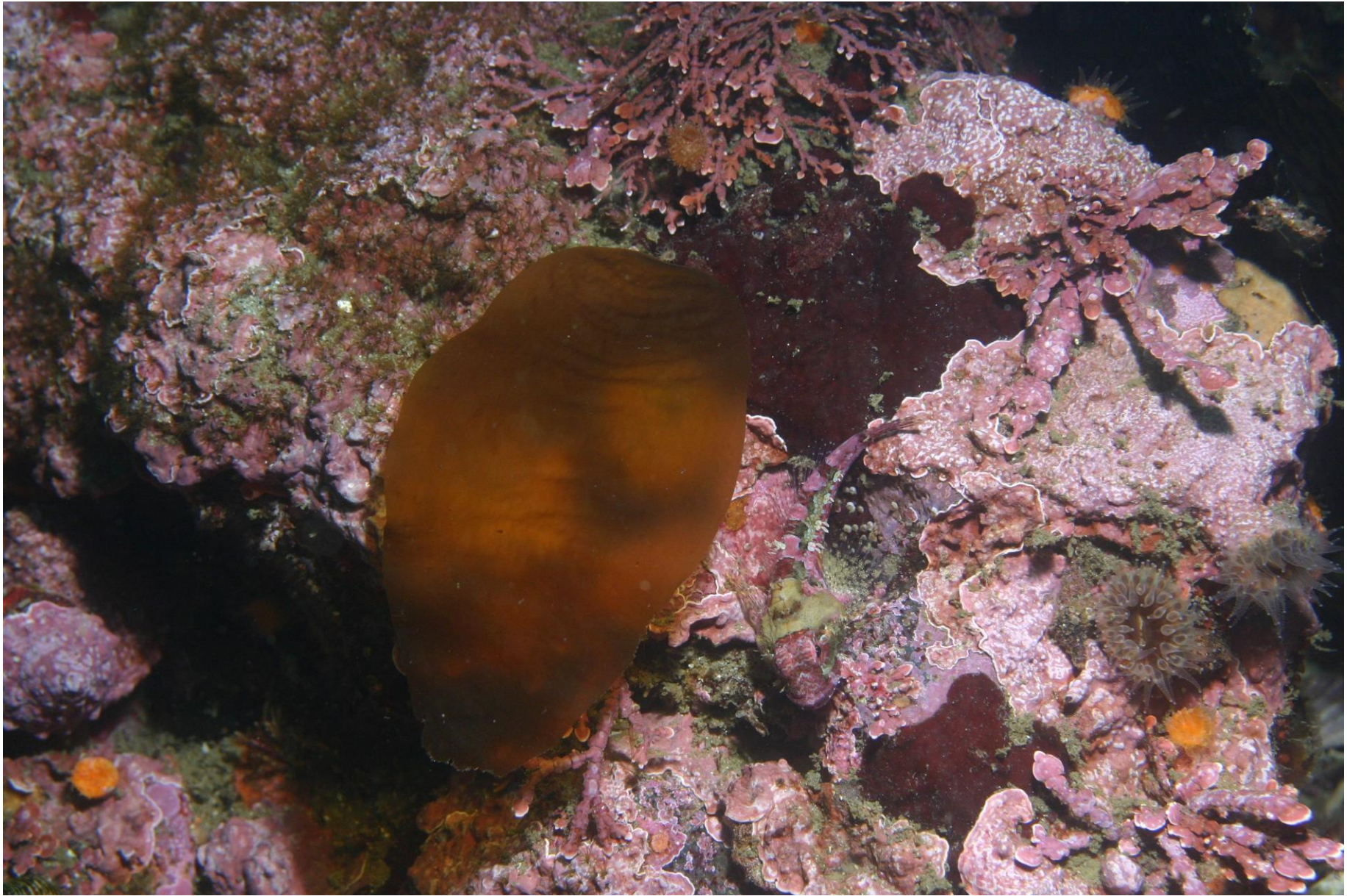
PISCO
Uniform Point Contact (UPC)
Invertebrates & Algae
2026

Superlayer

Drift algae and juvenile Laminariales (e.g., <30 cm stipe *Laminaria*, *Eisenia*, *Macrocystis*, *Pterygophora*) can be the first thing you encounter at your point. Record the superlayer, move it aside and then record the primary substrate holder.

Superlayer	Drift Algae:		
	Juvenile Laminariales		





Juvenile Laminariales – superlayer category

Inanimate

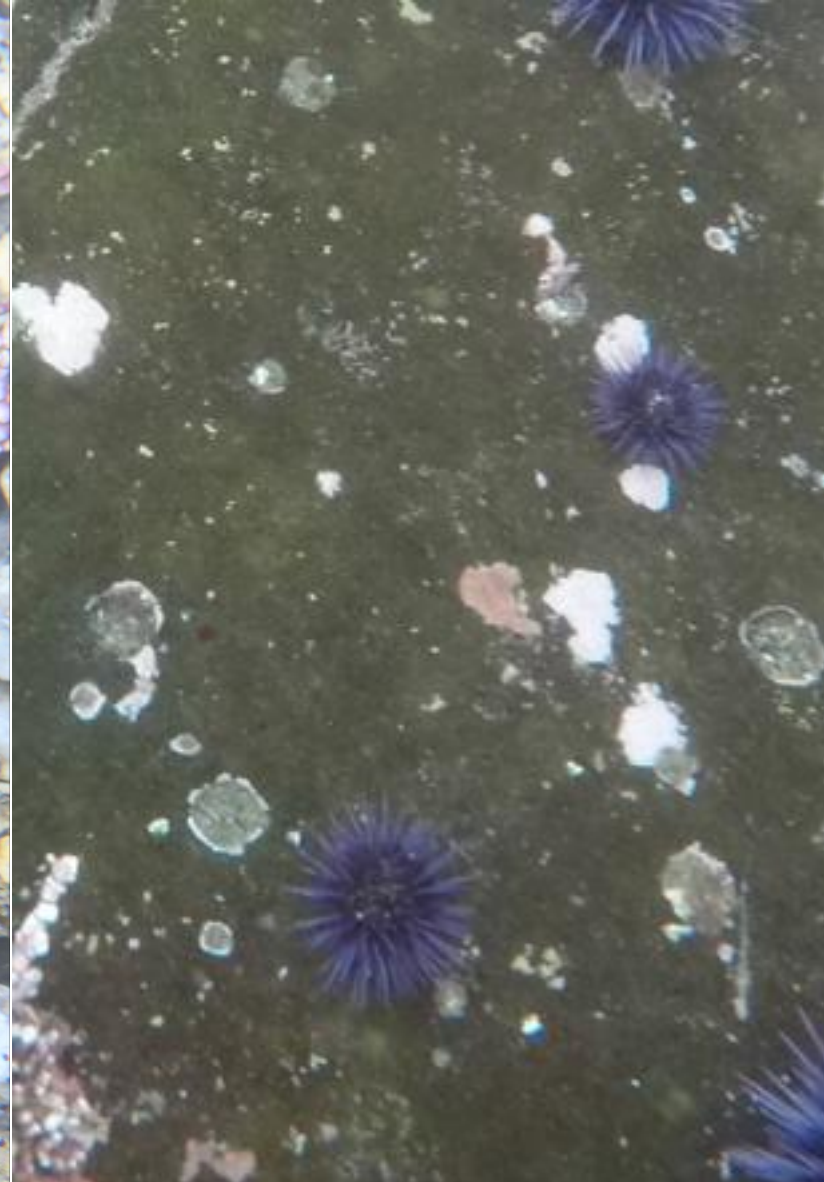
Bare rock

Bare sand

Shell debris

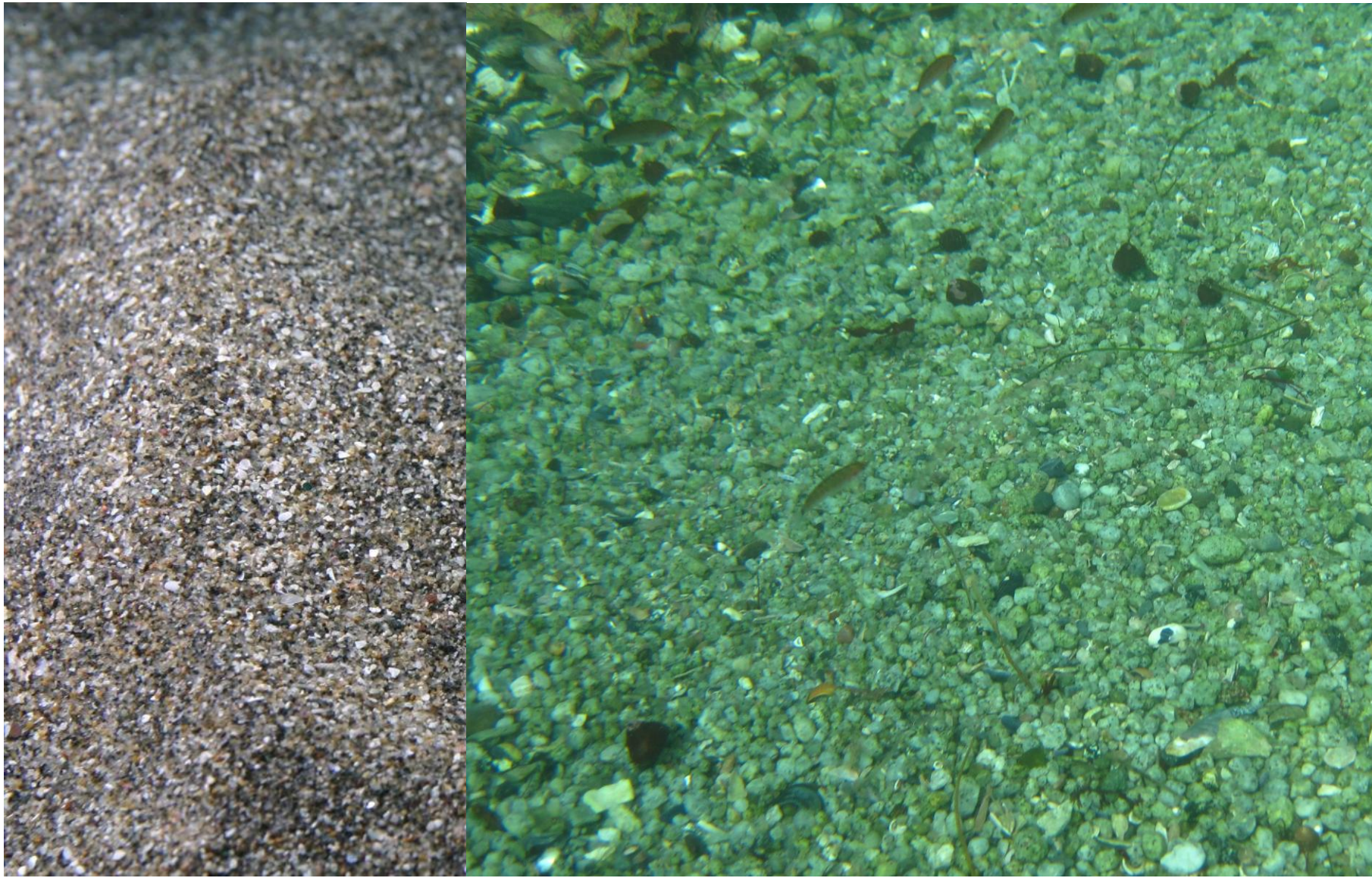
Sediment/med

Dead Kelp Holdfast (any)



Bare Rock

No inverts or algae under your meter mark; no biology, just geology



Bare Sand
Relatively coarse sand

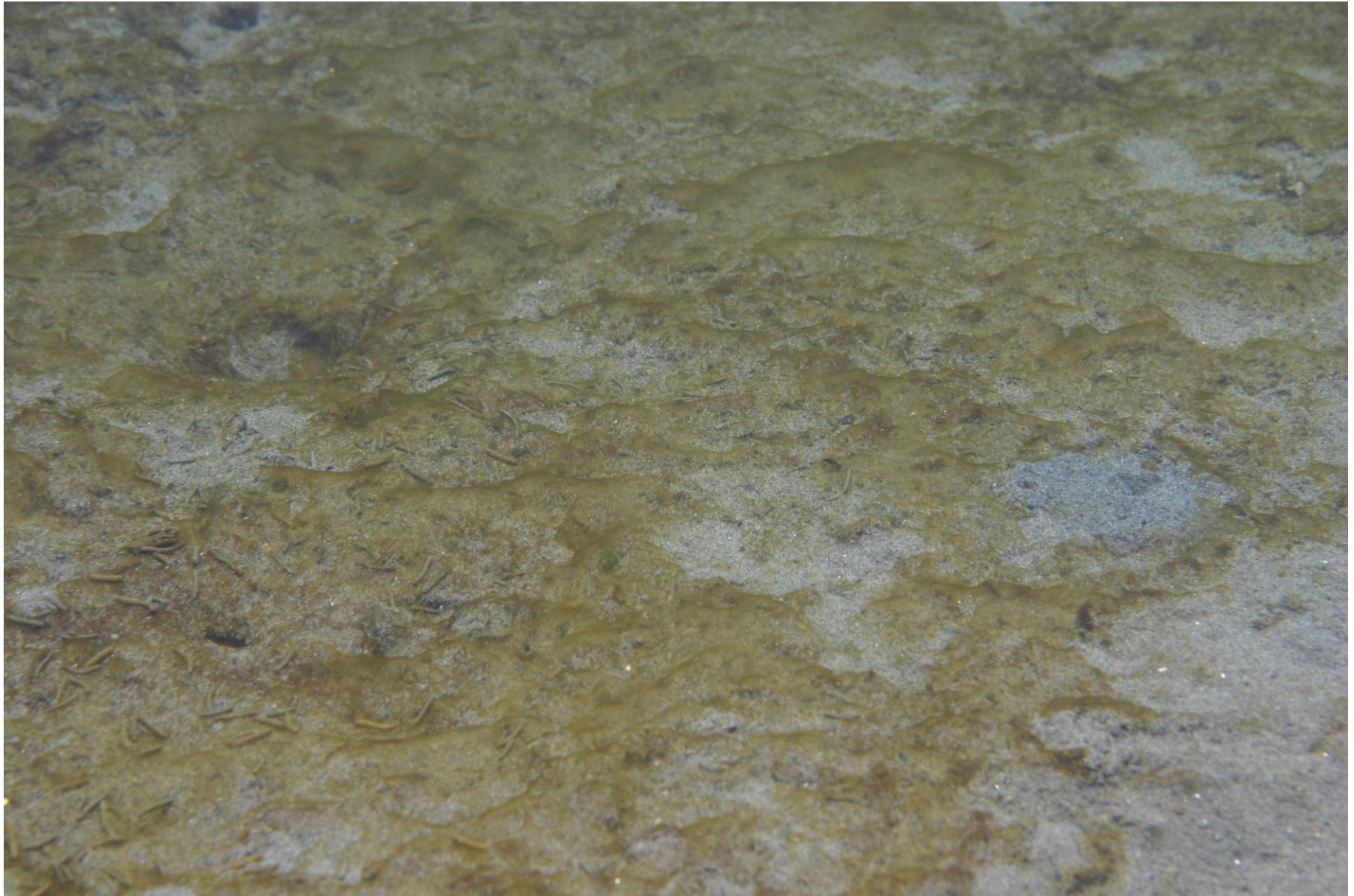


Bare Sand
Gravel



Shell Debris

Lots of shell fragments on top of sand or other sediment



Sediment / Mud

Very fine, creates suspended clouds if disturbed



Dead Kelp Holdfast (any species)

Can be any species (*Macrocystis*, *Nereocystis*, *Pterygophora*,
Laminaria, *Pleurophyucus*, et al.)



