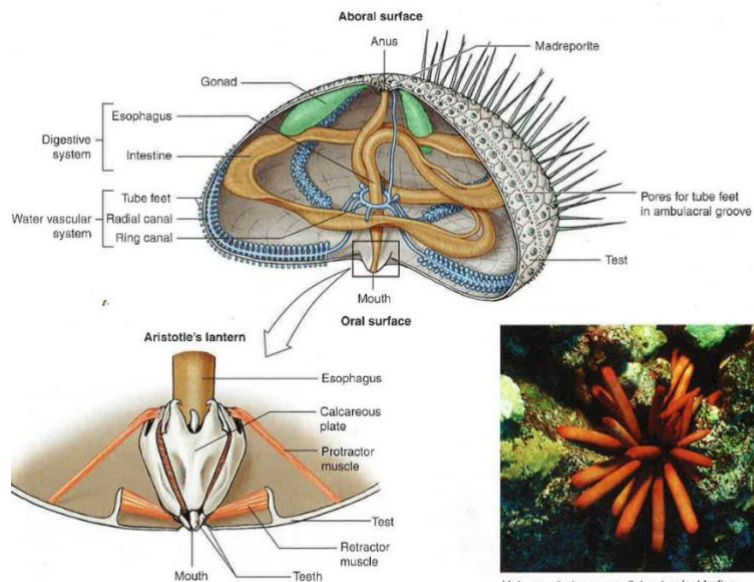
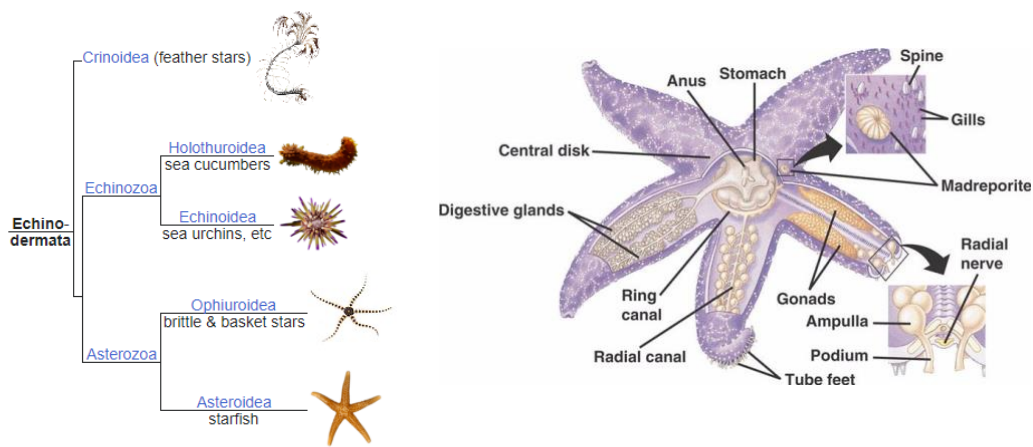


General recommendations for Echinodermata Phylum

Within **Echinodermata** adults are recognizable by their (usually five-point) radial symmetry and include starfish (**Asteroidea**), brittle stars (**Ophiuroidea**), sea urchins (**Echinoidea**), sand dollars (**Clypeasteroidea**) and sea cucumbers (**Holothuroidea**), as well as the sea lilies or "stone lilies" (**Crinoidea**).



Heterocentrotus mammillatus, tropical Indian and Pacific Ocean.

Sampling

After collection (manually, dredge/trawl, brushing), specimens are maintained in ambient seawater containers. At this step, specimens are identified with:

- sampling date
- station number
- name species / taxon
- "GENOME" label (to indicate that this specimen will follow the ATLASea cold chain)

After dredging and trawling, Ophiuroidea may be in poor condition. They should be processed quickly.

Photography

Ideally, images should be taken in the highest quality resolution (macro lens recommended) and where no voucher specimen parts are retained the pictures will serve as voucher and should include identifying features.

Specimen can be photographed on the support (Asteroidea and Ophiuroidea), do it quickly and put the specimen back in water between each photo. Otherwise, take the picture in a glass container.

Water should be clean and changed between each specimen.

If possible, discuss with the taxonomist to find out the important morphological elements to see, and therefore to photograph.

Take picture of boral and aboral face.

Take closer look of interesting parts or pattern.

With the specimen, one picture is taken with a **scale**, the **code identifier** (e.g. ATLASea QR code, specimen **MNHN-IE** barcode) and the station label.

