

Background - This lab will provide you with an opportunity to explore the variety of life living on the wharf posts or pilings in Monterey Bay, and to appreciate the diversity exhibited by marine organisms. Despite its name, the marine community called piling moss is actually the product of tubeworms, a marine annelid worm, rather than plants. Piling moss consists of thousands of slender flexible tubes secreted by *Phyllocaetopterus prolifica*, a polychaete worm that measures 1 mm in diameter and up to 15 cm in length. Their tubes, intertwined at the base and encrusted with sand, provide a stable refuge for a variety of marine life in shallow water up to 3 meters in depth.

Instructions - Separate a small clump of piling moss, and place it on a tray or dish of seawater. Working with a small group of other students, carefully dissect and examine your sample for living organisms. You may want to use a dissecting microscope for closer inspection. Carefully examine the surface of the larger animals and you may discover additional organisms living there as commensals or parasites.

1. **Sketch** - On the worksheet, sketch a simplified 'cartoon' of the different animals observed and estimate their relative abundance during the entire lab session.

2. **Phylum & Species** - As you locate each animal, try to identify the phylum and the species that it belongs to. Though we may not have studied all of these organisms, refer to the descriptions below and try to match them up with the correct classification. For most of these organisms, only scientific names are provided since there may not be any common names in existence -- these marine organisms are too small to attract much attention from the general public.

3. **Observations** - You should inspect each specimen for any obvious adaptations that help them to feed and survive in their environment. Consider how they solve the fundamental challenges of biological existence: obtaining food, oxygen, and shelter, avoiding predation and the elements, and competing with other animals. Even if you don't actually observe them eat or interact with one another, their anatomical structures should provide sufficient clues for you to deduce their functions.

PHYLUM	SPECIES*	DESCRIPTION
•• RADIALLY SYMMETRIC WITH NO HEAD ••		
CNIDARIA		
stumpy	sea anemone (<i>Corynactis californica</i>)	Strawberry Anemone, red with knobby white tentacles
plant-like	hydroid colony (<i>Clytia</i>)	straight white stalks, clumped on shells
	hydroid colony (<i>Obelia</i>)	branched yellow-green stalks, clumped on shells
	hydroid colony (<i>Syncoryne mirabilis</i>)	branched orange-pink stalks, knobby tentacles
ECTOPROCTA		
plant-like	entoproct colony (<i>Bugula</i>)	bushy whorled stalks, red-brown to purple-brown
ECHINODERMATA		
5-arms	seastar (<i>Patiria miniata</i>)	five thick arms with fleshy webbing, orange
	brittle star (<i>Ophiothrix spiculata</i>)	five slender arms with irregular spines
	brittle star (<i>Ophiopertis papillosa</i>)	five slender arms with thick lateral spines
globe-like	sea urchin (<i>Strongylocentrotus purpuratus</i>)	Purple Sea Urchin, long purple spines, no arms
CHORDATA		
lumpy	tunicate (<i>Ascidia</i> or <i>Molgula</i>)	tough clear white, two small holes
	tunicate (<i>Styela truncata</i>)	tough orange-brown, two red spouts

• • WORM-LIKE • •

NEMERTEA		
long flat	ribbon worm (Cerebratulus or Micrura)	ribbon-like with rounded head & tail
SIPUNCULIDA		
short plump	peanut worm (Phascolosoma agassizii)	yellow-brown peanut-like with tentacles at mouth
ANNELIDA		
short-segmented	scale worm (Halosynedna brevisetosa) scale worm (Arctonoe)	pairs of round scales along back cream-brown, 2 rows of brown spots on back
long-segmented	bristleworm (Arabella iricolor) bristleworm (Nereis) bristleworm (Anatides mucosa) bristleworm (Dorvillea moniloceras)	red-brown segments, no parapodia (fins) yellow-green segments with spiky parapodia blue segments with long parapodia red body with contrasting white parapodia
tubed	tubeworm (Phyllocaetopterus prolifica) tubeworm (Myxicola) tubeworm (Serpula)	the worms that produced the piling moss tubes long white with crown of furry tentacles Plume Worm, red tentacles, twisted calcium tube
MOLLUSCA		
slug-like	nudibranch (Archidoris) nudibranch (Cadlina)	Dorid, white-yellow with rough texture all over back Little Cask, white with distinct yellow bumps on back
ECHINODERMATA		
pickle-like	sea cucumber (Cucumaria) sea cucumber (Eupentacta quinquesemita)	smooth or bumpy with bushy tentacles at mouth white with yellow projections & orange tentacles