INANIMATE section: Dead kelp holdfast (any species)



Lonhart/SIMoN
MBNMS NOAA

Dead kelp holdfast (any species)

Red Algae

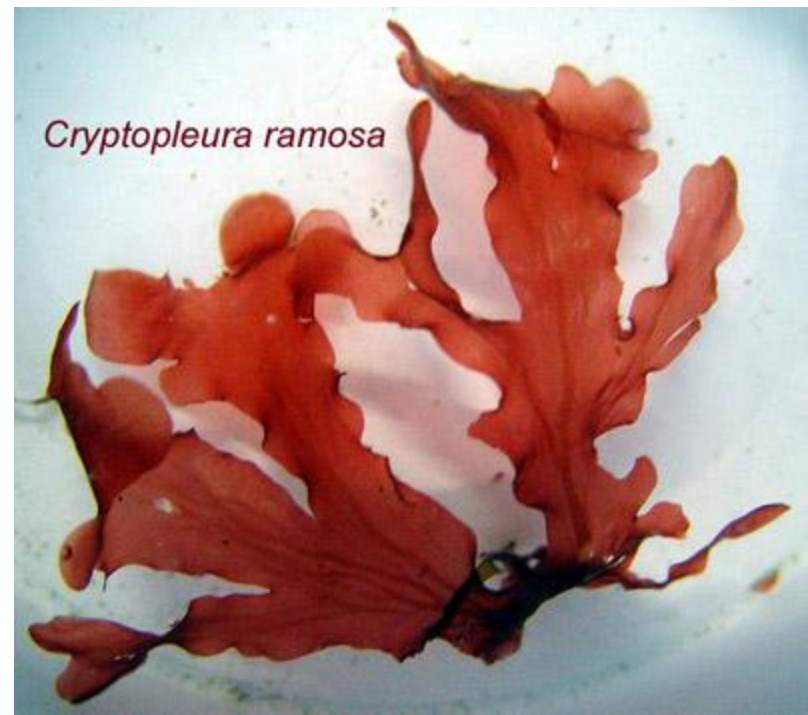
Branch

Leaf

Lacy

Encrusting red

Turf



BRANCH – flat branching

Red algae with branches
& flat cross-section

e.g., *Callophyllis*, *Cryptopleura*,
Hymenena, *Fryeella*,
Opuntella californica, *Pikea*,
and *Rhodymenia*





BRANCH:
branching, flat



Lonhart/SIMoN
MBNMS NOAA



BRANCH:
branching, flat



Rhodymenia californica



BRANCH:
branching, flat

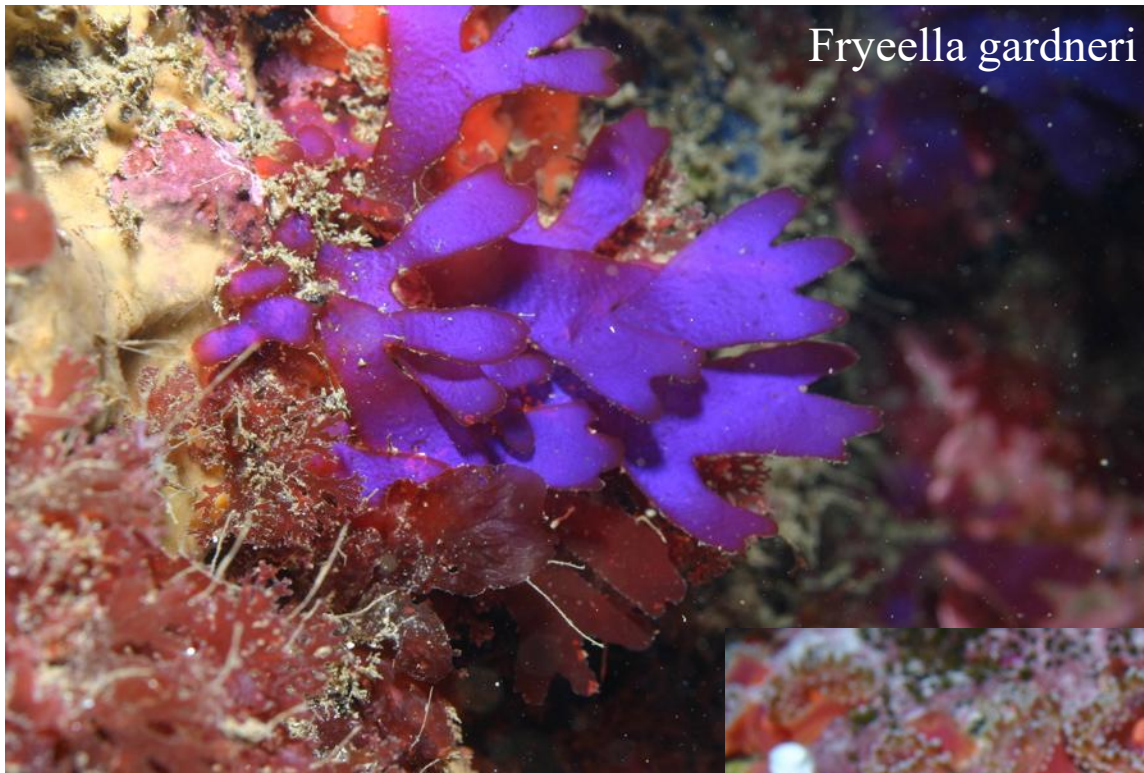




BRANCH:
branching, flat



BRANCH:
branching, flat

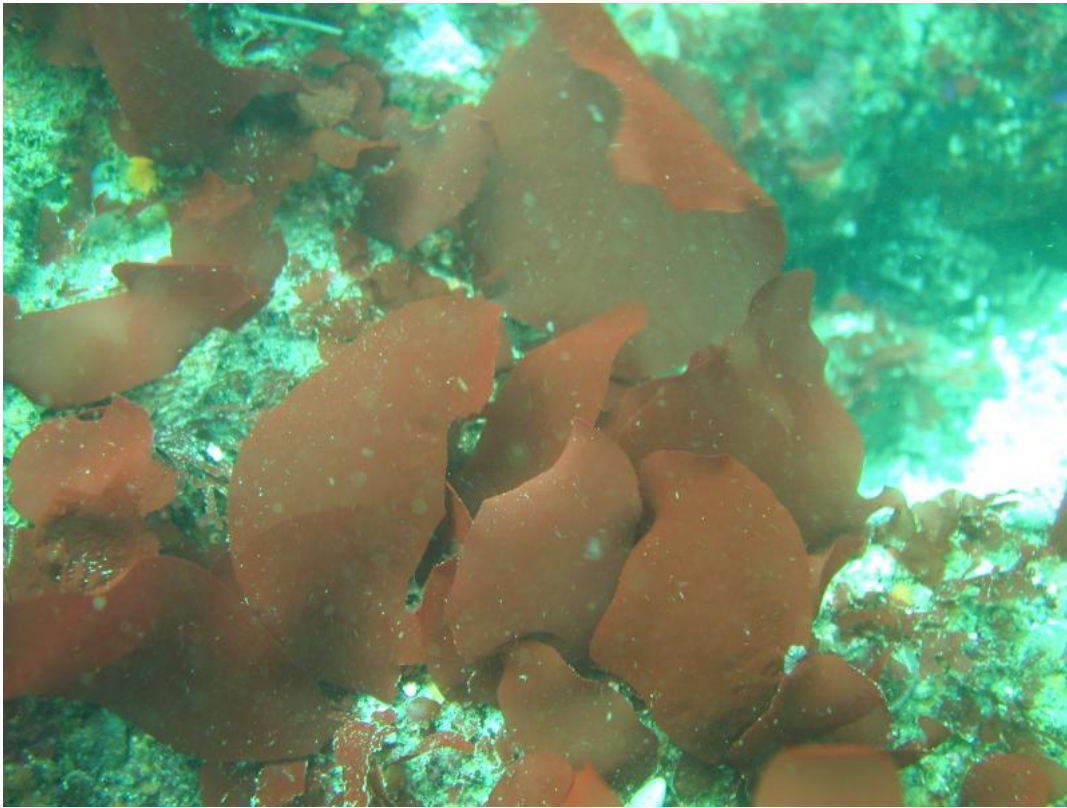


Fryeella gardneri

BRANCH:
branching, flat



Rhodymenia pacifica



LEAF – blade, unbranched

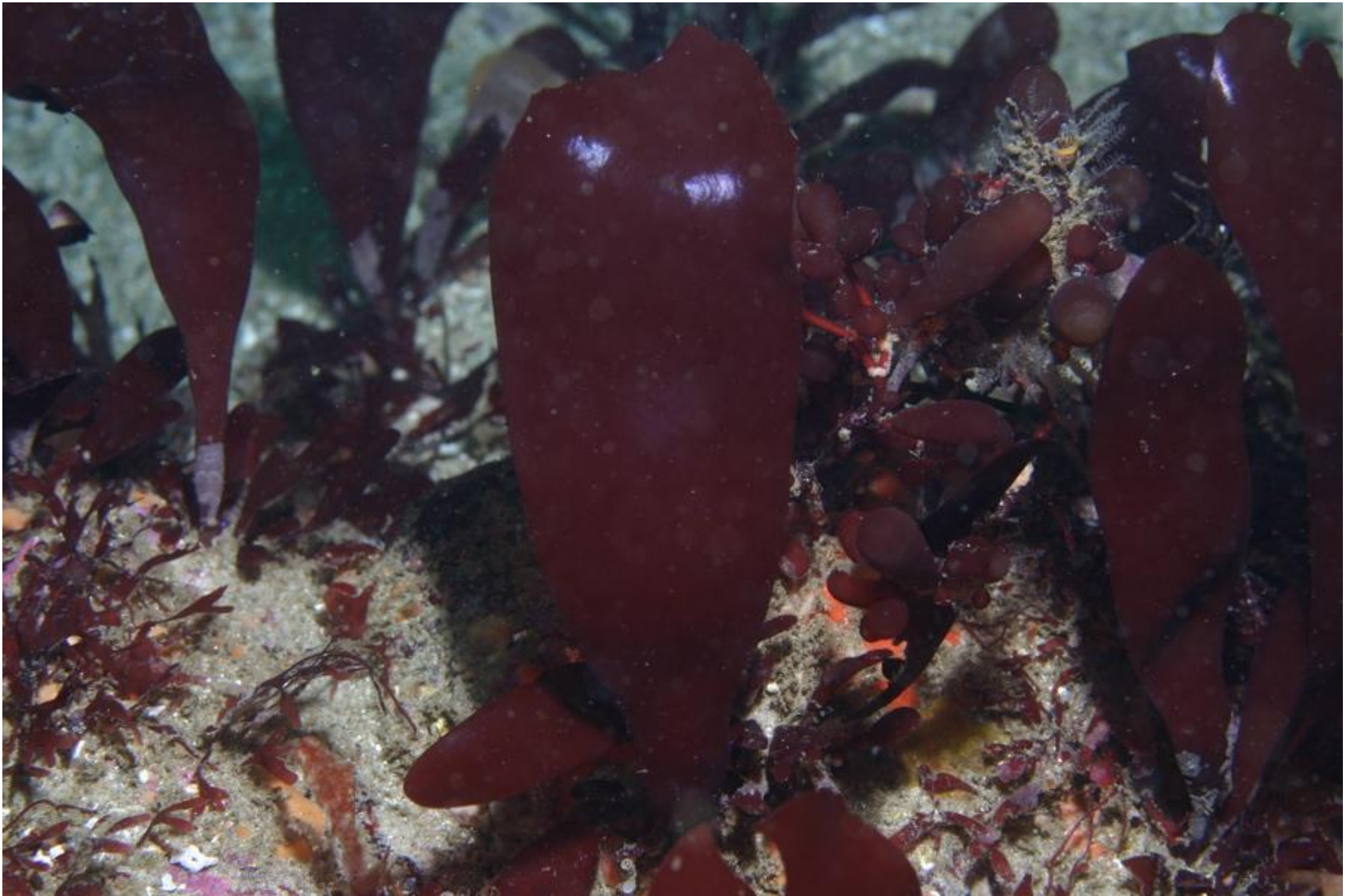
Wide sheet, no branches (but can be torn)

e.g., *Chondracanthus (Gigartina)*, *Halymenia*, *Mazzaella*, *Weeksia*



LEAF

Wide sheet, no branches



LEAF

Wide sheet, no branches



LEAF
Wide sheet, no branches



LEAF
Wide sheet, no branches



LEAF
Wide sheet, no branches



King/ SIMoN
MBNMS NOAA



BUSHY - cylindrical branches

e.g., *Botryocladia*, *Gastroclonium*, *Gelidium*, *Gracilaria*, most *Prionitis*



BUSHY
Cylindrical branches



BUSHY
Cylindrical branches



BUSHY
Cylindrical branches



BUSHY
Cylindrical branches



BUSHY
Cylindrical branches



BUSHY
Cylindrical branches



BUSHY
Cylindrical branches



LACY – filamentous/dense

highly branched

e.g., *Ceramium*, *Microcladia*, *Neoptilota*, *Platythamnion*, *Plocamium*, *Polysiphonia*



LACY

Very fine branchlets off of secondary branch

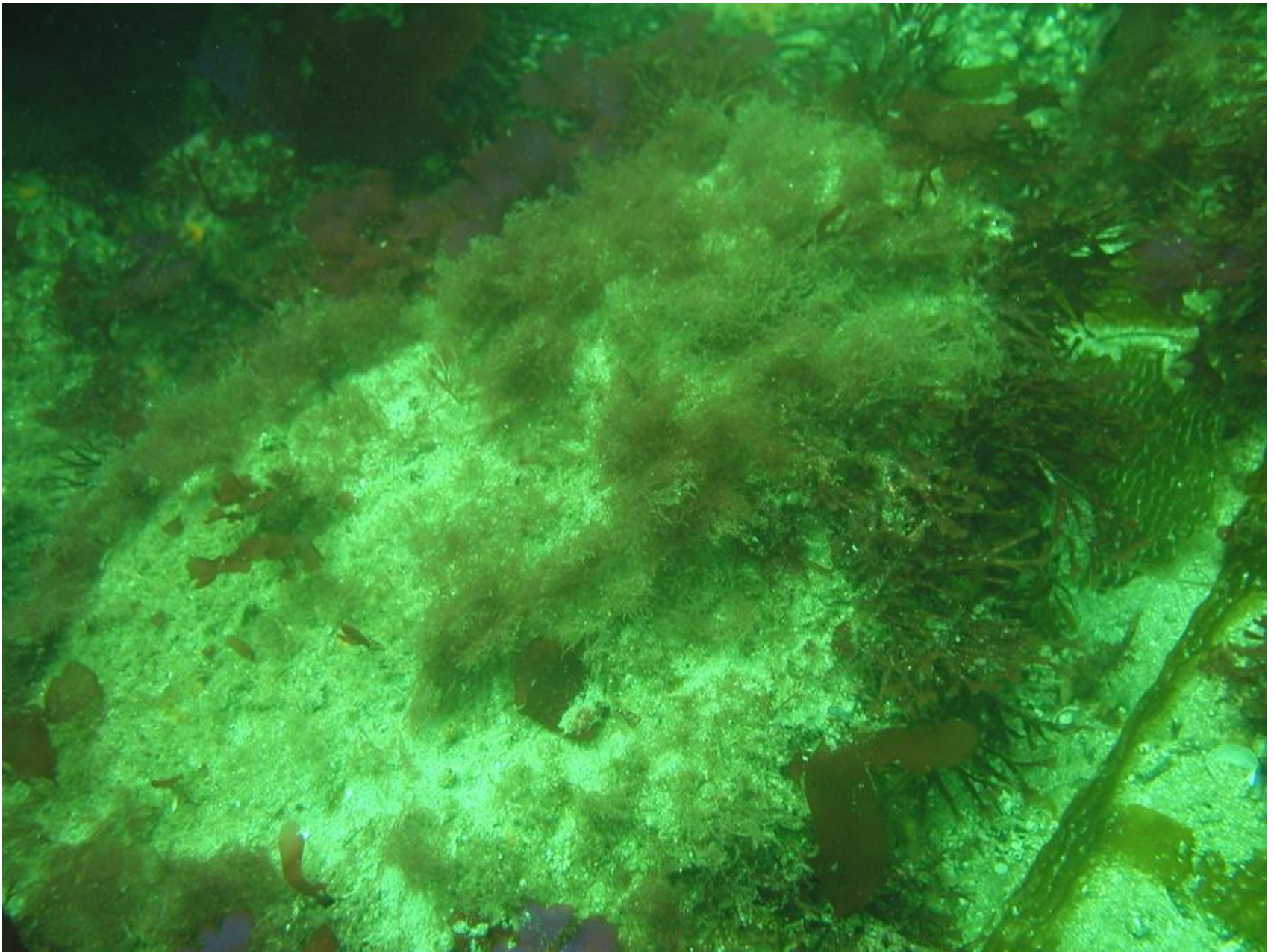
Neoptilota densa



LACY
Filamentous/dense



LACY
Filamentous/dense clump



LACY
Filamentous/dense clump



LACY
Filamentous/dense



LACY or BRANCH?
Filamentous/dense



Encrusting Red
Not a coralline, usually very smooth, often deep red



Encrusting Red
Not a coralline, usually very smooth, often deep red



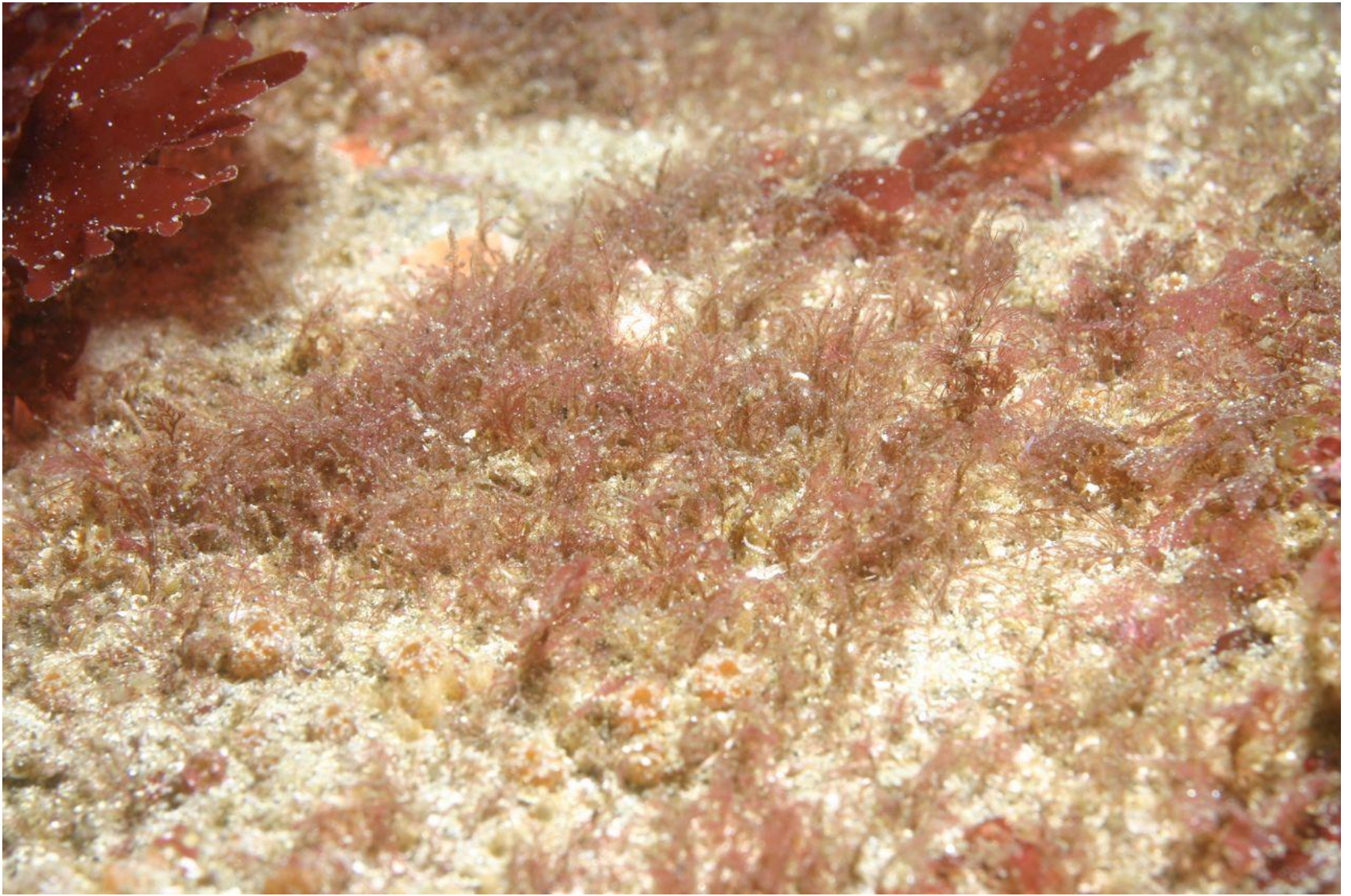
Encrusting Red
Not a coralline, usually very smooth, often deep red



Encrusting Red
Not a coralline, usually very smooth, often deep red



Encrusting Red covering *Dodecaceria*
Not a coralline, usually very smooth, often deep red



Turf

Not in a clump, short (<1-2 cm tall), like mowed grass

Coralline

Crustose coralline algae

Articulated coralline algae



Crustose Coralline Algae
usually pink



Crustose Coralline Algae
usually pink



Crustose Coralline Algae
usually pink



Crustose Coralline Algae
usually pink



Articulated Coralline Algae
erect and branching
e.g., *Bossiella*, *Calliarthron*, *Corallina*



Articulated Coralline Algae
erect and branching



Articulated Coralline Algae
erect and branching

Brown Algae

Stephanocystis osmundacea

Dictyoneurum spp.

Egregia menziesii

Desmarestia spp.

Macrocystis holdfast (live)

Laminariales holdfast (live)

Dictyotales



Stephanocystis osmundacea

Large, low lying, brown-green, robust, blades are like oak leaves, long chains of pneumatocysts when reproductive



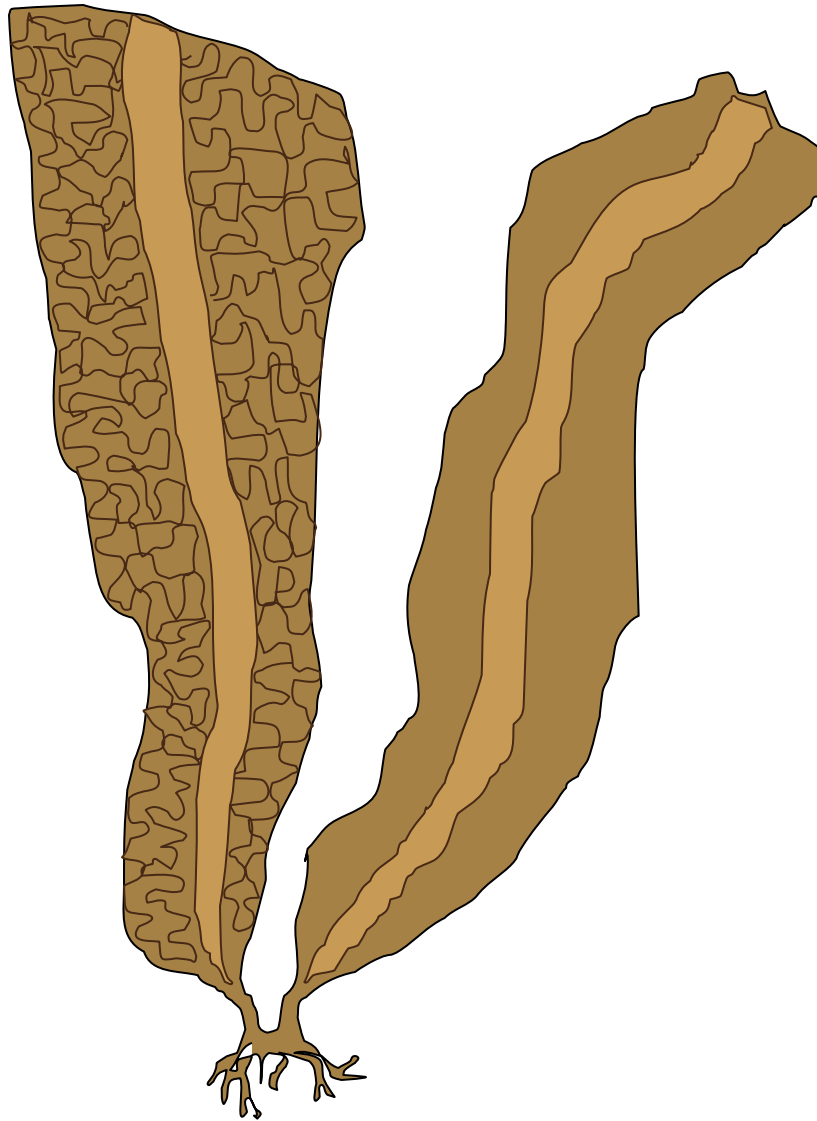
Stephanocystis osmundacea



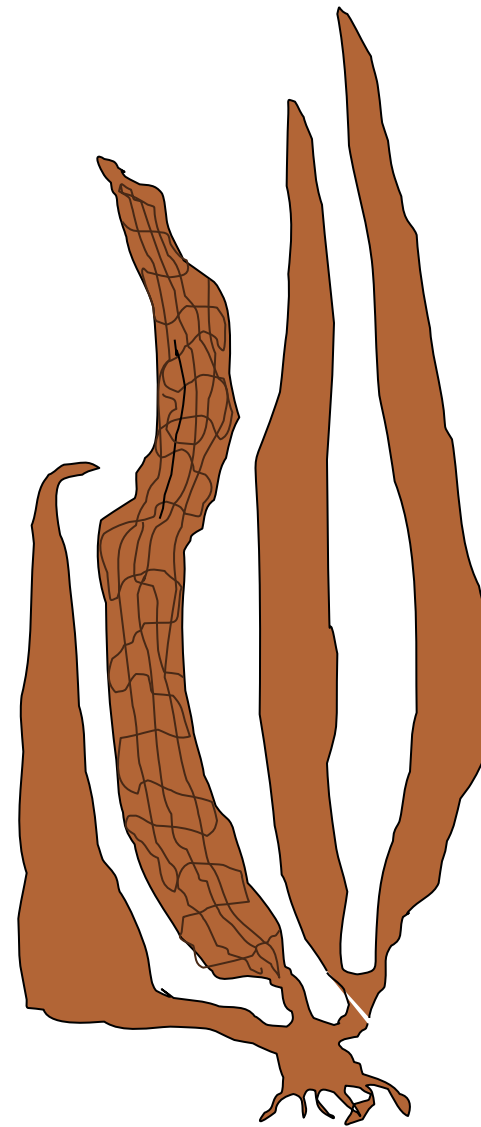
Stephanocystis osmundacea



Stephanocystis osmundacea
covered by a tunicate (epibiont)



Dictyoneurum reticulatum versus
With midrib, wide vs.



Dictyoneurum californicum
without midrib, skinny; shallows



Dictyoneurum reticulatum
with tear along midrib



Dictyoneurum reticulatum
midrib present



Dictyoneurum reticulatum
midrib present



Dictyoneurum californicum
midrib absent



Dictyoneurum californicum
midrib absent



Egregia menziesii





Egregia menziesii



***Desmarestia* spp.**
Acid weed





***Desmarestia* spp.**
(var. *firma*)
Acid weed

Desmarestia spp.
Acid weed





***Desmarestia* spp.**
Acid weed



King/SIMoN
MBNMS NOAA

***Desmarestia* spp.**
Acid weed



***Desmarestia* spp.**
Acid weed

***Desmarestia* spp.**
Acid weed





***Macrocystis* holdfast (Live)**



***Macrocystis* holdfast (Live)**



Laminariales Holdfast (Live)

If you hit the holdfast of *any* stipitate kelp.



Laminariales Holdfast (Live)
High epibiont cover

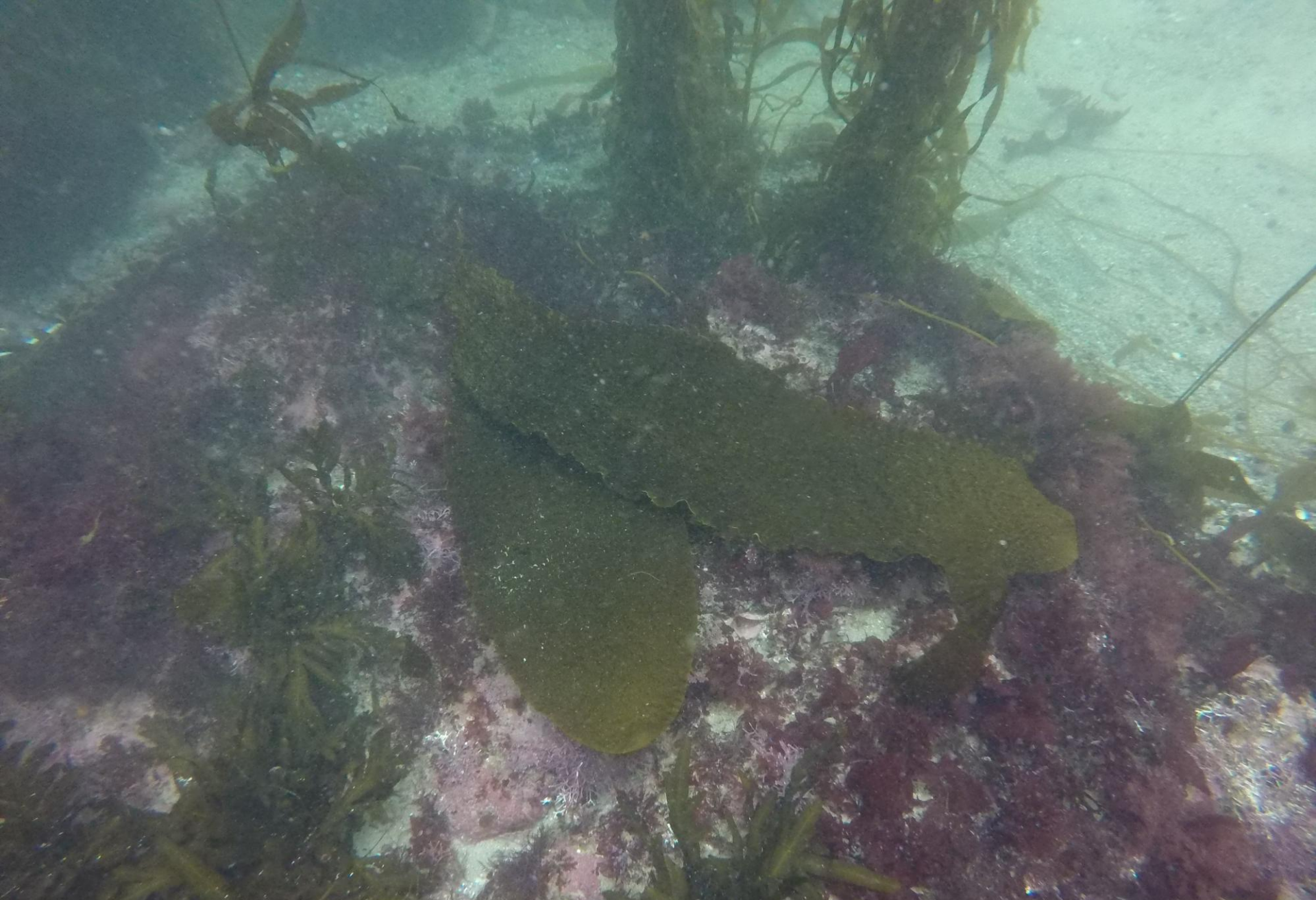


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Dictyotales
Brown, branching algae



Dictyotales
Brown, branching algae



Tube Worms

Tube worm – Other Solitary

Diopatra ornata / *Chaetopterus*

Phragmatopoma

Dodecaceria spp.



Tubeworm - Other Solitary
Myxicola infundibulum



Tubeworm - Other Solitary
Pista elongata



Diopatra ornata

Ornate tube worm covered with shells (two pictured)



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Diopatra ornata

Ornate tube worm covered with shells



Diopatra ornata

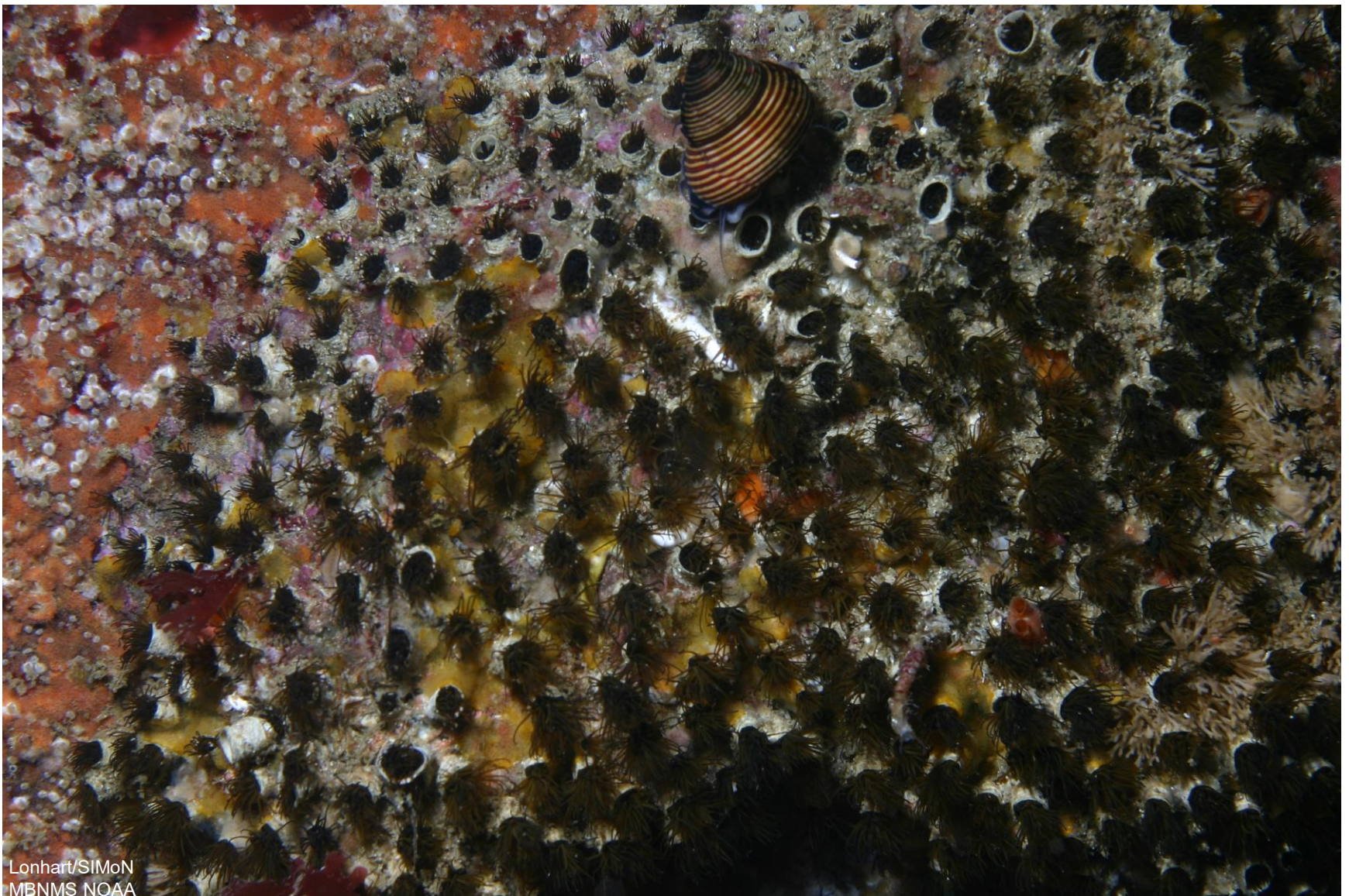
Ornate tube worm out of its tube



Phragmatopoma californica

Honeycomb worm

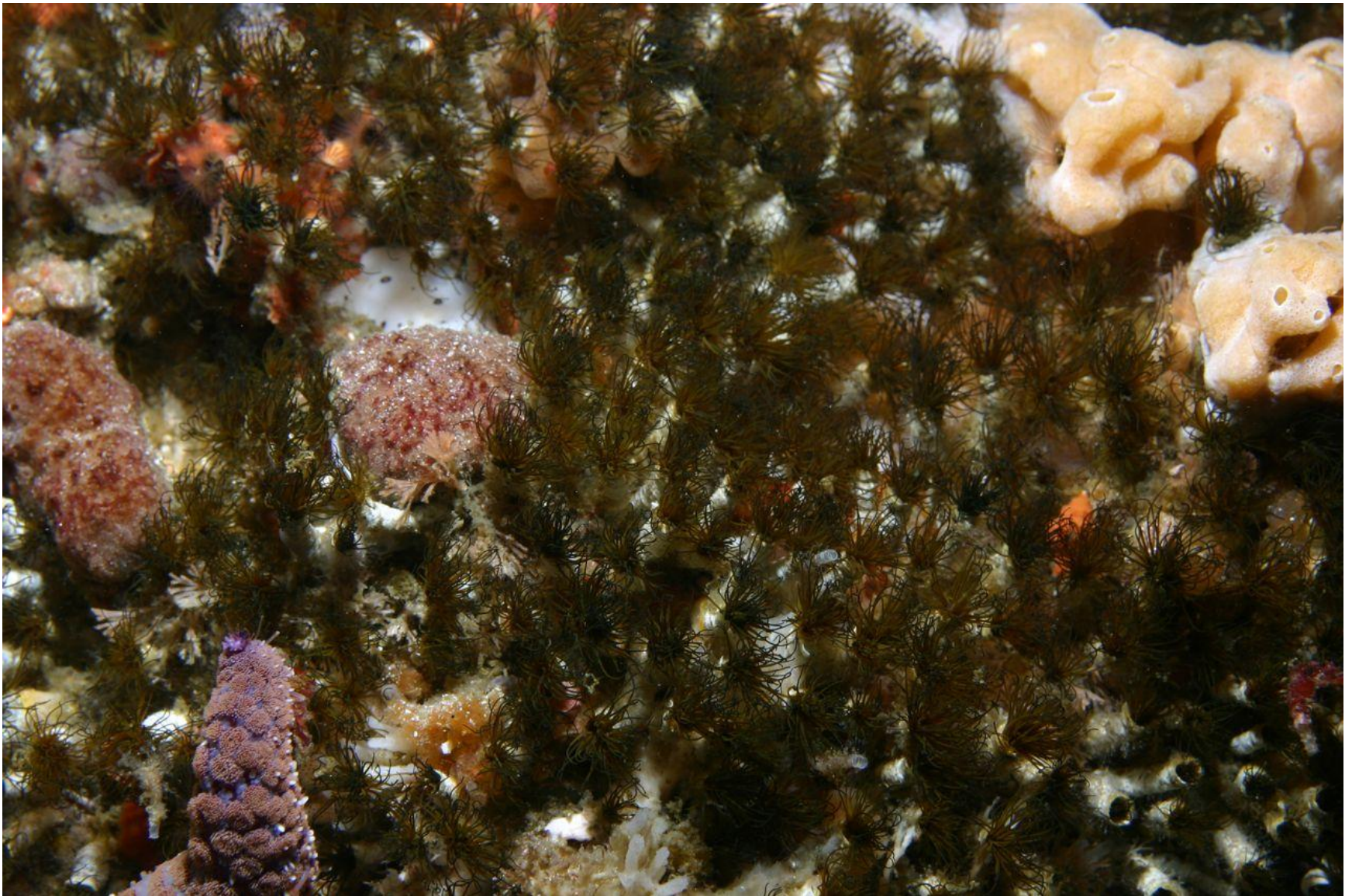
Tube worm with sand tubes, usually with purple tentacles



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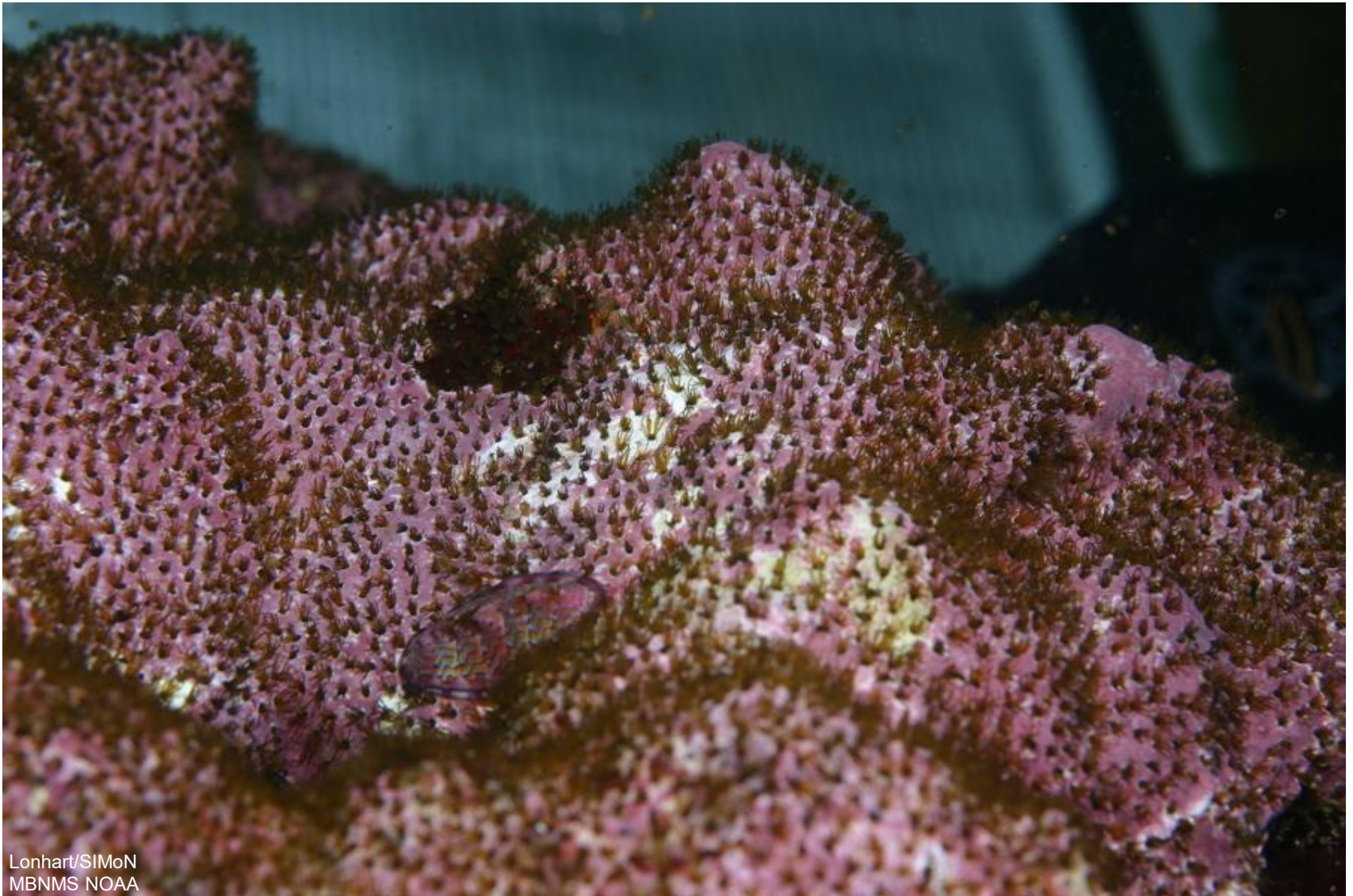
Dodecaceria fewkesi-pacifica

Colonial tubeworm, white tube with black-green tentacles,
tube openings 3-5 mm diameter



Dodecaceria fewkesi-pacifica

Colonial tubeworm, white tube with black-green tentacles,
tube openings 3-5 mm diameter



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Dodecaceria concharum

Colonial tubeworm, white tube with green-brown tentacles,
tube openings 2 mm diameter



Chad King
MBNMS NOAA

Dodecaceria concharum

Close-up of green-brown tentacles,
tube openings 2 mm diameter



Dodecaceria concharum

Colonial tubeworm, white tube with green-brown tentacles,
tube openings 2 mm diameter



Dodecaceria concharum

Colonial tubeworm, white tube with green-brown tentacles,
tube openings 2 mm diameter



Dodecaceria concharum

Colonial tubeworm, white tube with green-brown tentacles,
tube openings 2 mm diameter



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Dodecaceria concharum

Colonial tubeworm, white tube with green-brown tentacles,
tube openings 2 mm diameter

Snails

Thylacodes squamigerus

Petalochonchus montereyensis



Thylacodes (Serpulorbis) squamigerus

Vermetid gastropod, larger than *Petalconchus montereyensis*, orange lips



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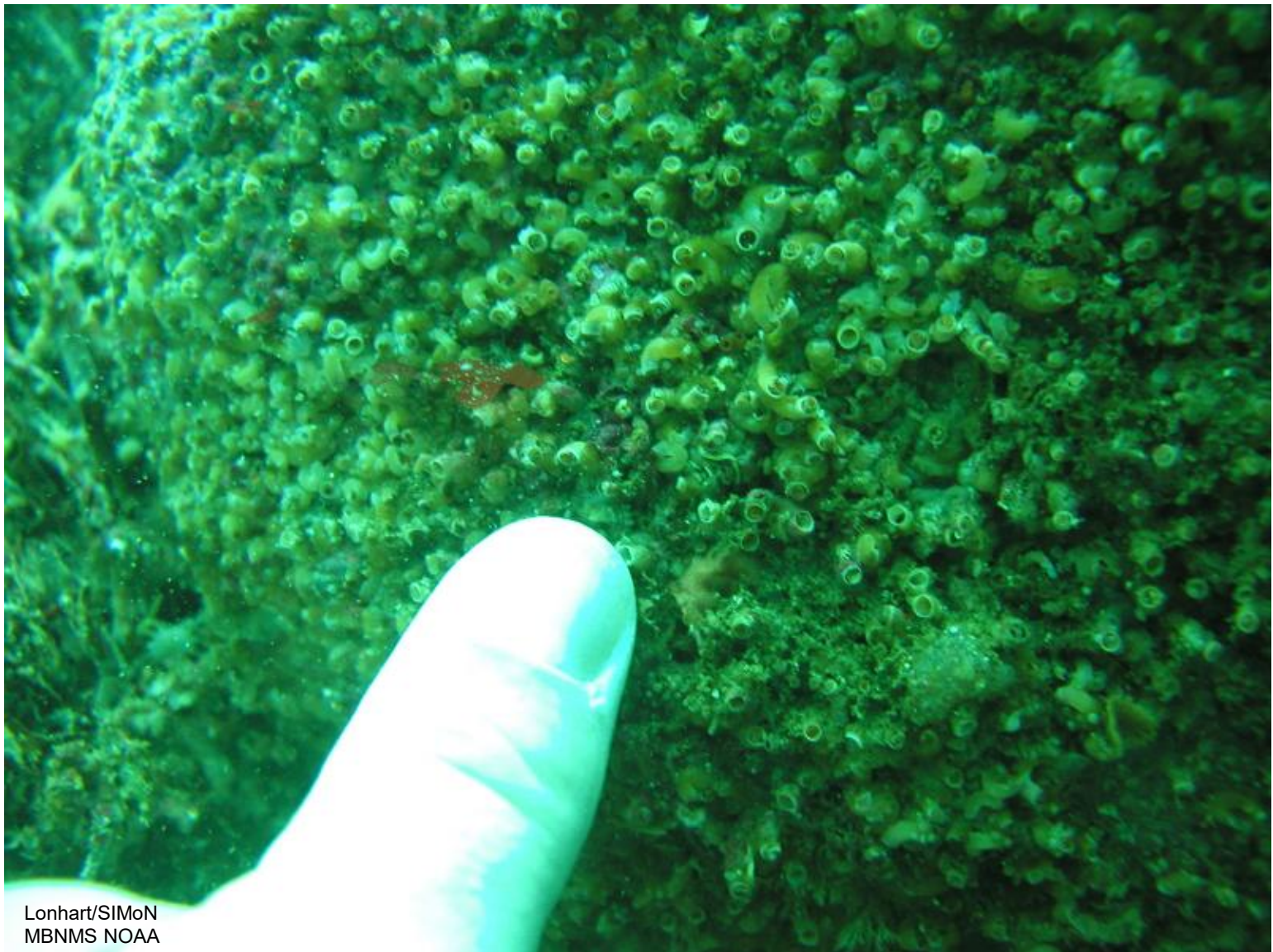
Thylacodes (Serpulorbis) squamigerus

Vermetid gastropod, larger than *Petalconchus montereyensis*, orange lips



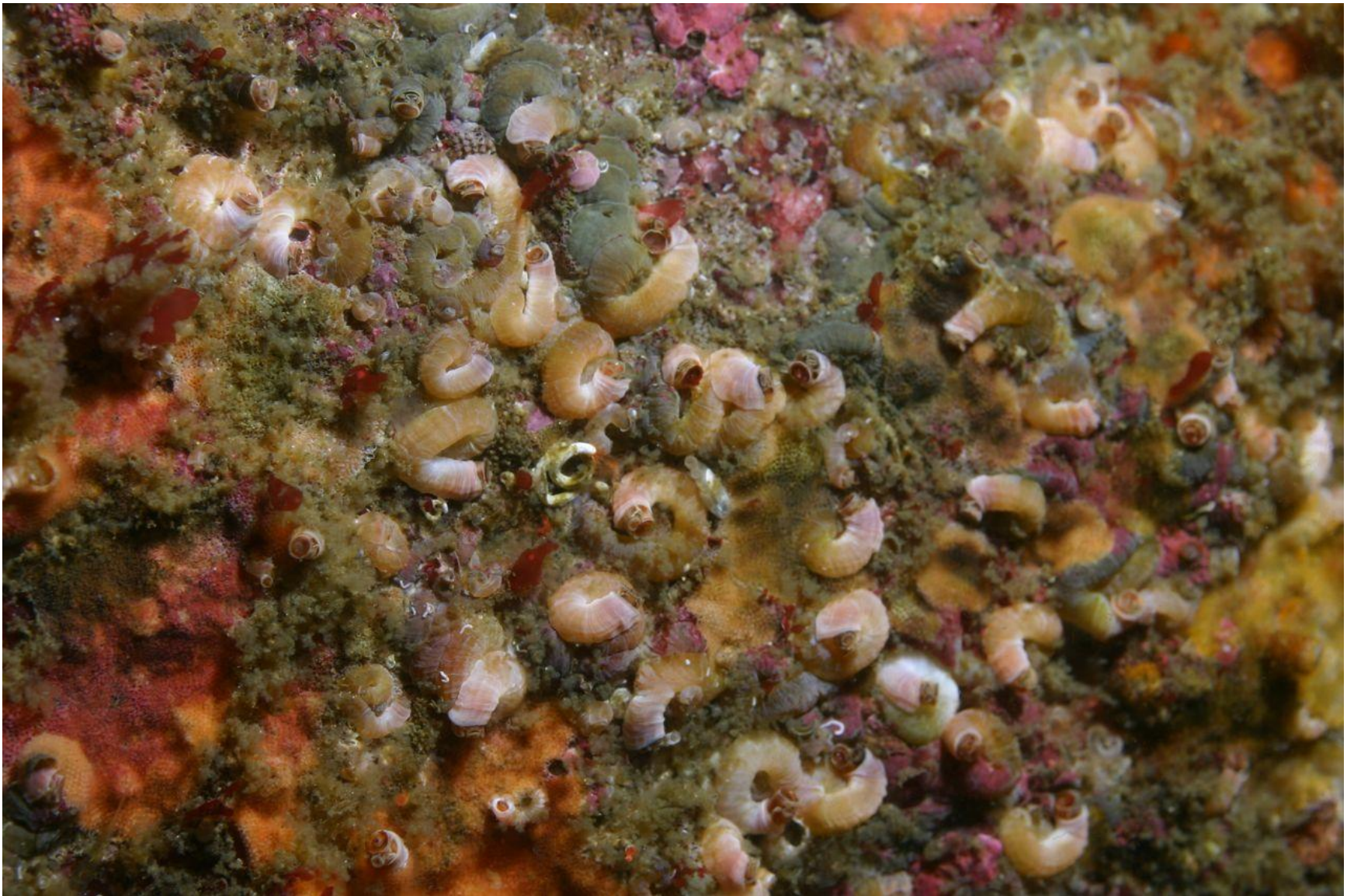
©Lonhart

Petalconchus montereyensis
Vermetid gastropod, smaller than *Serpulorbis*



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Petalocochus montereyensis
Vermetid gastropod, smaller than *Serpulorbis*



Petalconchus montereyensis
Vermetid gastropod, smaller than *Serpulorbis*

Cnidarians

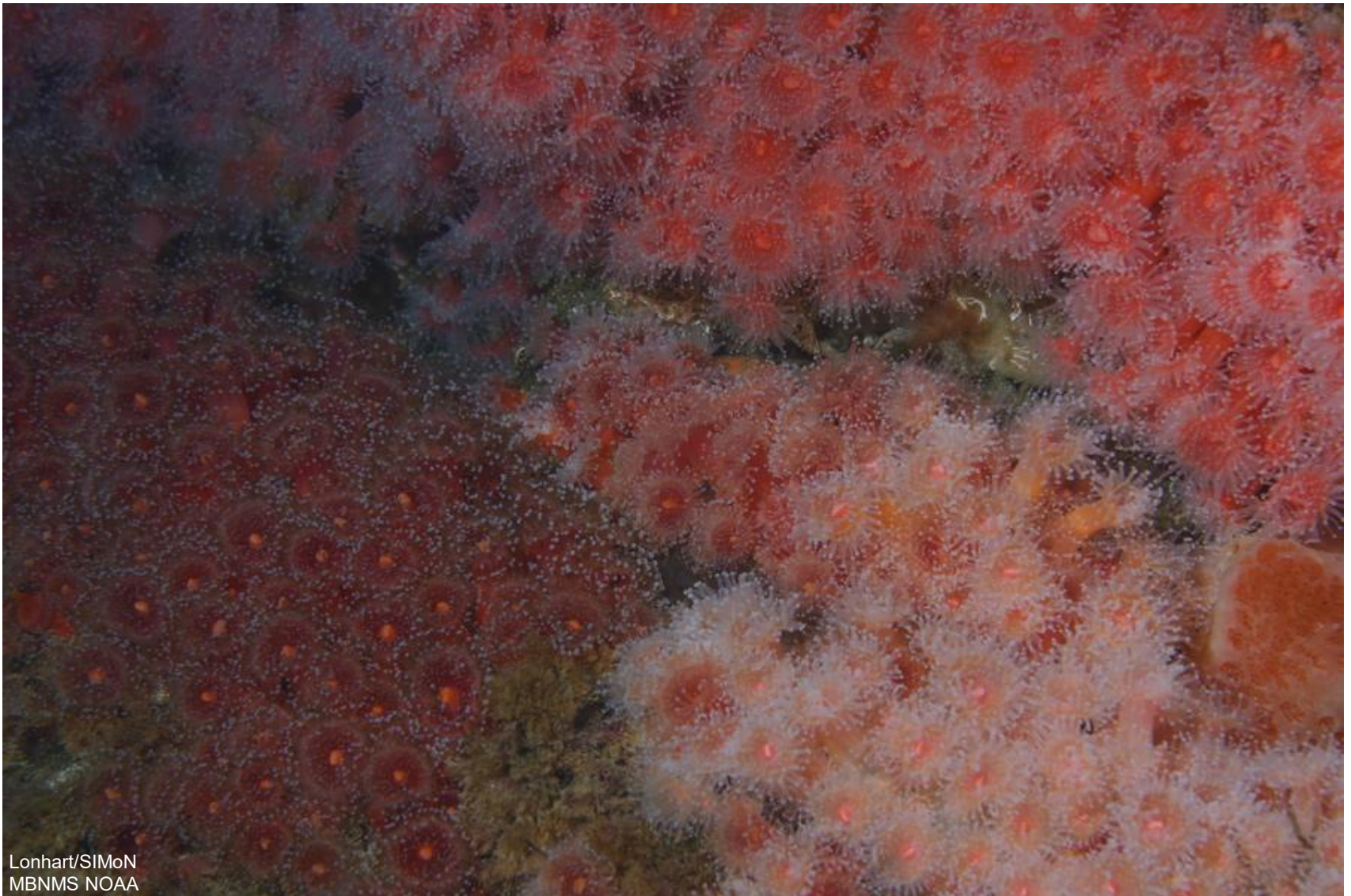
Corynactis californica

Cup corals

Other anemone

Hydroids

Stylaster californicus



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Strawberry or club-tipped anemone

Corynactis californica

Often red, orange or pink, white tentacles with bulbous tips, dense clusters



Strawberry or club-tipped anemone

Corynactis californica

Often red, orange or pink, white tentacles with bulbous tips, dense clusters



Lonhart/SIMoN
MBNMS NOAA

Strawberry or club-tipped anemone

Corynactis californica

Often red, orange or pink, white tentacles with bulbous tips, dense clusters



Cup coral

Balanophyllia elegans the orange cup coral



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Cup coral

Astrangia lajollaensis colonial brown cup coral
small diameter, numerous, golden brown