Dissection for DNA barcoding and Genome Sequencing

1. Rinse and brush specimen in filtered sea water (FSW).
2. **Avoid stomach and intestine.** Recommended tissues are listed below.
3. Dissect at least **10 pieces** (approx. **300-500 mg** each). Cut each piece into smaller before putting them in separate tubes (with unique identification labels).
4. Ensure that all tissues from the same individual are correctly identified on the log sheet.
5. Weight the tubes and scan the barcode on the log sheet.
6. Tubes should be flash-frozen in a liquid nitrogen charged dry shipper and stored in a -80°C freezer.

Recommended tissues to sample

Asteroidea

- **Arm or section of arm.** Dissect slightly away from the body to ensure the arrangement of arms can still be recognized, and leave at least one arm attached to the main body if leaving a **voucher**.
- Avoid any gonadal tissue (unless you can ensure it is unfertilized) and the central disk (stomach contents).

Ophiuroidea

- Whole sections of **arm** or gonad.

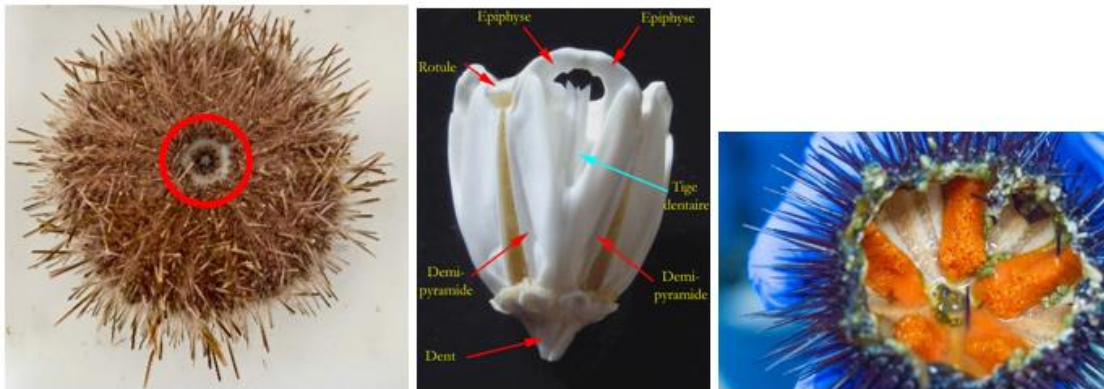
Crinoidea

- **Arms** or section of arm.

Echinoidea

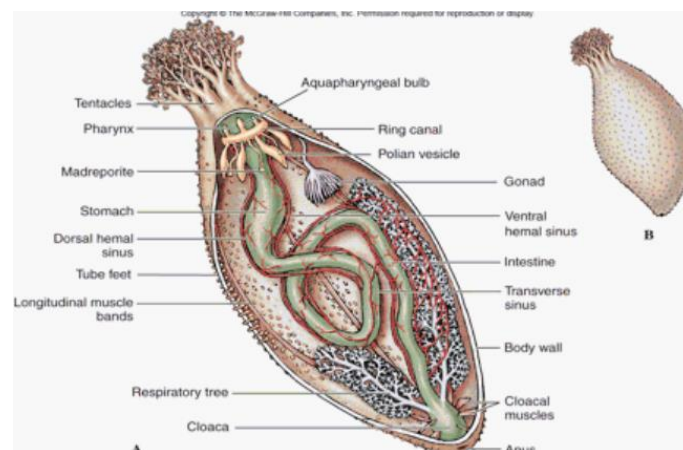
- **Muscles** from **Aristotles lantern**.

- **Gonads** (be sure the reproductive tissues are unfertilized)
- Sections of the test itself (minus spines if possible).



Holothuroidea

- Tentacle, retractor muscles, gonads, respiratory tree.



Backup/Biobanking:

1. Dissect at least 1 and up to 10 pieces in separate tubes (with unique identification labels).
2. 10 tubes by specimen.
3. Tubes should be flash-frozen in a liquid nitrogen.

Voucher & Taxonomic Assignment samples:

Voucher will be storage at MNHN.

1. Keep the leftover specimen, as many parts/tissues as possible or another individual from the same population and checked by a taxonomist as belonging to the same species.
 - For Asteroidea, Crinoidea, Ophiuroidea keep the oral part with one arm.
 - For Holothuroidea keep the tegument
 - For Echinoidea keep as many parts of the test as possible

2. Place the barcode **MNHN-IE** identifier and the station label with the specimen in tube/container.
3. Put 75-80% ethanol in the tube/container. There must be 10 times the volumes of specimen in alcohol.
4. Put the tube/container with the others specimens in the ATLASea barrels for shipment to the MNHN.