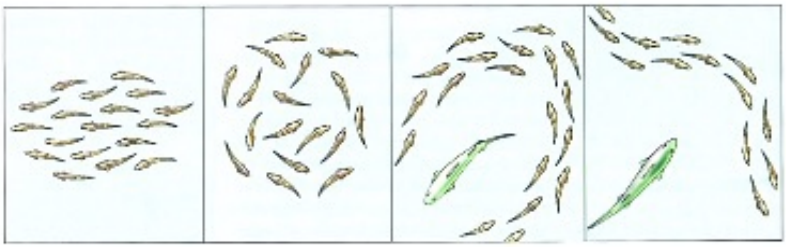
schooling
- very common in nektonic fish
- some fish full time, others part time
- most elasmobranchs solidarity
- herring schools up to 5000million m3
- well coordinated bt not led
  - dont have leader
- distance between fish fairly constant
- vision important but not always essential
- recognisable patterns formed
- travelling feeding encircling streaming
- benefits:
  - confuse predators
  - confuse prey
  - hydrodynamics
  - reproduction



ecology of nekton
- all nekton predators
- most prey on other nekton
- plankton feeders primary fed on zooplankton
- includes sardeens, salmon and baleen whales
- size of predators and prey are related
- most nekton predators generalist
- prey may vary with season and location
- algae support food web

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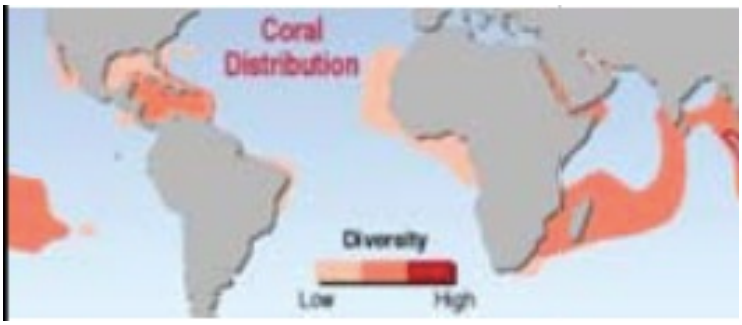
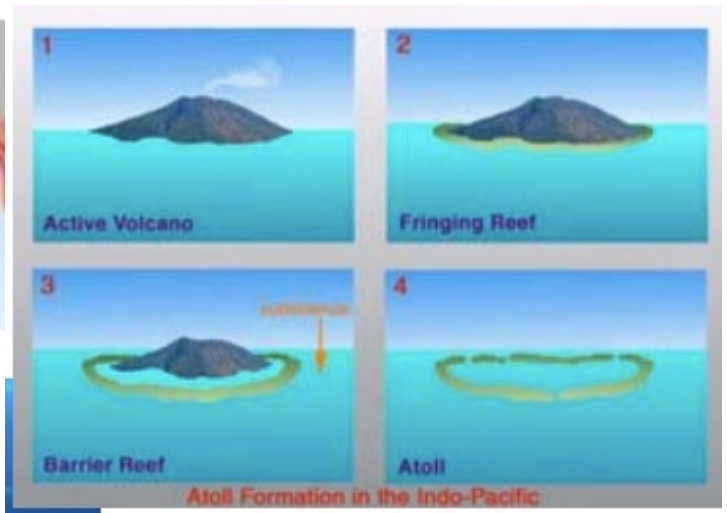
lecture 19 - coral reefs

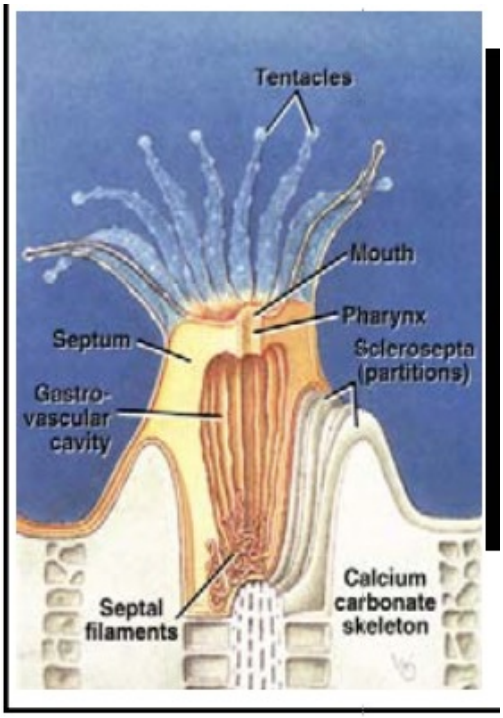
world map
- in our areas = highest diversity
- limited to equatorial regions
- distribution is determined by
  - temperature >18C
    - corals can grow, however cant grow quickly enough to form reefs
  - depth
    - tend to be in shallow water - related to light - photosynthetic algae is how coral reefs grow
  - salinity
    - e.g. near outlet of amazon river cant grow as too much freshwater
  - light
    - photosynthesis of algae
  - sedimentation
    - sediment increases near outlet of rivers, which increases turbidity which reduces light penetration
  - emergence
    - cant grow above low tide mark





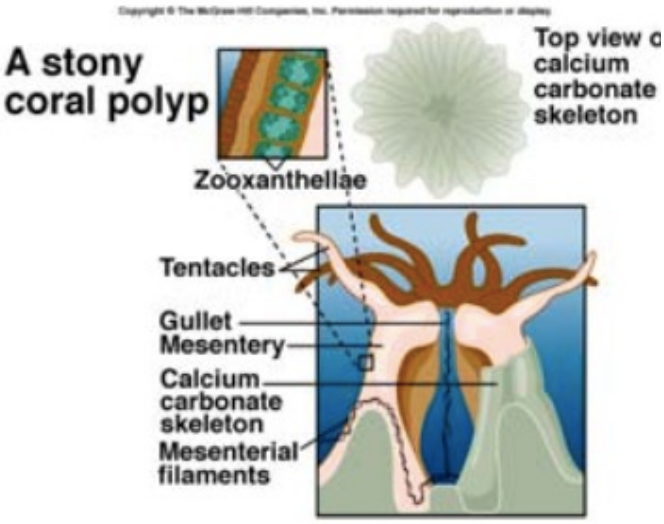
formation
- hermatypic corals - form reefs
- ahermatypic corals - dont form reefs
- shelf reefs
- barrier reefs - form continuous chain along continental shelf (100km or more along coastline)
- atoll - comes from underwater volcanoes - grows on edge of volcano - ring where original structure has disappeared in the middle
- island formation
  - reef form - as wind and waves carry sediment which accumulates on one end of reef - over time island forms
  - once sand becomes exposed at high tide - birds land drop seeds etc so plants established.

reef structure
- base of coral reef - up to 150m depth (no coral at that depth)
- as come up reef slope, transition zone 50-20m = delicate corals (at that depth don't get wave action etc.)
- stronger more heavy corals are more favoured as go up more as more waves hit slope
- crest forms, reef flat up to island (reef flat is sheltered)
- types of corals has to do with depth and level of disturbance



coral polyps
- basis of reef formation, but not all do
- colony increases by asexual cloning
- polyp bailout - polyp can leave colony - success rate is low
- algae lives inside it - where it gets its colour - symbiosis
- predatory animals with stinging tentacles - come out at night to hunt
- cnidarians - catch planktonic prey
- how do they form reef?
  - asexual reproduction
  - larvae settles and begins to grow
    - start to bud and clone themselves
    - as grows lays down skeleton for new coral to grow on
    - inner part is calcium carbonate - not living

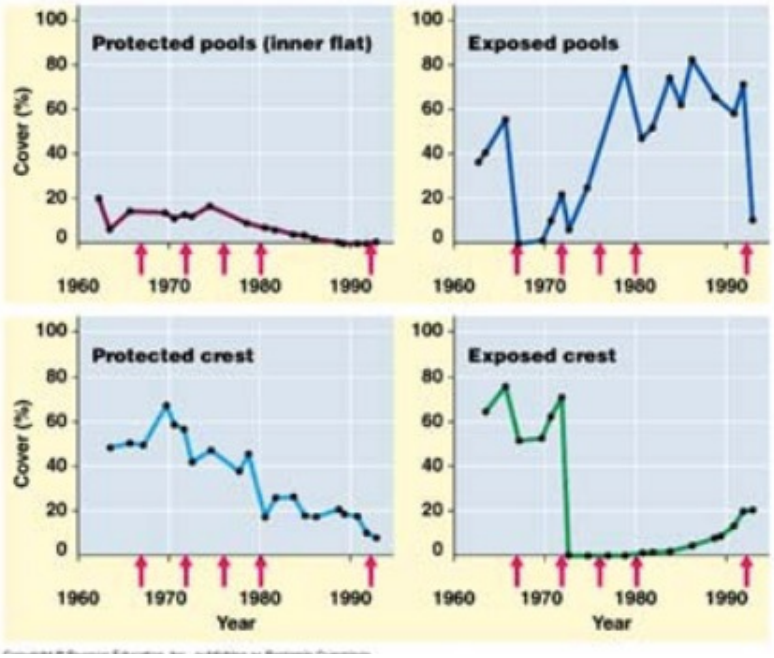
- structure of polyps
  - joined to next polyp by thin layer of tissue
  - white area in photo is calcium carbonate skeleton - forms structure on which it sits - over time gets larger and larger and forms reef



zooxanthellae
- mutualistic relationship
  - both partners benefit
  - coral gets energy, algae gets safe environment
- >90% of energy for coral from algae
- coral can survive without algae
  - but more difficult as loses most energy
- not fond in ahermatypic corals
  - large reason why cant grow fast enough to form reefs
- lives in the outer tissues
  - sunlight penetrates outer tissue and used by algae which creates energy for coral
- coral bleaching - when algae are killed and expelled by coral polyp
- coral types
  - shape and colour greatly change with light and depth
  - wave disturbance = strong coral and fast growing
  - fragile corals grow in low turbidity areas

coral spawning
- most common method
- sexual - tied after spring full moon
- egg and sperm packets
- synchronous
- free swimming planula larvae
- fish tend to eat the gametes
- forms slick - high mortality or failed fertilisation - settling rates is very low

competition
- why success rate for forming colony is low:
- intense competition for space and resources
  - competing with each other for access to food and light
  - plate coral - grows out at the margin - catches most sunlight however, shades underneath coral so cant grow
  - current = more food
- exploitative
  - exploiting resources - plate coral
- interference
  - actively fight each other
  - corals grow on top of each other
  - put out tentacles at night and try to sting each other to death
  - if conditions favour one over another then one will be successful
  - however if no favour, then they will remain fairly constant



effect of storm disturbance
- catastrophic mortality maintains high species diversity
- if protected pools - coral are slower growing and slow to recover - frequent disturbances = wiped out
- exposed areas are more likely to have species that are faster growing and quicker to cover

coral bleaching
- at high water temps algae are expelled
  - algae switch to produce something else rather than energy - so therefore energetically unfavourable to coral - last ditch effort to survive
- can result in massive coral death
- problem - when high temperatures prevent algae from re-establishing
- can be as little as a few days of high temps

previous lecture notes
why echolocation is not more widespread amongst nekton
- most don't have complex enough brains to process
- generation of sound gives away location of animal generating it - biggest animals are the ones who generate it - who don't have as many predators
  - e.g. if you are a fish - you will give away your position to all predators