The Intertidal Zone and Benthic Organisms

- **The Intertidal zone (Littoral zone):**

It is the area of the shore-line lying between the low tide and high tide marks. It is exposed to air at low tide and covered with water at high tide.

Intertidal zone can be found on sandy beaches or rocky shores. The rocky intertidal areas are the most diverse and highly populated.

- **The intertidal** is subdivided into four vertical zones, which are:

1. Supra-tidal or Spray zone.
2. Upper intertidal zone.
3. Middle intertidal zone.
4. Lower intertidal zone.

The Sub-tidal (Sub-littoral) zone is permanently submerged.

Rocky intertidal area:

(Photo taken at low tide)

Supra-tidal zone

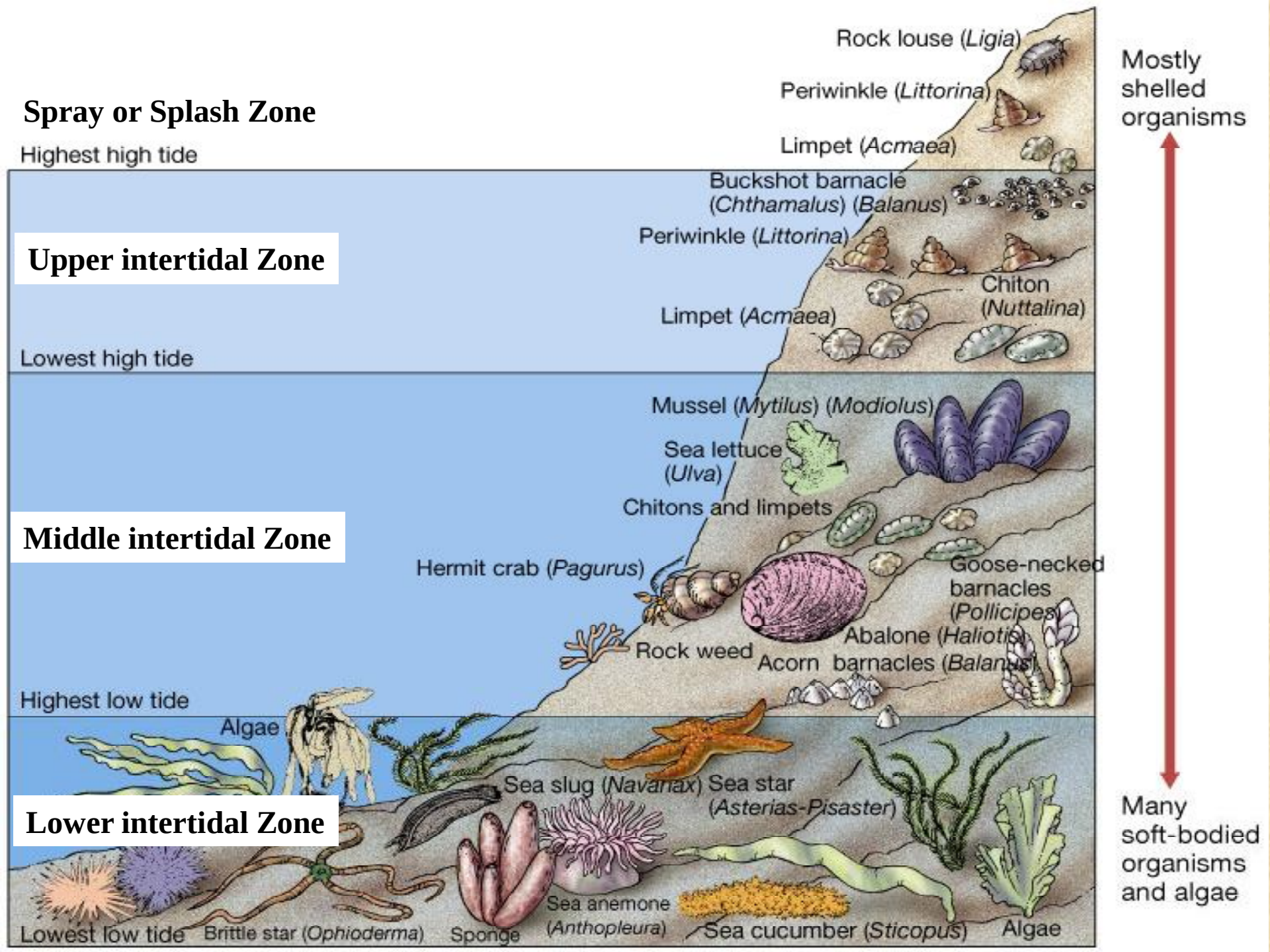
(Splash zone)

Upper intertidal zone

Middle intertidal zone

Lower intertidal zone

Sub-tidal zone


Spray or Splash Zone
Highest high tide
Rock louse (Ligia)
Periwinkle (Littorina)
Limpet (Acmaea)
Upper intertidal Zone
Buckshot barnacle (Chthamalus) (Balanus)
Periwinkle (Littorina)
Chiton (Nuttalina)
Limpet (Acmaea)
Lowest high tide
Mussel (Mytilus) (Modiolus)
Sea lettuce (Ulva)
Chitons and limpets
Middle intertidal Zone
Hermit crab (Pagurus)
Goose-necked barnacles (Pollicipes)
Abalone (Haliotis)
Rock weed
Acorn barnacles (Balanus)
Highest low tide
Algae
Sea slug (Navanax)
Sea star (Asterias-Pisaster)
Lower intertidal Zone
Sea anemone (Anthopleura)
Lowest low tide
Brittle star (Ophioderma)
Sponge
Sea cucumber (Sticopus)
Algae
Mostly shelled organisms
Many soft-bodied organisms and algae

The lowest levels of the Intertidal Zone are the most crowded with life.

While, the higher dryer levels are less populated.

Rocky tide pool

(At low tide)

Sandy tide pool - Wet-land habitat

Wet land habitat

Lower intertidal zone at high tide

High tide

Low tide


Low tide


High tide

Artificial tide pool

Physical conditions affecting organisms in the Intertidal areas:

1. **Waves**:

Bring nutrients and moisture but can remove organisms off the substrate.

2. **Exposure time to air:**

If it is high, organisms will lose water (desiccate, dehydrate) and die.

3. **Fast change from water to air temperature**:

Temperature changes very fast above water (in air).

4. **Type of substrate:**

Supports different organisms at various degrees (sand or rock).

5. **Available space:**

For organisms to live in.

Biological interaction in the intertidal areas:

1. Predation:

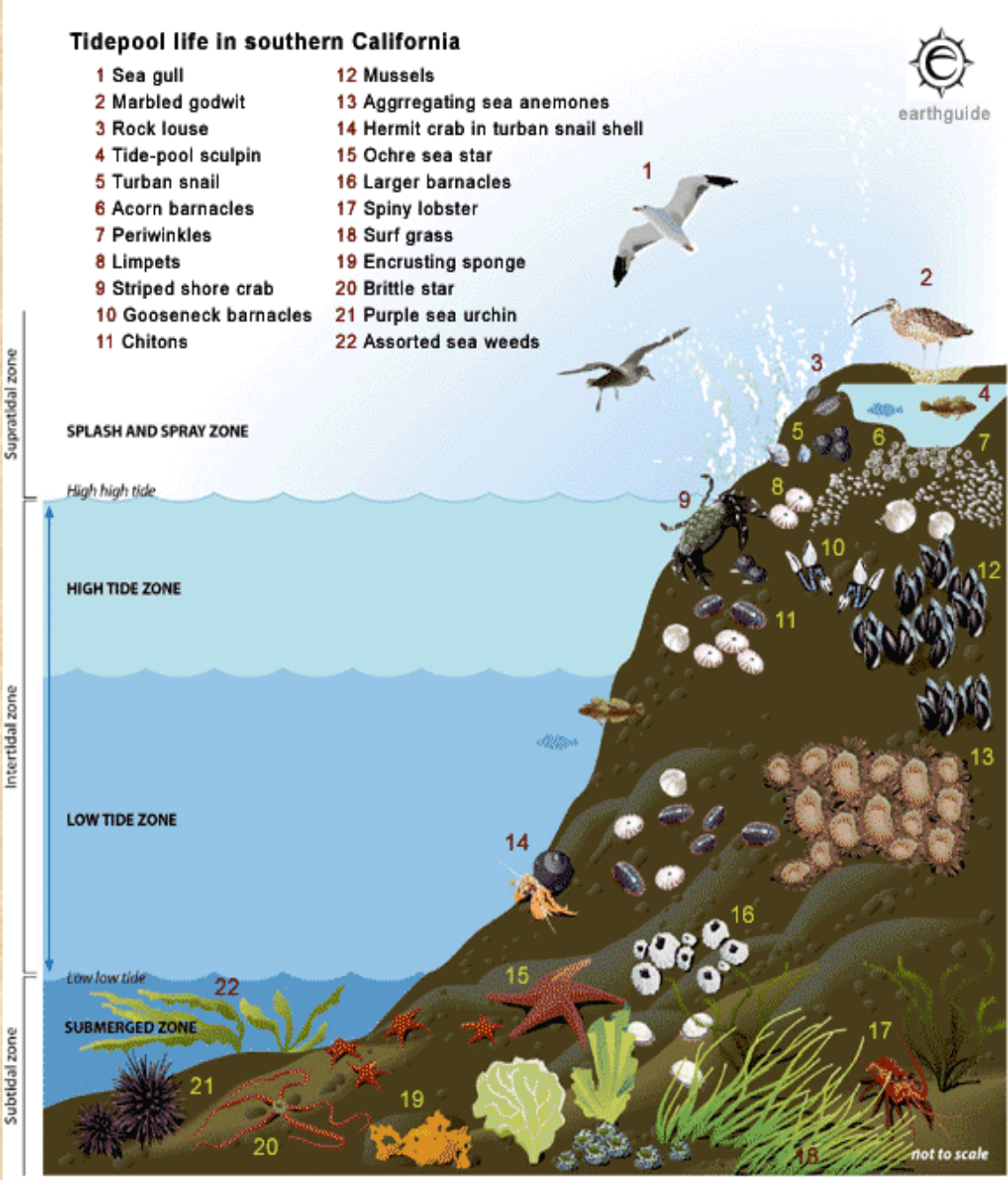
Organisms will be exposed to terrestrial predators.

2. Competition:

For food, shelter and mates.

3. Adaptation:

Physiological and morphological adaptations to be adapted to these hard physical conditions.



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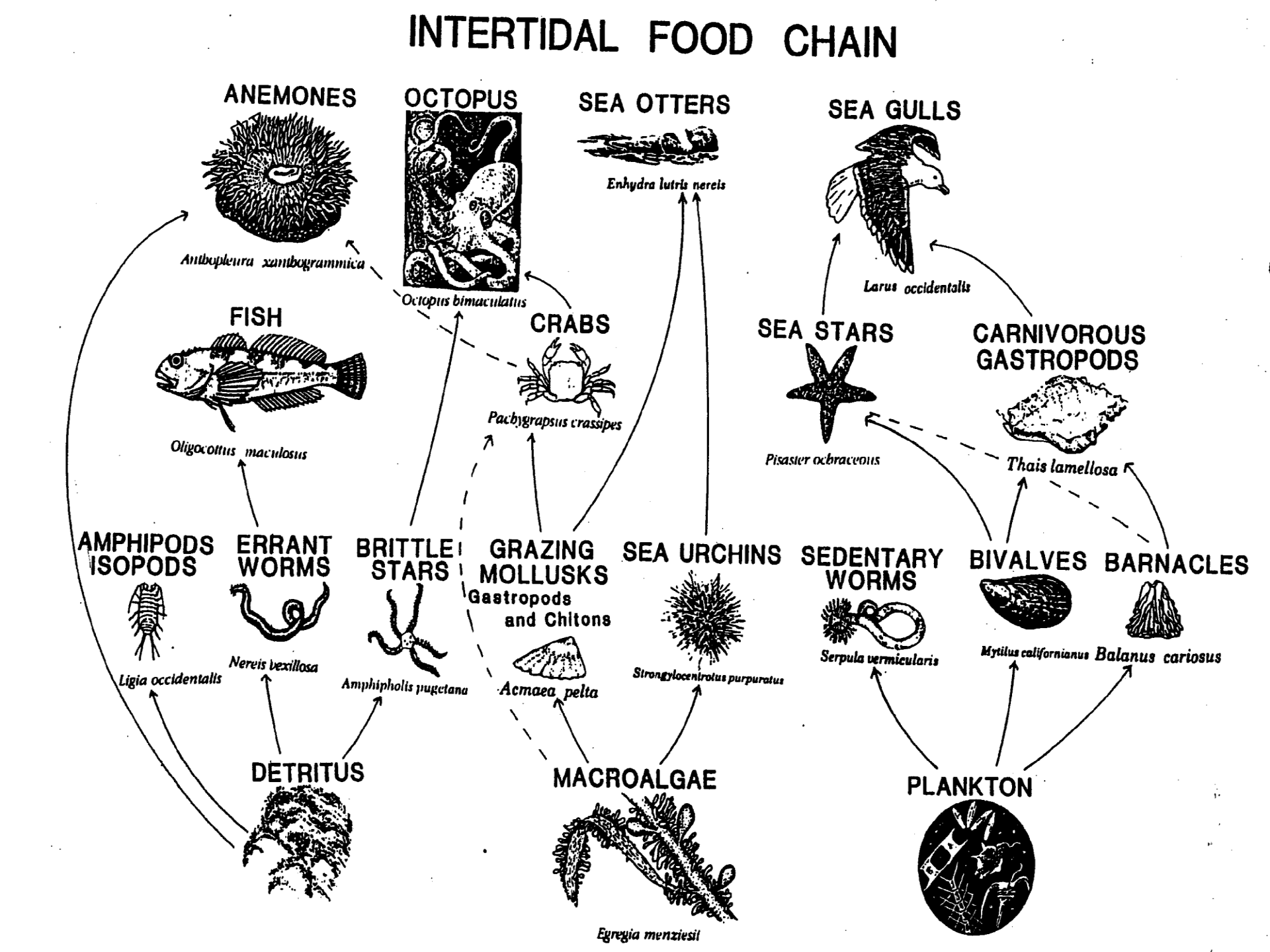
INTERTIDAL FOOD CHAIN



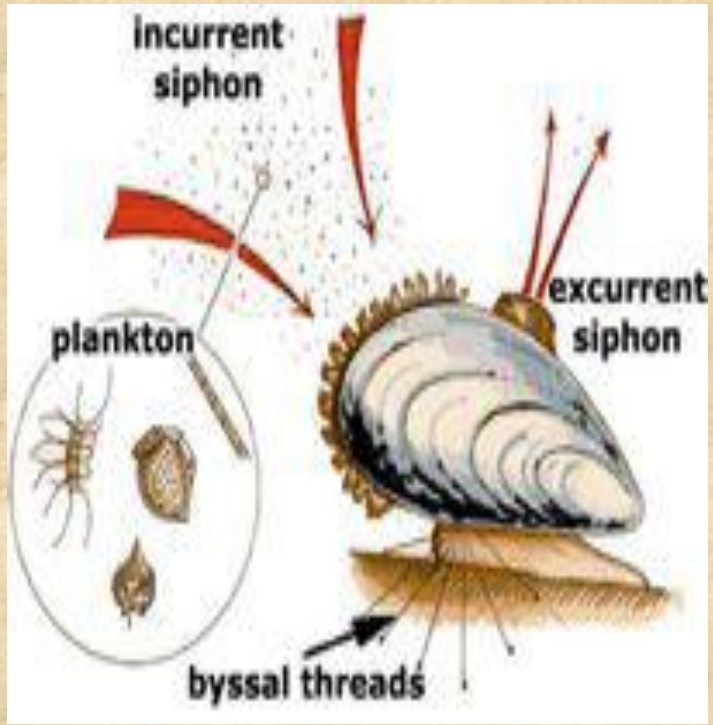
Common intertidal organisms and their adaptation

- **Snails**:

- Have large shell volume which give more space for water storage.
- This adaptation help snails to resist desiccation, thus most snails live in the upper intertidal zone.

- **<u>Mussels</u>:**

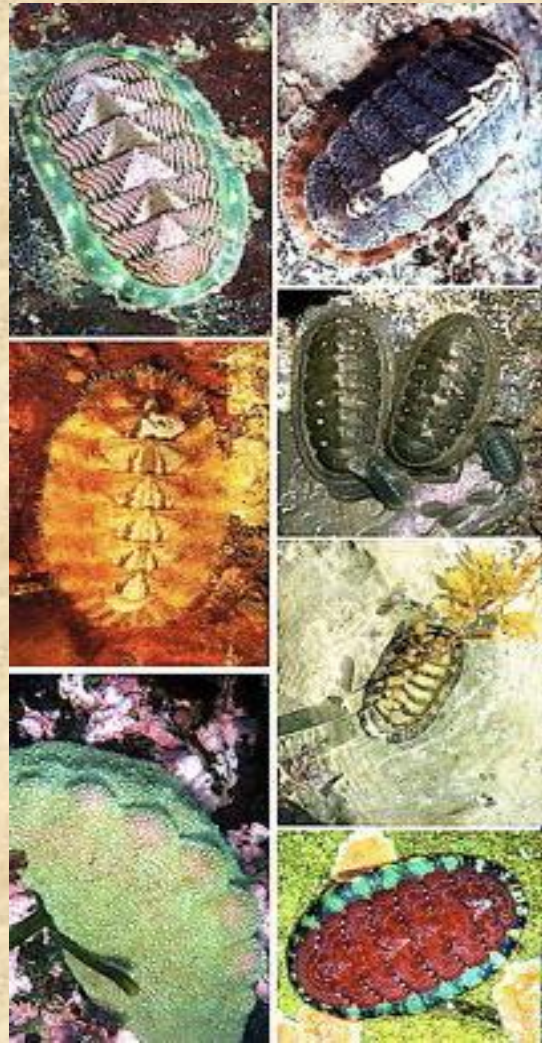
- Benthic, non-motile (Sessile) organisms.
- Open when submerged (present under water) to feed on planktons.
- Close at low tide to prevent desiccation (dehydration).



- **<u>Limpets and Chitons</u>**:

- Mobile grazers that feed on algae when submerged (present under water).

- Clamp down to the substrate at low tide to prevent desiccation (dehydration).



- **Crabs**:

- Store water in gill chambers and can move to concealed areas (tide pools or crevices) or into the water if necessary.

Hermit crab (not a true Crab)

Ghost crab

- **<u>Echinoderms</u>**: (Starfish and sea urchins)

- Feed on clams and mussels.

- At low tide, move into tide pools to avoid desiccation.