Cup coral

Brown cup coral

Solitary, brown calyx, diameter of a quarter



Other anemone
Halcapa decemtentaculata



Other anemone

Anthopleura elegantissima aggregating or pink-tipped anemone



Other anemone

Urticina lofotensis white-spotted rose anemone



Other anemone

Urticina crassicornis painted or green-blotched anemone



Other anemone

Urticina piscivora fish-eating anemone



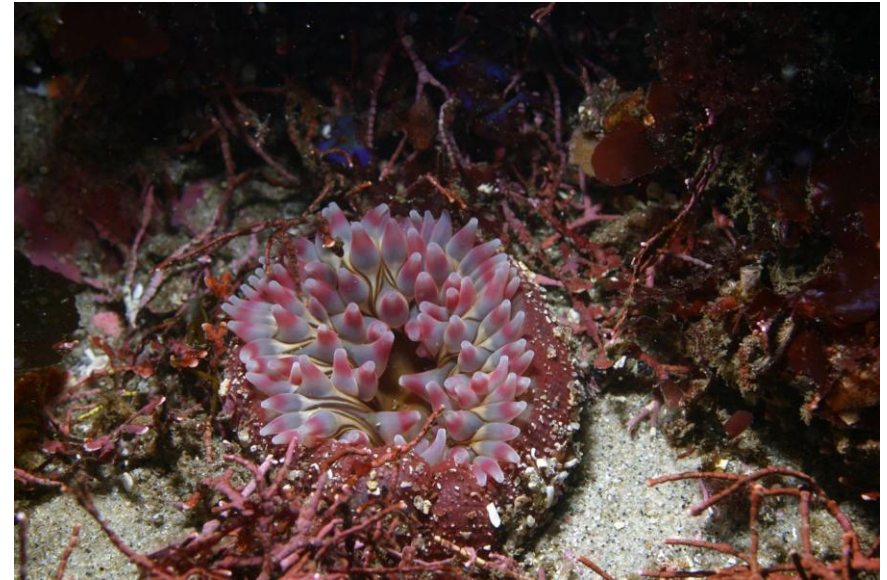
Other anemone

Urticina columbiana sand-rose anemone



Other anemone

Urticina coriacea stubby rose anemone



Other anemone

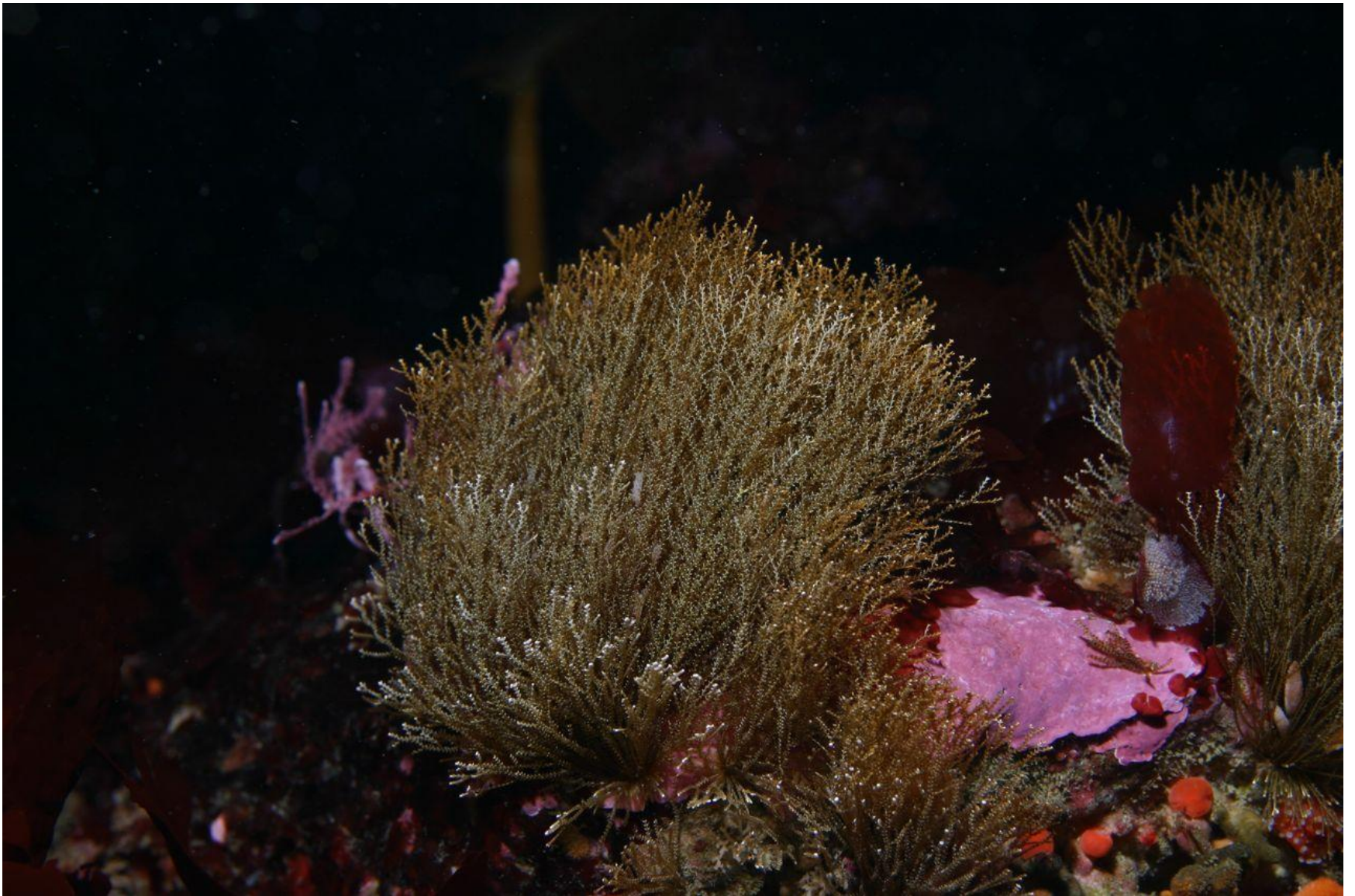
Urticina spp. distinctive column patterns and textures



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Hydroids

Unlike bryozoans, which these can resemble, hydroids are flexible



Hydroids



Lonhart/SIMoN
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Hydroids

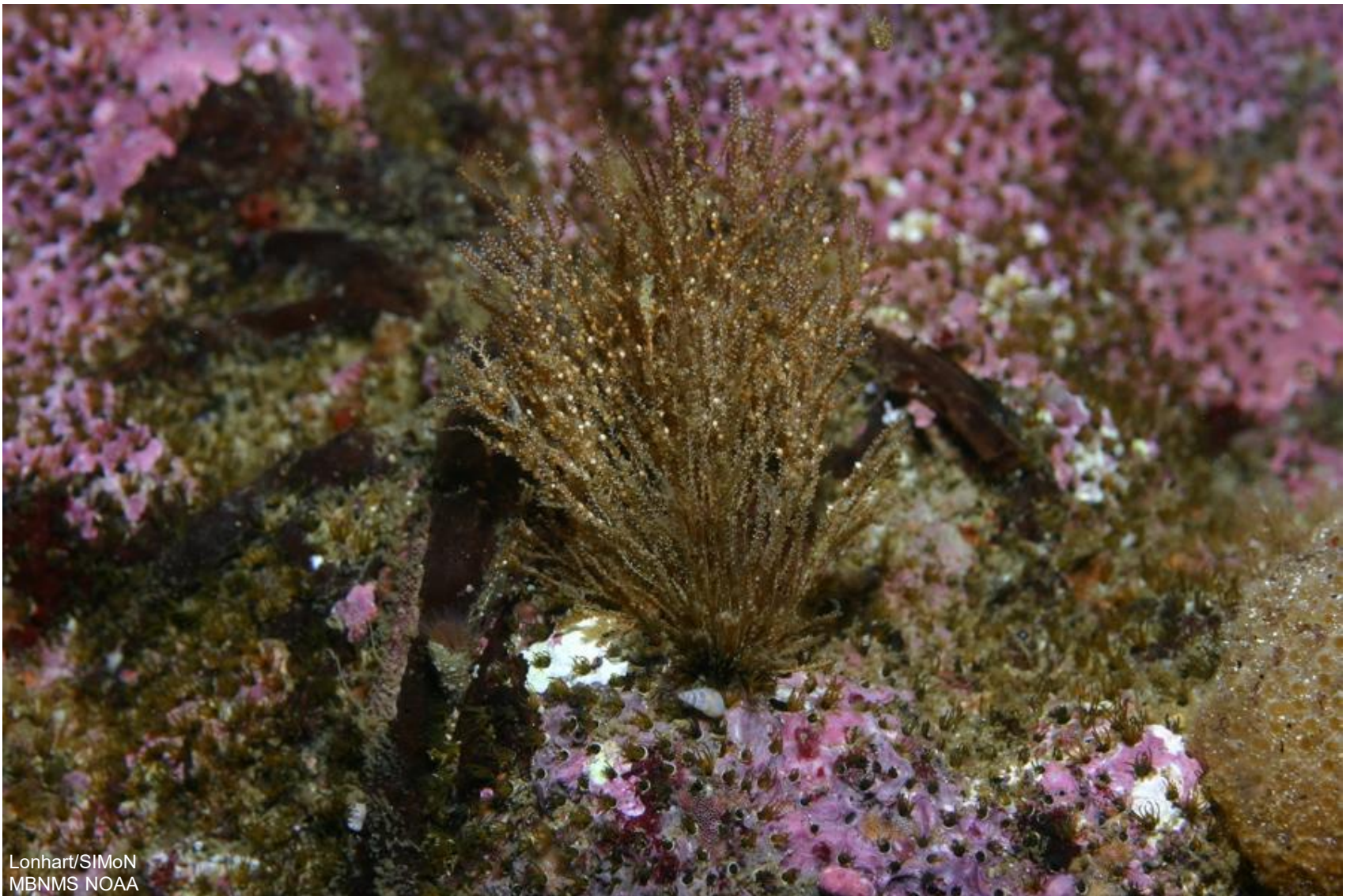


Hydroids



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Hydroids



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Hydroids



Hydroid
Aglaophenia spp.

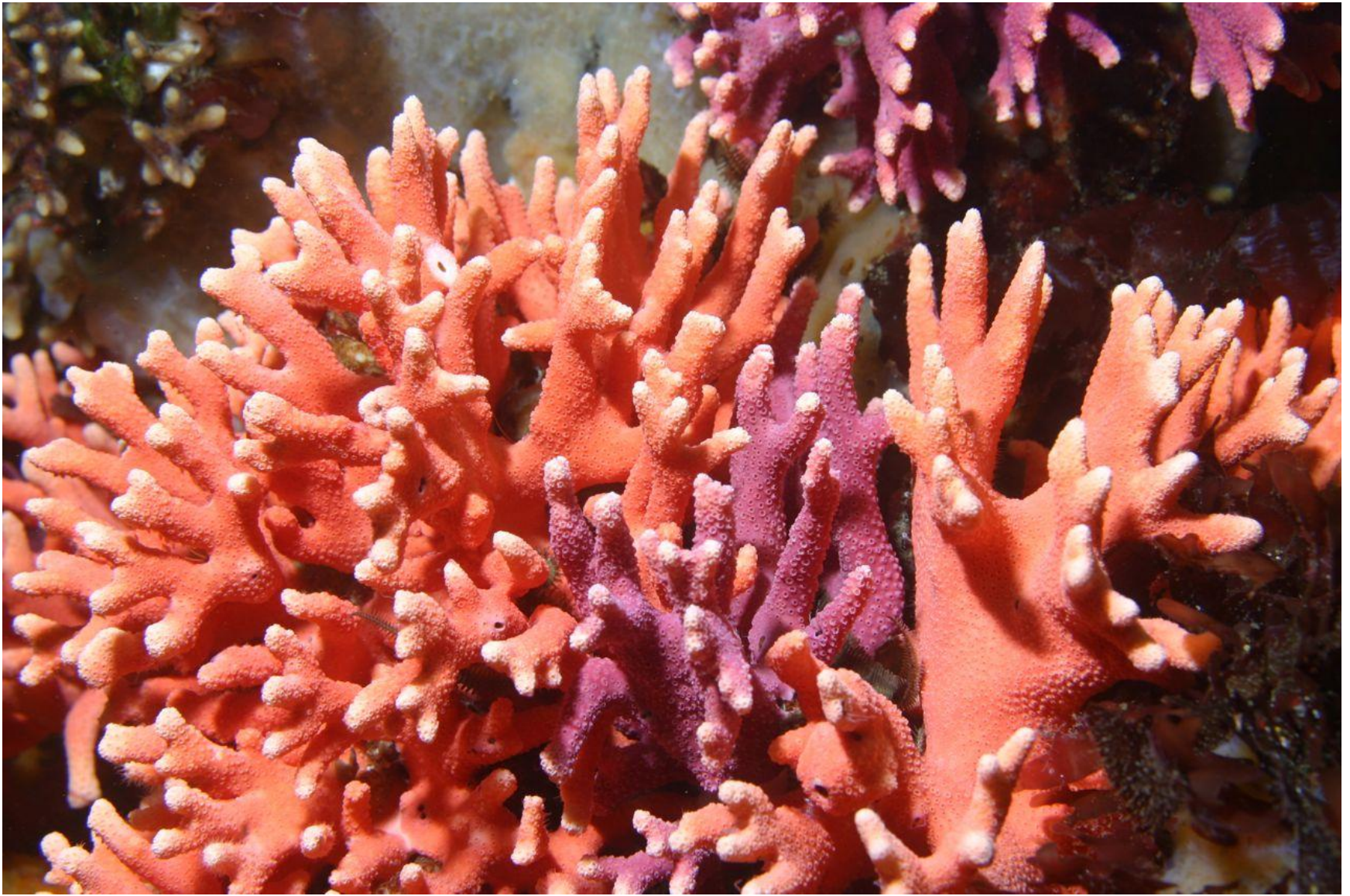


Hydroids



Hydroids

Hedgehog hydroid *Hydractinia milleri*



California hydrocoral

Stylaster californicus

Variable colors, usually in high flow areas

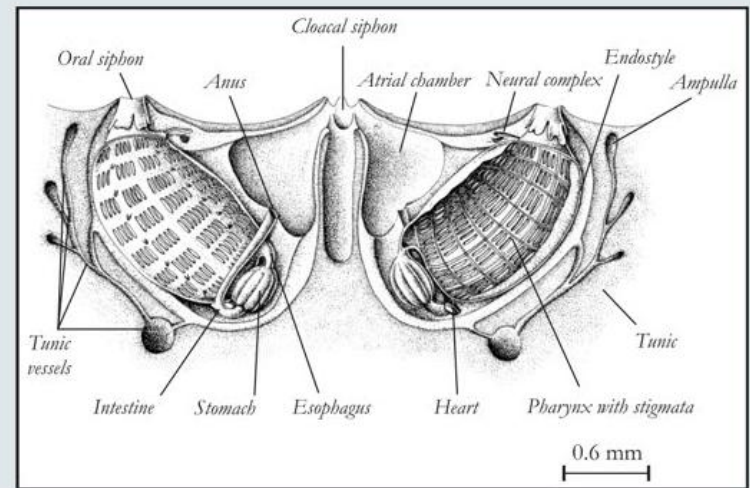
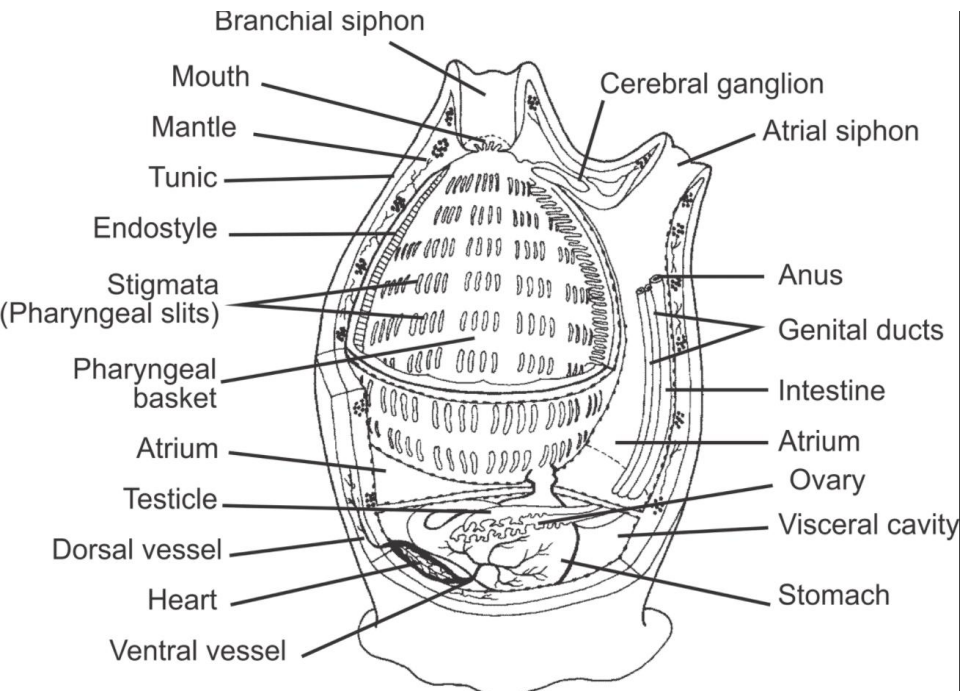


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California hydrocoral
Stylaster californicus

Urochordata (tunicates)

- **Solitary** and either **colonial** or compound
- Fleshy, rough (rare) or smooth (often)
- Many colors, often amorphous shape
- Incurrent siphons react, often geometric



Scheme of the internal anatomy of a *B. schlosseri* colony
(modified from Delage Y. and Hérourard E., 1898, *Traité de Zoologie Concrète*. Schreicher Frères Eds., Paris)

Styela montereyensis



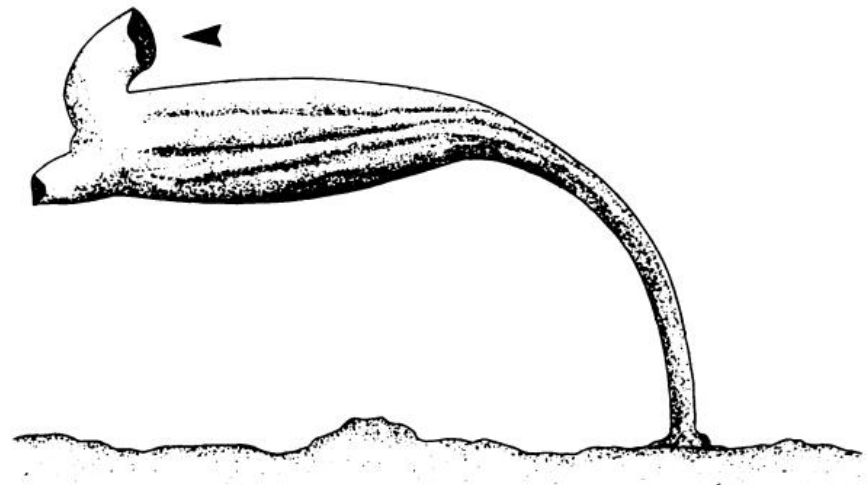
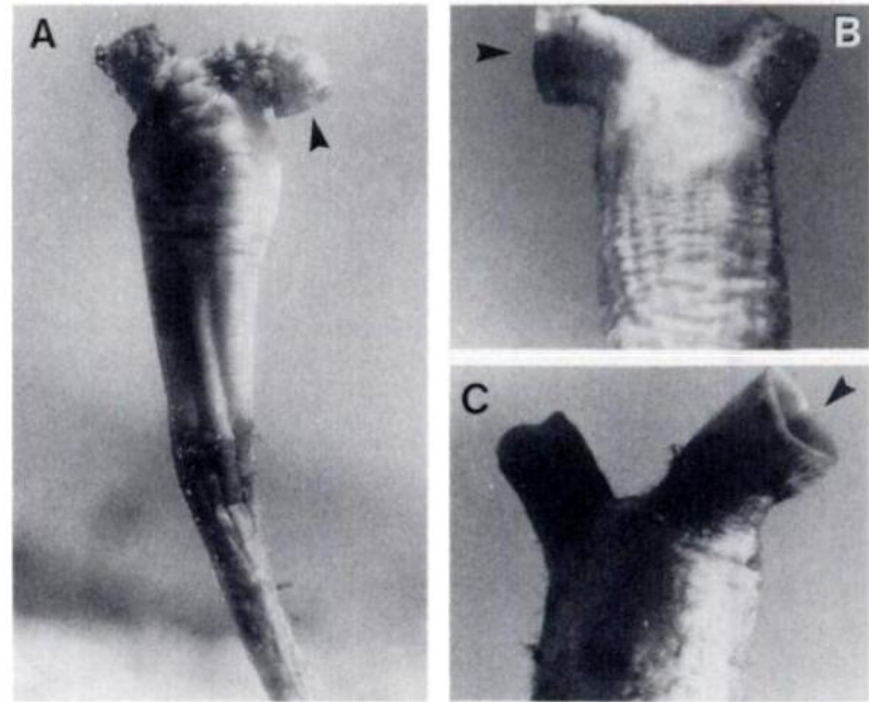


FIGURE 3. (Top.) Typical siphon inclinations of *Styela montereyensis* collected from the open coast (A) and protected bays (B, C). Arrows indicate incurrent siphon apertures.

FIGURE 4. (Bottom.) Current-facilitated orientation in *Styela montereyensis*.

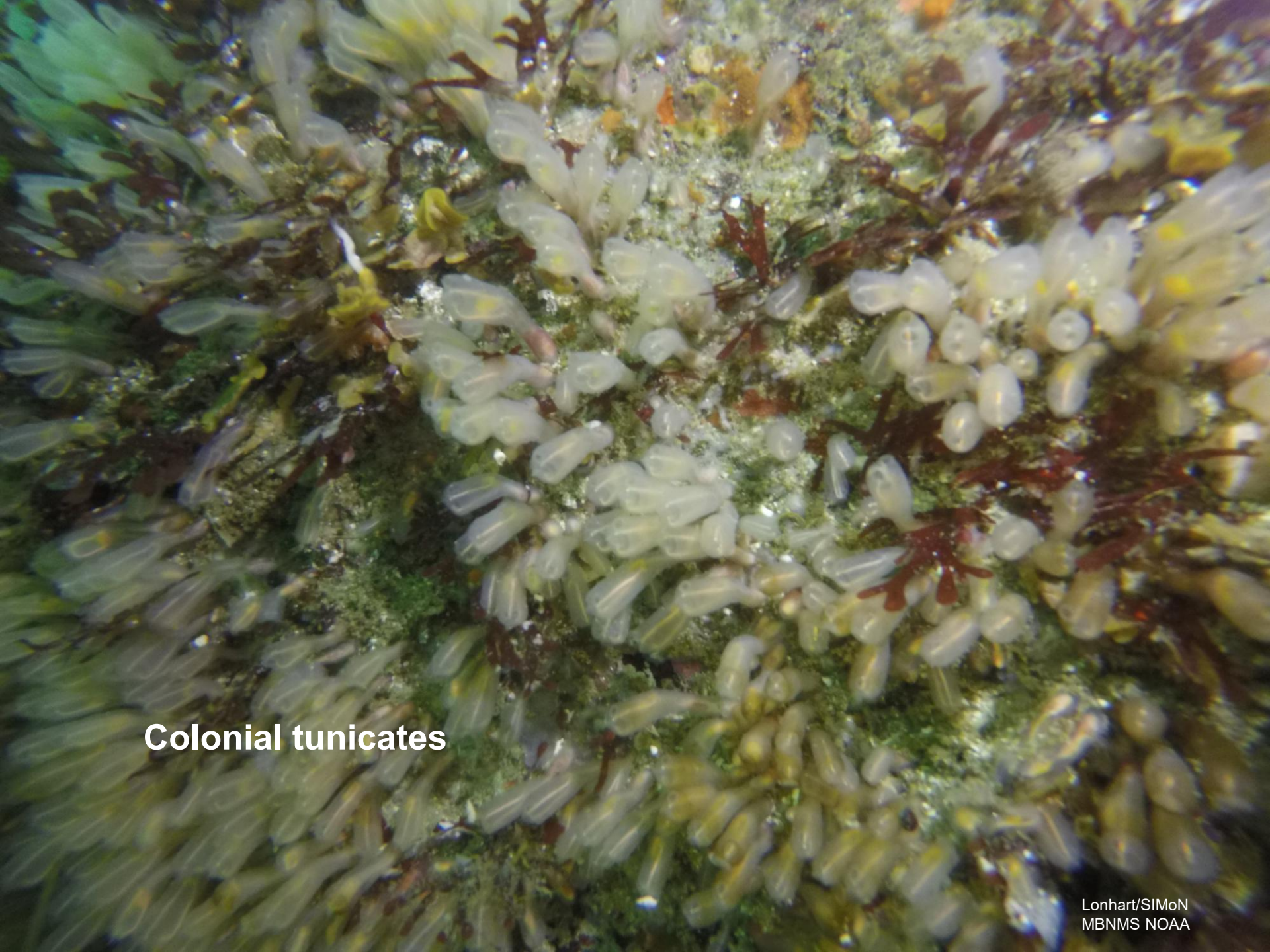


Colonial tunicates



Colonial tunicates





Colonial tunicates



Colonial tunicate



Colonial tunicate



Colonial tunicate



Colonial tunicate



Colonial tunicate



Colonial tunicate



Colonial tunicate



Efird

Colonial Tunicate



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Solitary tunicate

Cnemidocarpa finmarkiensis

Smooth tunic, usually orange or red



Solitary tunicate

Styela montereyensis

Smooth tunic, can be covered with epibionts



Solitary tunicate

Other

Scallop

Embedded cucumber

Barnacle

Bryozoan

Sponge



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Scallop
(*Crassadoma gigantea*) - Giant Pacific rock scallop



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Embedded Cucumber



Embedded Cucumber



Embedded Cucumber

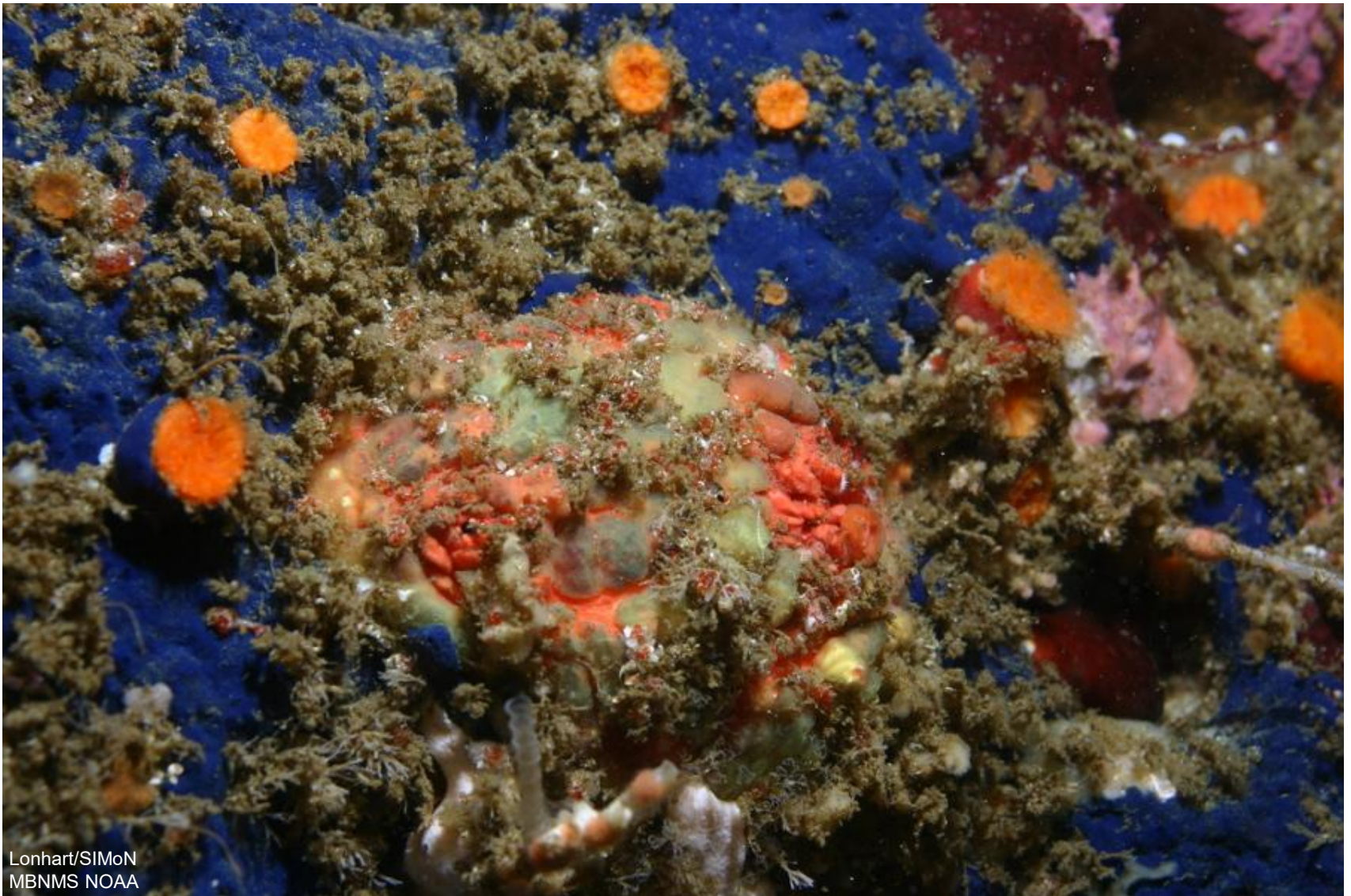


Embedded Cucumber



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Embedded Cucumber



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Embedded Cucumber



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Barnacle



Lonhart/SIMoN
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Barnacle

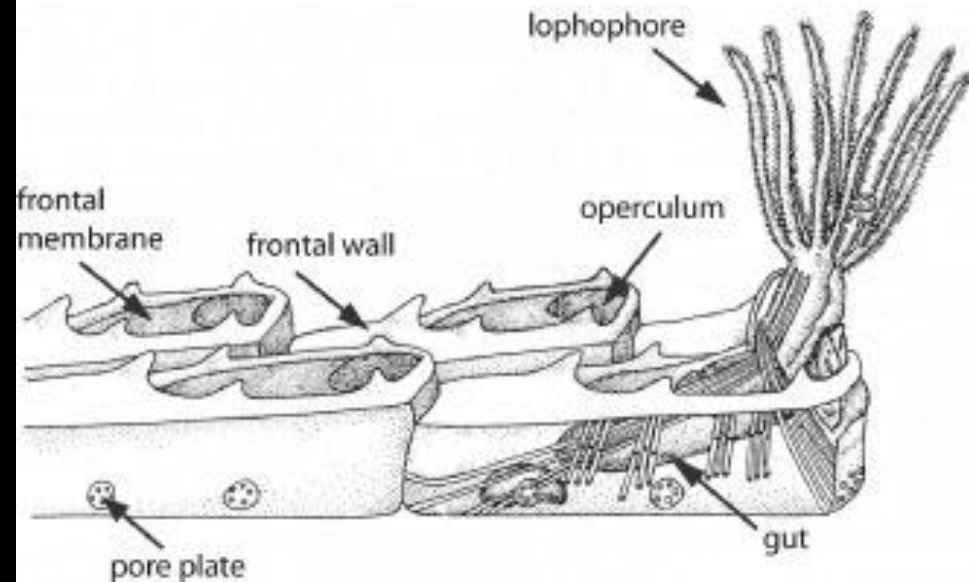
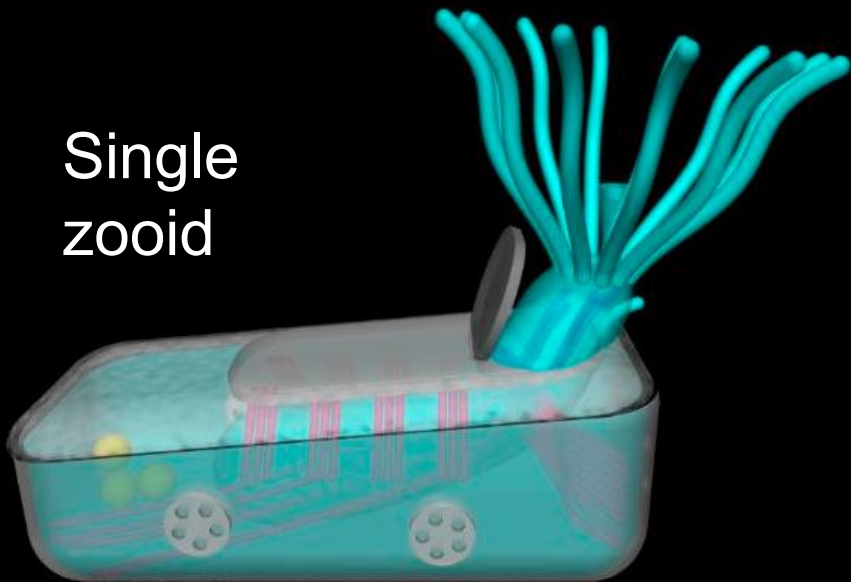


Barnacles

Bryozoans

- Most are rigid and will break if touched
- Rough texture, like sand paper
- Geometric growth of zooids (like tiles), regular pattern
- Lophophores can retract quickly; fuzzy to smooth

Single
zooid





Bryozoans

Brittle and rough texture

Colonies branching tubes with joints (*Cellaria mandibulata*)



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Bryozoans

Colonies branching, not quite cylindrical, short, highly ridged (*Diaperoforma californica*, formerly *Diaperoecia*)



Bryozoans

Brittle and rough texture

Orange was called *Costazia* but is now *Celleporina*



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Bryozoans

Brittle and rough texture

Part of this colony is dead (white, dirty brown) while the rest is alive (golden)



Bryozoans

Colonies branching, cylindrical, pale to golden (likely *Celleporella* and not *Heteropora*)



Bryozoans

Not so brittle but with a rough texture
This can be confused with a hydroid



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Bryozoans

This is an exception—not brittle but instead very flexible (*Bugula*)
This can be confused with a hydroid, but concentric rings/spirals are key



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Bryozoans

Brittle and rough texture

Colonies fluted like corn flakes (*Hippodiplosia insculpta*)



Bryozoans

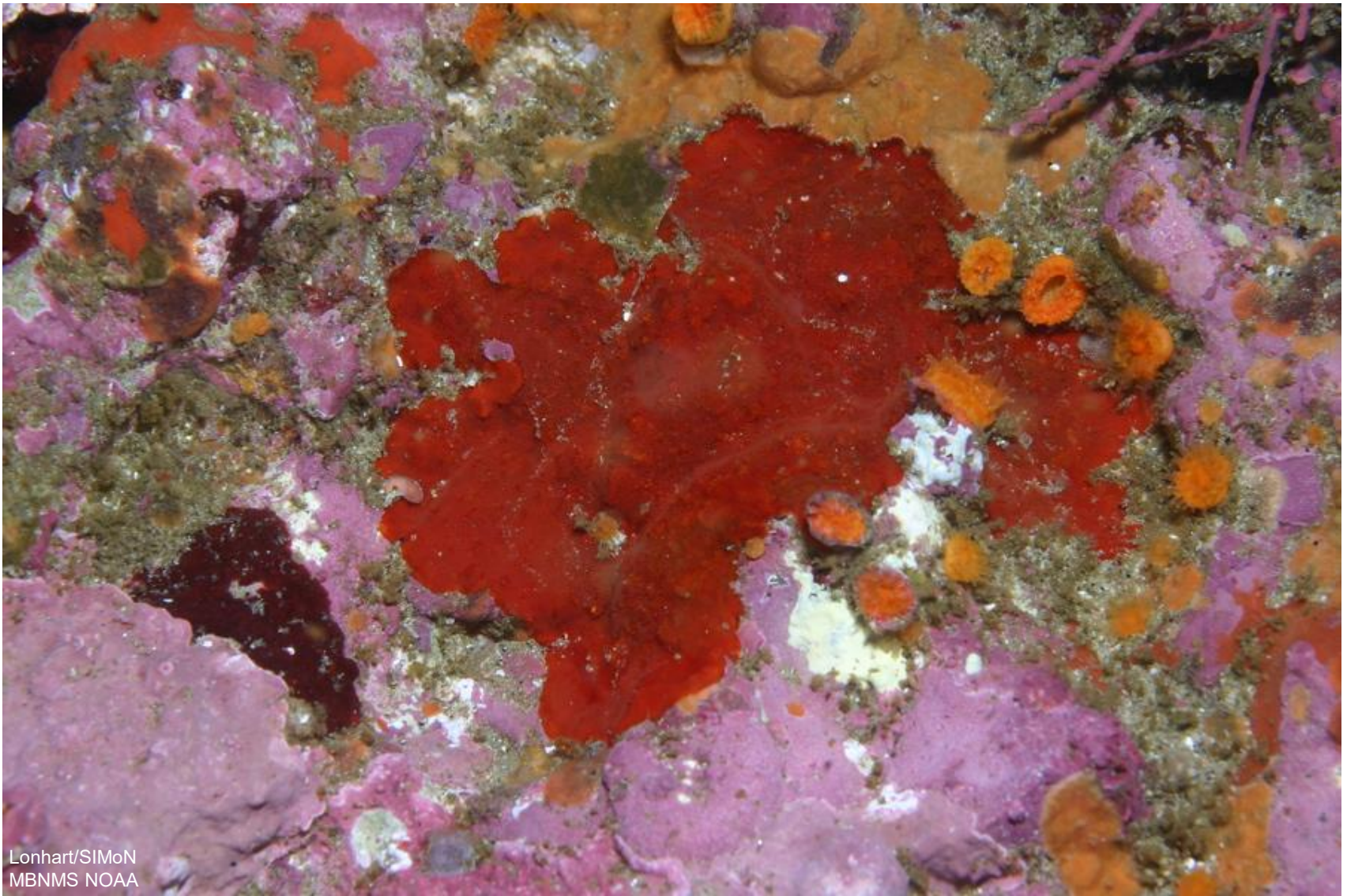
Brittle and rough texture (*Watersipora* sp.)

Colonies fluted or sheet-like crusts, burgundy alive, black or grey when dead



Bryozoans

Brittle and rough texture (reddish colony with white lophophores)
Colonies sheet-like crusts



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Bryozoans

Brittle and rough texture (bright red, not burgundy, which is an alga)
Colonies sheet-like crusts



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Bryozoans

Brittle and rough texture

Colonies sheet-like crusts (bright red) and tunicates (light orange)



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Brittle and rough texture
Colonies sheet-like crusts



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Bryozoans

Brittle and rough texture
Colonies orange sheet-like crusts



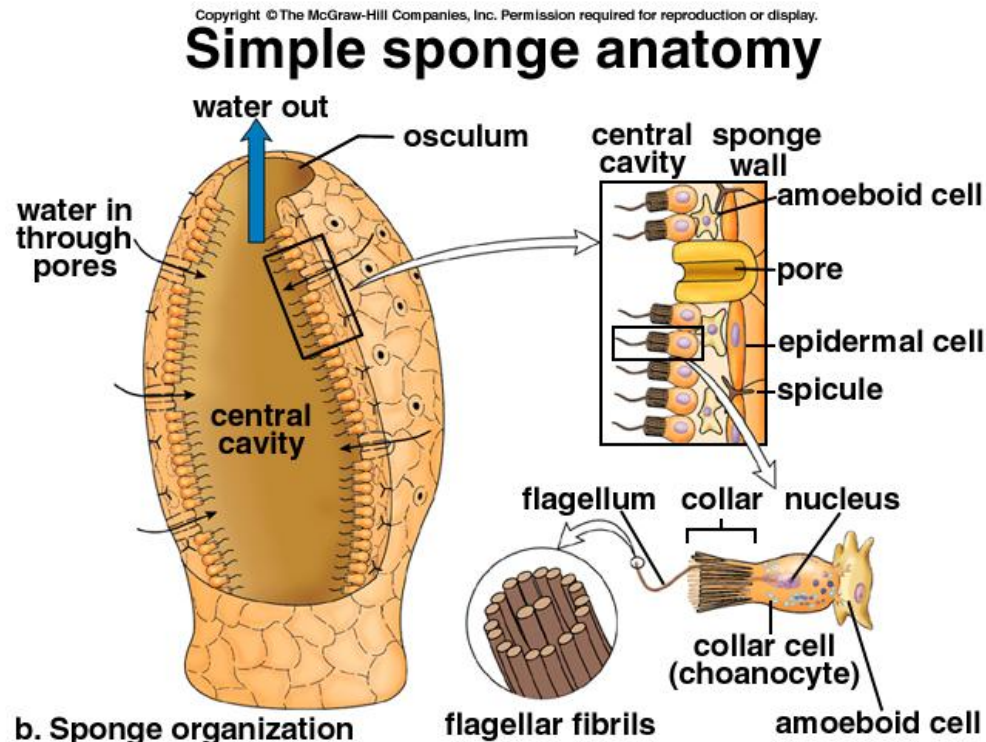
Lonhart/SIMoN
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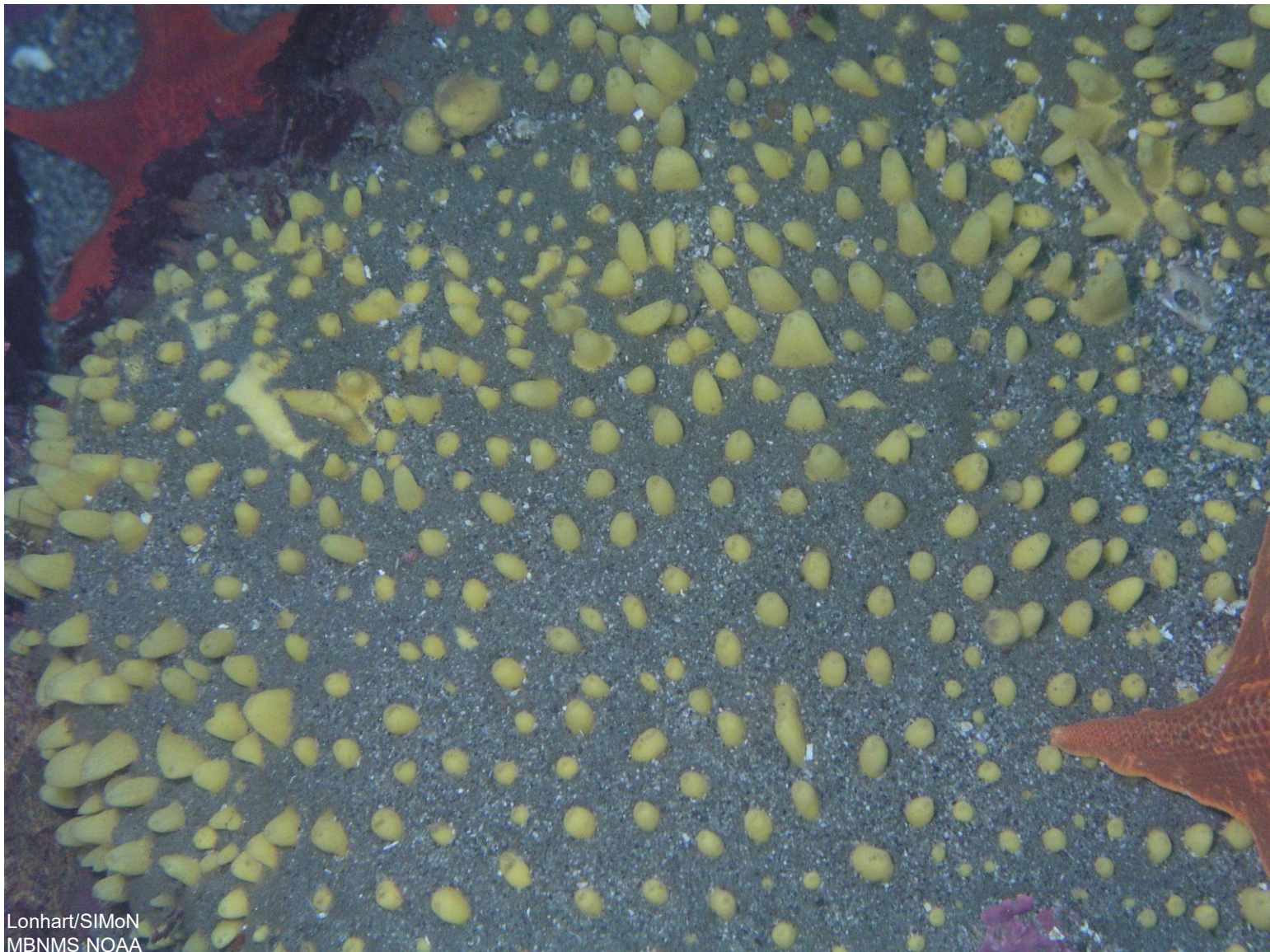
Bryozoans

Brittle and rough texture (golden *Reginella hippocrepis*)
Colonies fluted on edges of sheet-like crusts

Sponges

- Like bread, very porous, irregular pattern
- Rough texture, like kitchen sponge
- Some give to pressure & rebound, others form 'dents'
- Pores do not react, some osculum extensions can retract a bit





Sponge

Polymastia pacifica (= *pachymastia*)

Aggregated fingers with osculae on top, can cover areas up to 3 m diameter



Sponge

Polymastia pacifica (= *pachymastia*)

Osculum of this species can contract

Sponge

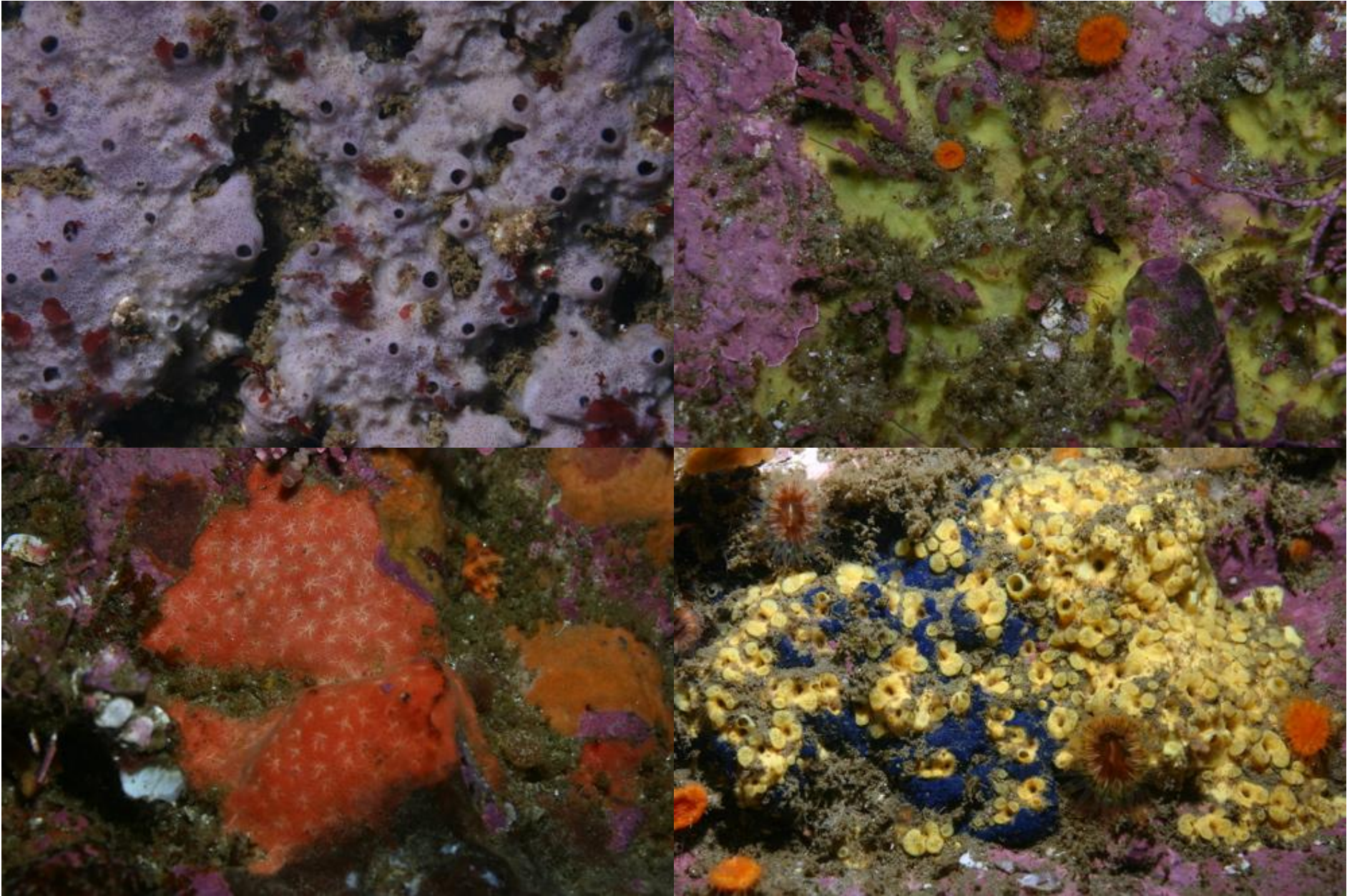
Polymastia pacifica (=pachymastia)





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Sponge
Polymastia pacifica (=pachymastia)



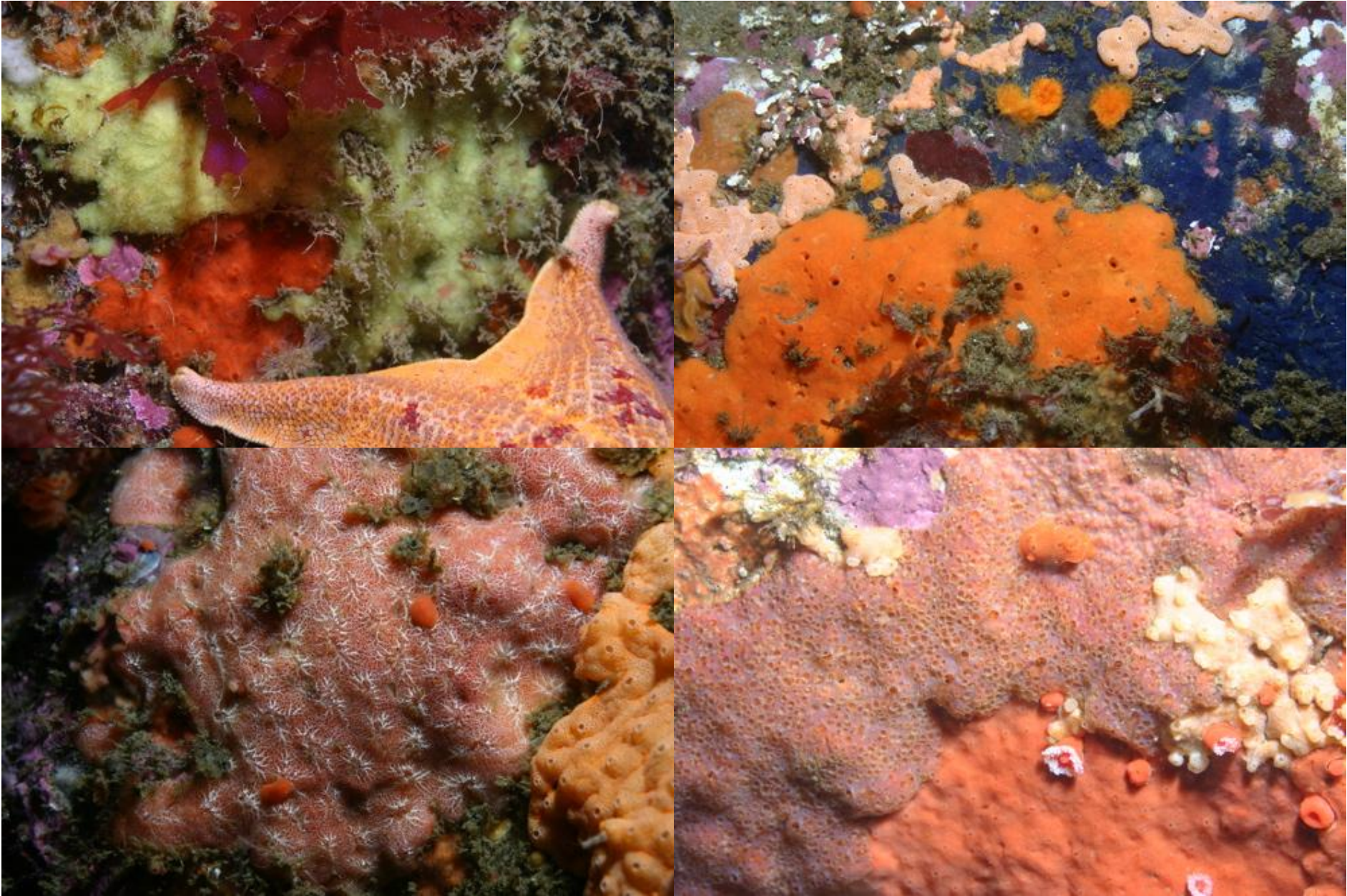
Sponge

Sheets, clumps, balls, or fingers; often rough, spongy



Sponge

Sheets, clumps, balls, or fingers; often rough, spongy



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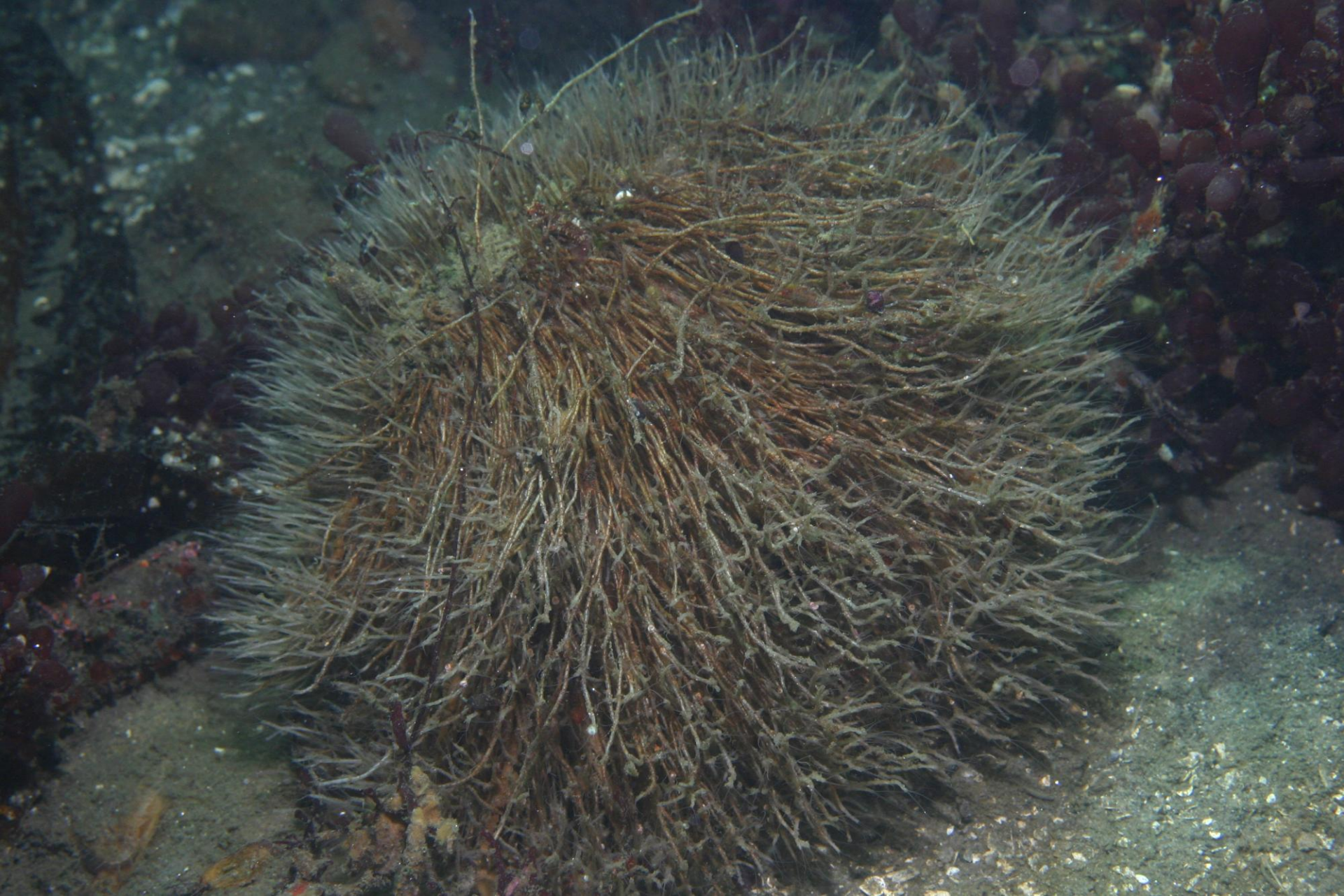
Sponge

Sheets, clumps, balls, or fingers; often rough, spongy

WRITE INS



Mussels



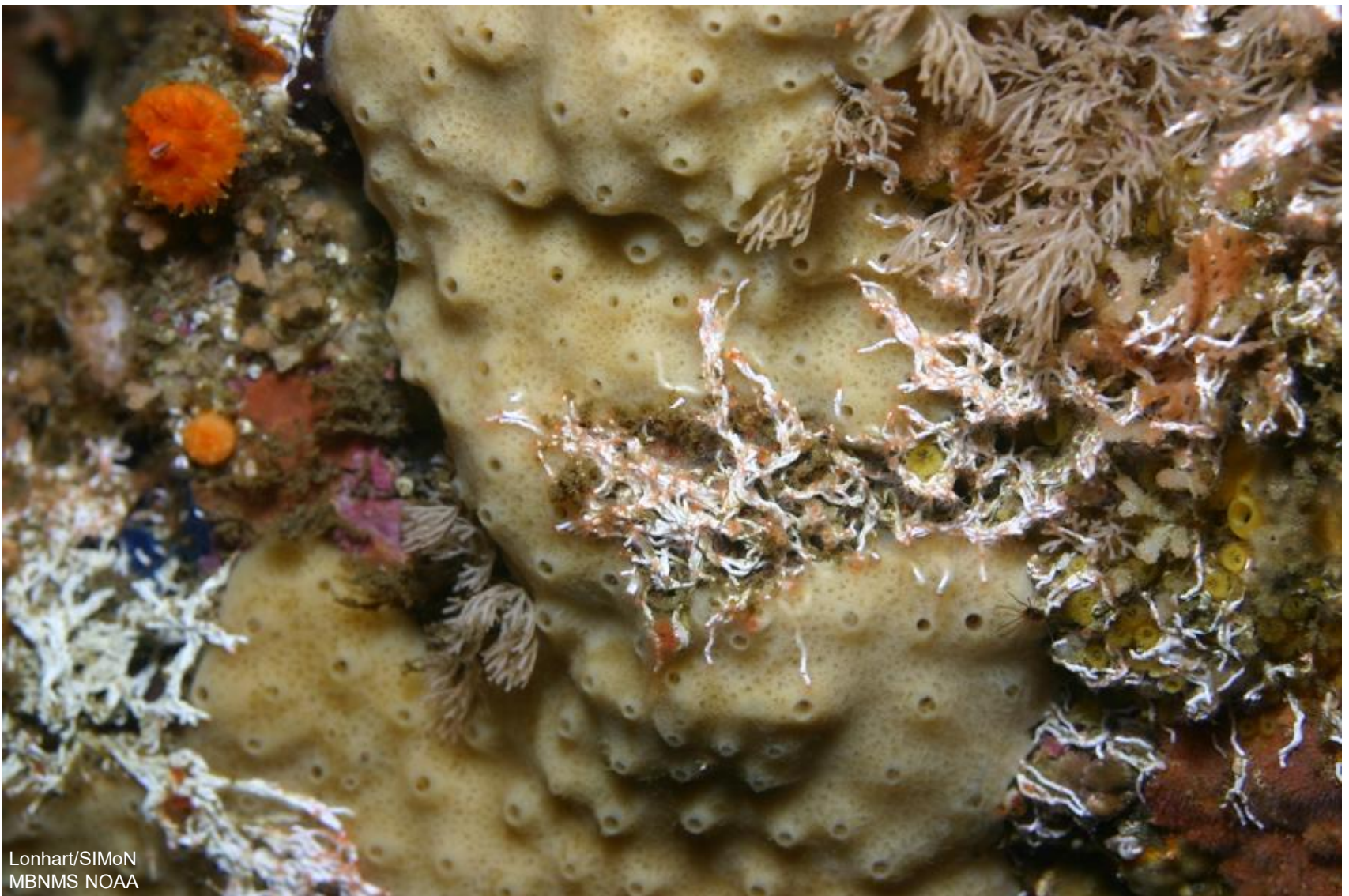
Tube Mat

Probably *Phyllochaetopterus prolifica*, which forms large tube mats



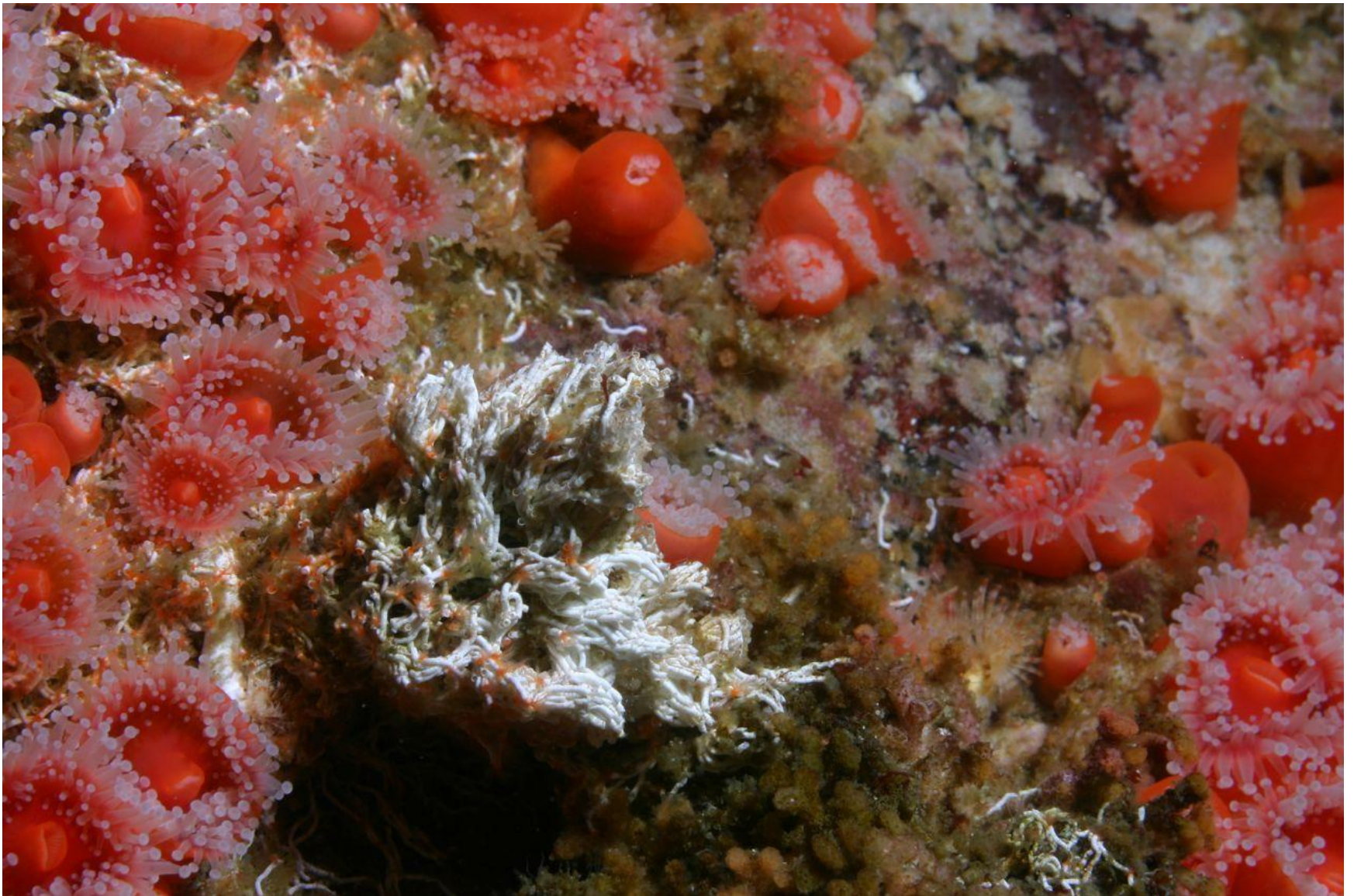
Tube Mat

Probably *Phyllochaetopterus prolifica*, which forms large tube mats



Salmacina tribranchiata

Calcareous tubeworm, very fragile white tubes with bright orange tentacles

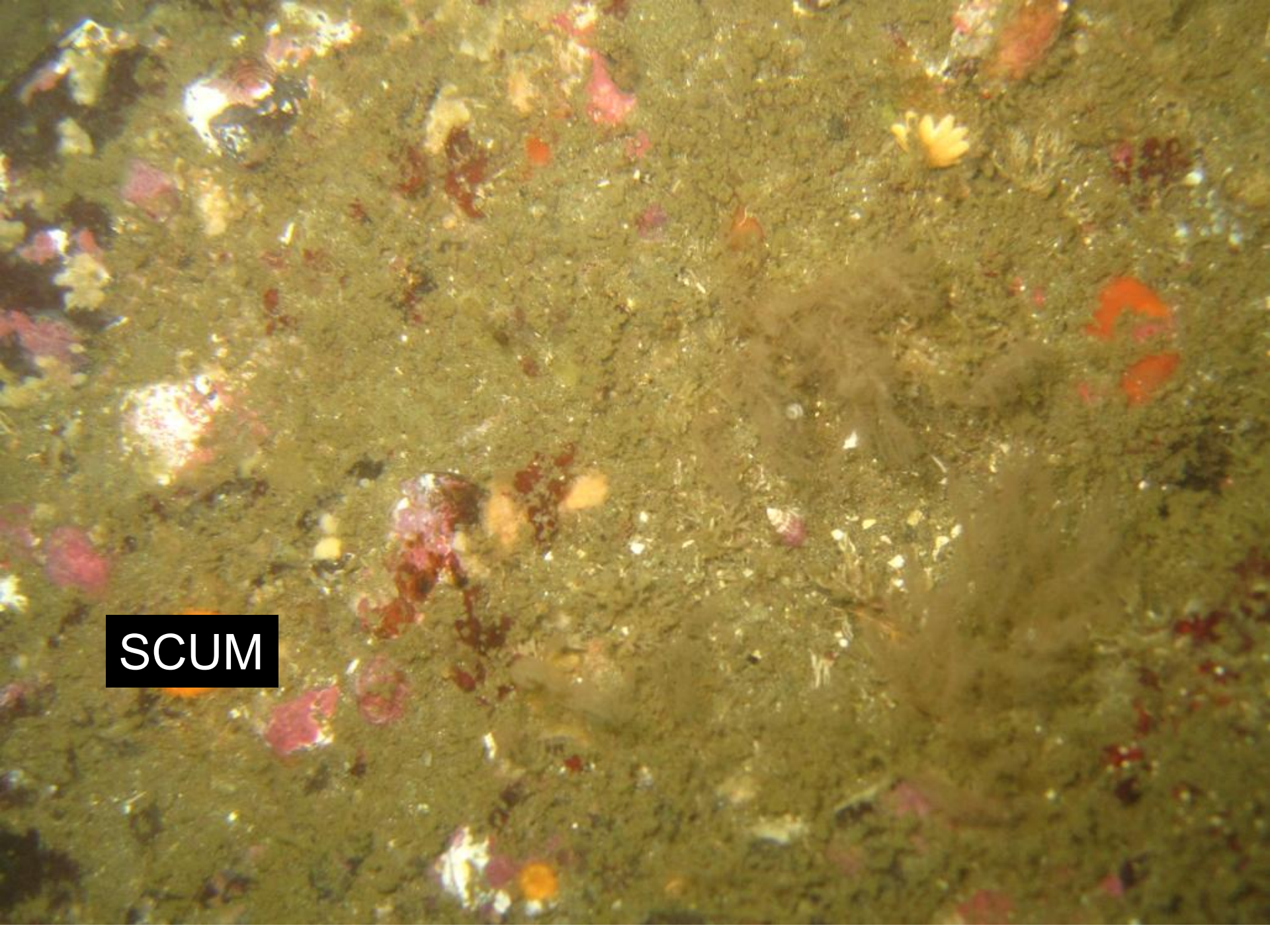


Salmacina tribranchiata

Calcareous tubeworm, very fragile white tubes with bright orange tentacles

SCUM

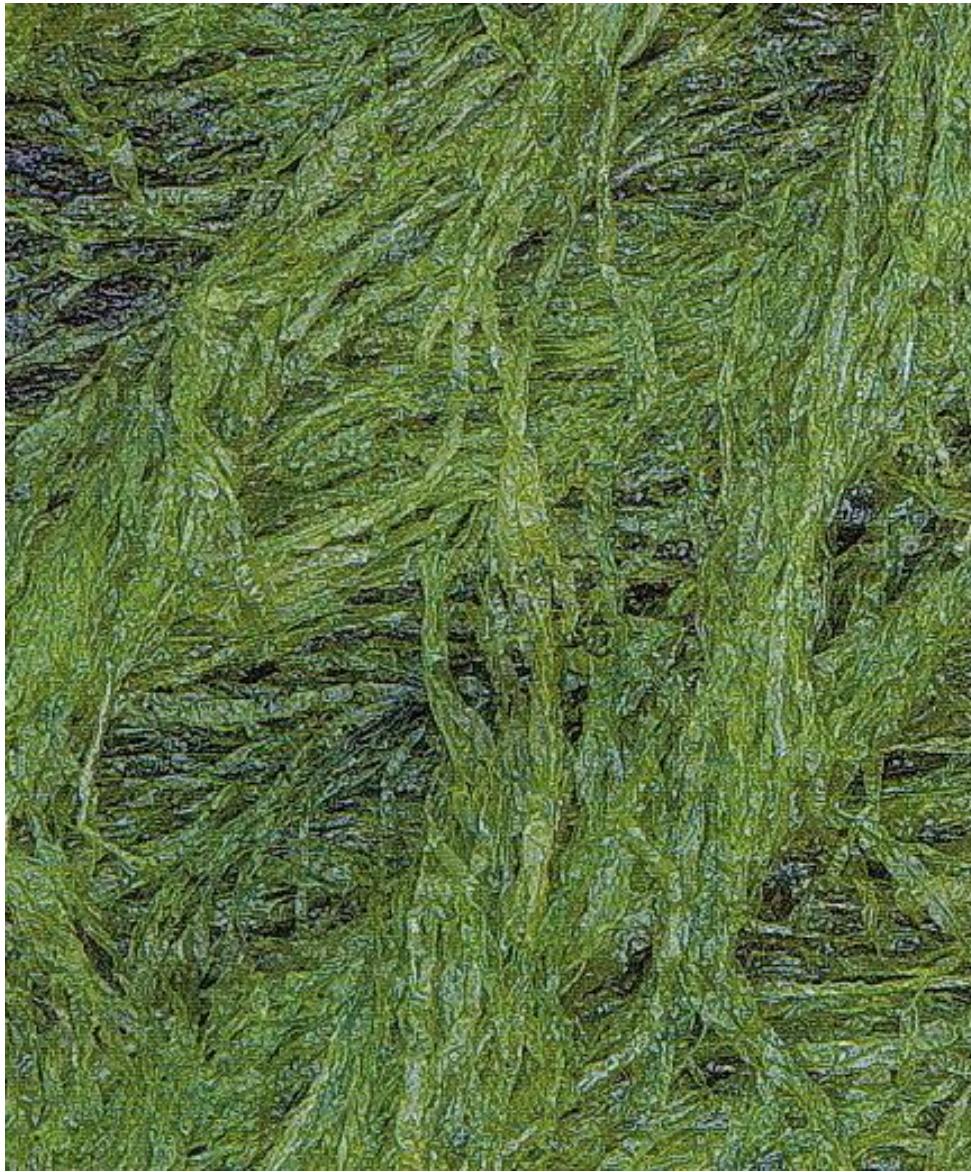


An underwater photograph showing a rocky seabed covered in a dense layer of greenish-brown algae or silt. Scattered throughout the scene are various marine organisms, including small red and orange crustaceans, yellowish starfish or brittle stars, and some larger, more complex structures that could be coral or specialized sponges. The lighting is somewhat dim, typical of an underwater environment.

SCUM



***Phyllospadix* spp. (Surf Grass)**



Green Algae
Ulva spp.



Green Alga
Codium setchellii



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Green Alga



Lonhart/SIMoN
MBNMS NOAA

Green Alga



Undaria pinnatifida



Sargassum horneri



Sargassum horneri

Sargassum muticum (Yendo) Fensholt, 1955

Wireweed



Concarneau Bay, France, sea surface, 2008, WBN