• • SHELLED • •

MOLLUSCA		
coiled shell	snail (Haminoea) snail (Bittium) snail (Urosalpinx)	White Bubble Snail, smooth roundish brown shell long yellow-brown shell, shallow furrow between coils Oyster Drill, long yellow-brown shell with ridges
cone shell	limpet (Diodora) limpet (Megatebennus bimaculatus)	Rough Keyhole Limpet, small hole at off-center apex Keyhole Limpet, large oval hole at central apex
2-shell	bivalve - clam (Saxicava) bivalve - mussel (Modiolus) bivalve - scallop (Hinnites) bivalve - scallop (Pecten hercicus)	long white shell with fleshy tubes extended Horse Mussel, long dirty brown shell, whitish hinge Rock Scallop, thick brown shell with ribs thin yellow-brown shell with ribs
8-shell	chiton (Callistochiton crassicosatus)	eight brown shell plates, deep furrows between plates

• • JOINTED EXOSKELETON • •

ARTHROPODA		
volcano-like	barnacle (Balanus)	Acorn Barnacle, white volcano-like shell
narrow	shrimp (Betaeus harfordi) shrimp (Alpheus clamator) shrimp (Crangon) shrimp (Hippolyte) shrimp (Spirontocaris palpator)	Abalone Shrimp, red-brown with large claws Pistol Shrimp, brown, large spotted claws, snapping tail Bay Shrimp, brown with small claws Grass Shrimp, green with small claws Broken-back Shrimp, green-brown with hump on back
wide	crab (Cancer jordanii) crab (Lophopanopeus bellus) crab (Scyra acutifrons) crab (Mimulus) crab (Pugettia) crab (Loxorhynchus crispatus) hermit crab (Paguristes)	Hairy Rock Crab, red-brown resembling edible variety Black-clawed Crab, mottled brown with black claws Sharp-nose Crab, mottled brown, extra-long snout Kelp Crab, green-brown shield-like, blunt spines Kelp Crab, brown shield-like shell with sharp spines Masking Spider Crab, covered with algae etc. lives in empty snail shell, bumpy claws

* This list includes most of the invertebrate organisms previously found in piling moss from Monterey Bay, as identified by the Sea Life Supply Company in Sand City.

Abundance: rare 1-2 uncommon less than 10 common up to 50 abundant over 50

SKETCH	CLASSIFICATION	OBSERVATIONS
1	Phylum: Species:	feeding or adaptation: abundance:
2	Phylum: Species:	feeding or adaptation: abundance:
3	Phylum: Species:	feeding or adaptation: abundance:
4	Phylum: Species:	feeding or adaptation: abundance:
5	Phylum: Species:	feeding or adaptation: abundance:
6	Phylum: Species:	feeding or adaptation: abundance:
7	Phylum: Species:	feeding or adaptation: abundance:
8	Phylum: Species:	feeding or adaptation: abundance:

MORE SPACE ON BACK OF THIS SHEET. TURN THIS IN AT THE END OF CLASS.

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SKETCH	CLASSIFICATION	OBSERVATIONS
9	Phylum:	feeding or adaptation:
	Species:	abundance:
10	Phylum:	feeding or adaptation:
	Species:	abundance:
11	Phylum:	feeding or adaptation:
	Species:	abundance:
12	Phylum:	feeding or adaptation:
	Species:	abundance:
13	Phylum:	feeding or adaptation:
	Species:	abundance:
14	Phylum:	feeding or adaptation:
	Species:	abundance:
15	Phylum:	feeding or adaptation:
	Species:	abundance:
16	Phylum:	feeding or adaptation:
	Species:	abundance:
17	Phylum:	feeding or adaptation:
	Species:	abundance:

