**Keys to the major groups**

**of marine invertebrates**

(modified for the Southeastern United States coast from a page created by Dave Cowles at <http://www.wallawalla.edu/academics/departments/biology/rosario/inverts/>)

Identification of marine invertebrates is divided here into three keys based on broad body plans:

**Key A, Key to Marine Invertebrates with Worm-shaped bodies,** includes organisms shaped like a round or flattened worm or slug; with a soft exterior (includes animals that may be living in a cemented, calcified, or chitinous tube and soft pelagic worms)

**Key B, to Marine Invertebrates with jointed exoskeletons (Arthropods),** includes organisms whose body is segmented and covered with an exoskeleton, with jointed legs

**Key C: Key to Marine Invertebrates without jointed exoskeletons, nor worm-like bodies,** includes other organisms not described in Key A or Key B.

Start from the beginning until you are very familiar with each key. The characteristics that describe a taxon in its final couplet are not a complete description. The complete description includes all the preceding couplet descriptions that have directly led to that final couplet.

A: Key to Marine Invertebrates with

Worm-shaped bodies

Shaped like a round or flattened worm or slug; with a soft exterior (includes animals that may be living in a cemented, calcified, or chitinous tube and soft pelagic worms)

**1a** Exterior is a leathery tunic with two openings, the incurrent (buccal) and excurrent (atrial) siphon. Permanently attached to a substrate………………………………………. …………..Phylum **Chordata,** Subphylum **Urochordata,** Class **Ascidiacea**

**1b** Not with a buccal and atrial siphon ………………………………………………………… **2**

**2a** Small, flattened, translucent, predatory pelagic (swimming or planktonic) worms with lateral fins and long setae for jaws………. ………………………...Phylum **Chaetognatha**

**2b** Not small, flattened predatory pelagic worms with lateral fins and long setae for jaws………**3**

**3a** Bodies are clearly segmented with repeating units………….. Phylum Annelida………. **4**

**3b** Bodies are not segmented with repeating units ……………………………………...………. **6**

**4a** Have parapodia on at least some body segments; parapodia usually have many bristly setae. May be free living, burrowing, or live in a tube……………. Class Polychaeta………**5**

**4b** Have no parapodia. Rounded worms with multiple segments and a few setae……………. ……………………………………………………………………..Class **Oligochaeta**

**5a** Large number of body segments, those of the head and posterior differing from the rest, with head appendages differentiated into palps, antennae, tentacular cirri, etc. Typically mobile predators; mouth has paired jaws (though maybe retracted)….…….. Subclass **Errantia**

**5b** Limited number of body segments separated into different regions. Anterior appendages may be absent or a few to many similar appendages. Usually filter or deposit feeders; no jaws. All are burrowers or tube-dwellers. ……………………………… Subclass **Sedentaria**

**6a** Flat worms with a blind gut; the only opening to which is a pharynx which is generally midventral. The gut has many side pockets, often visible from the outside…………….. …………………………………Phylum **Platyhelminthes,** Class **Turbellaria**

**6b** Not flat worms with a blind gut………………………………………………………………. **7**

**7a** Feed by means of a specialized circle of tentacles or by ciliated ridges (lophophore) near the mouth …………………………………………………………………………………….…..**8**

**7b** Do not have a specialized circle of feeding tentacles or lophophore near the mouth ……..…..**9**

**8a** Deposit or suspension feeders. Feed with a specialized circle of feeding tentacles which are held out in the water or scraped along the sediment, then stuffed into the mouth. Usually have tube feet, which may be in five longitudinal rows along the body…………………… ………………………………Phylum **Echinodermata,** Class **Holothuroidea**

**8b** Suspension feeders. Worms that live in a chitinous tube and feed by extending a ciliated ridge or lophophore up into the water……………………………… Phylum **Phoronida**

**9a** Flattened, predatory ribbon worms, often brightly colored, which capture prey using an eversible proboscis which may have fangs………………………….. Phylum **Nemertea**

**9b** Not flattened, predatory worms which hunt with an eversible proboscis…………………… **10**

**10a** Round worms which burrow in soft sediments, or live in crevices in rock or coral. Have a large, extensible projection on the head which may or may not be completely retractable into the trunk…………………………………………………………………………………… **11**

**10b** Not round worms living in sediments and with a large, retractable projection on the head  ……………………………………………Phylum Mollusca, Class Gastropoda………… **12**

**11a** Anterior structure is a flattened proboscis whose edges fold ventrally to form a gutter which leads to the mouth. Proboscis cannot be completely retracted into the trunk. Two large, hooked setae on the ventral side near the anterior end of trunk may be visible…………………………………..…………...Phylum **Annelida**, class **Echiura**

**11b** Anterior structure is a rounded introvert, which is greatly extensible and can be completely retracted into the trunk. Mouth is at the anterior end of the introvert. Does not have two hooked setae on the trunk……………………………………………. Phylum **Sipuncula**

**12a** Pelagic, with foot extensions into a ventral fin or lateral paddles for swimming. May or may not have a shell……………………………………………………………………………. **13**

**12b** Most not pelagic. Have a ventral foot but it does not extend into a ventral fin or lateral paddles for swimming…………………………. Subclass **Opisthobranchia** (in part)

**13a** Elongated, twisted cylindrical gastropod mollusk, with a ventral extension on the foot which serves as a fin for swimming. Swims upside down and has a reduced shell………….. ………………………………………………………………Subclass **Prosobranchia,** **Order Mesogastropoda, Superfamily Heteropoda**: Heteropods

**13b** Pelagic gastropod with a foot with lateral extensions used for rowing………………… ………………………………………Subclass **Opisthobranchia** (in part): Pteropods

B: Key to Marine Invertebrates with

jointed exoskeletons (Arthropods)

Body segmented, covered with

an exoskeleton, and having jointed legs

**1a.** Chelicerae (anterior most paired appendages with pinchers used to grasp food) instead of mandibles (jaws). No antennae………………..………………………………………..… **2**

**1b** Have mandibles instead of chelicerae. Have antennae.………...……………...……………. **3**

**2a** Spider-like, with long-legs extending from a small cephalothorax and with sucking mouth parts. No antennae but have a proboscis.…………………….….. Class **Pycnogonida**

**2b** Cephalothorax covered by horse-shaped carapace. Long posterior spikelike telson……………………………………………………………..Class **Merostomata**

**3a** Small (< 1 cm long) as adults, planktonic. No special gills but legs are leaf-like appendages used both for swimming and for respiration …………………….Class **Branchiopoda**

**3b** Small or large, but do not breathe with leaf-like appendages used both for swimming legs and for respiration ……………………………………………………………………………….. **4**

**4a** Small (most < 1 mm) as adults (except for some bizarre parasitic forms). Short, cylindrical body. One median naupliar eye but no compound eyes. Abdomen has no appendages, except that the anal segment is forked into two caudal rami (furca). Long, conspicuous, uniramous first antennae …………………………………………………………… Class **Copepoda**

**4b** Not with a small, cylindrical body, not with one median naupliar eye, and not with caudal rami ……………………………………………………………………………………………… **5**

**5a** Permanently cemented to substrate as adults. Surrounded by six calcareous plates. Feed by beating filamentous legs or holding them in the current ………..… Class **Cirripedia**, ……………………………………………………….Order **Thoracica** ….…………..**6**

**5b** Not permanently cemented to the substrate as adults…………………………………………**7**

**6a** Surrounded by six calcareous plates which are cemented to the substrate …………………………………………………………….. Suborder **Balanomorpha**

**6b** Attached by a fleshy stalk; body is surrounded by plates which are not cemented to the substrate ……………………………………………….….. Suborder **Lepadomorpha**

**7a** Possess a cephalothorax; the head and several or all the thoracic segments are fused to one another at least dorsally by a carapace. Most or all individual thoracic segments are not visible from the dorsal side…………………………………………………………….……. **8**

**7b** The head and thoracic segments are not fused together with a carapace. The individual thoracic segments are visible from the dorsal side………………………………………….**11**

**8a**. Long body, dorso-ventrally compressed. Second pair of thoracic appendages form to raptorial claws (praying mantis-like). Two large, flat, biramous uropods and telson with spines…………………………………………………………….. Order **Stomatopoda**

**8b** Not as above…………………………………………………………………………..……....**9**

**9a** Dorsal carapace is attached to all thoracic segments ……………………..Order **Decapoda**

**9b** Dorsal carapace not attached to all the thoracic segments, though it may overlap them, usually small (intertidal species are usually < 3 cm long).…..…………………….…..…………. **10**

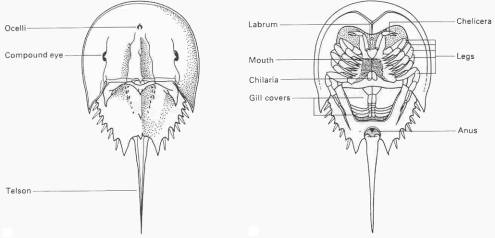
**10a** Possess a distinctive, bulbous, enlarged head and thorax with two anterior extensions that swing together to form a false rostrum. Abdomen narrow and has slender, elongated uropods at the end (no tail fan). May or may not have eyes. Burrowing filter feeders………………. ……………………………………………………..…………………….Order **Cumacea**

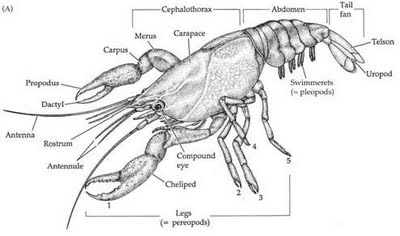
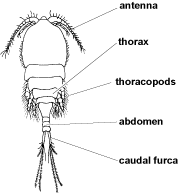
**10b** Shrimplike, with a laterally compressed thorax, and usually have a true rostrum. Most intertidal species have no gills. Females may have reduced pleopods. Fourth pleopod may be enlarged in the male. Possess stalked compound eyes. Free swimming or benthic…….. ………………………………………………………….Order **Mysida**: Opossum shrimps

**11a**Dorsoventrally flattened (the upper dorsal segments usually extend laterally so that thorax appears wider than it is high). Appendages near posterior (abdomen) well-developed pleopods for gas exchange. …………….…………………….………….  Order **Isopoda**

**11b** Laterally compressed (thorax appears higher than it is wide). Gills are thoracic. …………………………………………………………………...…...Order **Amphipoda**

**Arthropod Anatomy:**





C: Key to Marine Invertebrates without jointed exoskeletons, nor worm-like bodies

**1a** Body mass or colony has the appearance of an amorphous mass. May be hard, spongy, or gelatinous. May be a thin or thick crust or may be erect. Often have holes, which may be either single, paired, or scattered and may be on the tips of elevations on the mass …............................................................................................................................................. **2**

**1b** Body mass or colony variable, but does not have the appearance of an amorphous mass …... **3**

**2a** Mass is soft or hard and may contain calcium or glass spicules. Often numerous openings that are irregular in size and spacing. Larger holes, if present, do not occur in pairs…………………………………………...………………Phylum **Porifera**

**2b** Mass is gelatinous or leathery and does not contain spicules. Holes are in pairs. A basketlike network may or may not be visible inside………………………………………………. …………..Phylum **Chordata,** Subphylum **Urochordata,** Class **Ascidiacea**

**3a** Body is gelatinous/translucent and the species is pelagic (not benthic) ..………………….**4**

**3b** The body is not gelatinous or the species is not pelagic .………………………..………..**11**

**4a** Radially symmetrical. Having one or more swimming bells that contract for propulsion, or swim by beating rows of comblike cilia…………………………………………………..….**5**

**4b** Not radially symmetrical………………………………………………………………….….. **8**

**5a** Swim by beating rows of comb-like cilia Phylum **Ctenophora**

**5b** Swim by contracting one or more gelatinous bells, but not by beating rows of comb-like cilia. Contain stinging cnidocytes……………………………..…Phylum Cnidaria………… **6**

**6a** Solitary medusae which are often large, often colored (red, yellow, orange, and pink are common colors). The margin of the bell is often scalloped into lappets. No velum is present. Manubrium is often drawn out into 4 or 8 frilly oral arms.....………….Class **Scyphozoa**

**6b** Solitary medusae or a colony of swimming bells. Not often more than 6 cm in diameter. Usually not colored (may have white). The margin of the bell is not scalloped into lappets but often has a velum. Mouth is in the form of a tubelike manubrium but is not drawn out into frilly oral arms, though its margins may be lobed or frilly. Gut is a small central cavity with (usually four) radiating canals and a ring canal near the margin of the umbrella. A swollen tentacular bulb occurs at the junction of each radial canal with the ring canal. Colonial forms consist of a string of swimming bells, tentacles, and perhaps a gas-filled float …………………………………….Class Hydrozoa……………………………………**7**

**7a** Solitary medusae …………………….... **Hydrozoan** **medusae**

**7b** Colonial Class Hydrozoa………………. Order **Siphonophora**

**8a** Swim by beating comblike rows of cilia ……………………Phylum **Ctenophora**

**8b** Do not swim by beating comblike rows of cilia………………………………………..**9**

**9a** Body barrel-like. Take water in through an anterior buccal or incurrent siphon, filter it through an internal pharyngeal basket, and pump it out a posterior atrial or excurrent siphon ………….. Phylum **Chordata,** Subphylum **Urochordata,** Class **Thaliacea**

**9b** Do not filter water by pumping it through a buccal siphon, pharyngeal basket, and atrial siphon ………………………………………………………………………………..……. **10**

**10a** Laterally compressed, the foot is a ventral fin. Swim upside-down. Have a shell which may be large or small…… **Phylum** **Mollusca**, **Class** **Gastropoda**, **Subclass Prosobranchia, Order Mesogastropoda,** Superfamily **Heteropoda:** Heteropods

**10b** Foot has two fins projecting laterally and perhaps anteriorly or ventrally, May or may not have a shell……………. Phylum **Mollusca,** Class **Gastropoda, Subclass Opisthobranchia**: Shelled or naked pteropods

**11a** Growth form is a cuplike polyp (circular arrangement of tentacles surrounding mouth), either solitary or as a colony….Phylum Cnidaria……………………………………………**12**

**11b** Growth form is not as a polyp…………………………………………………………..…**15**

**12a** Small polyps (usually less than 1 mm), a few solitary but mostly colonial due to budding. Colonies may be arborescent (bushlike) or pinnate (featherlike). Not usually brightly colored. Different polyps in the colony are often polymorphic (specialized for different functions). Polyps are usually at least partially surrounded by a proteinaceous coat called a perisarc……………………………….Class **Hydrozoa**, Polyps of Order **Hydroida**

**12b** Polyps large and solitary, or if small, not in an arborescent or pinnate colony surrounded by a protein perisarc ……………………………………………...……Class Anthozoa…..**13**

**13a** Polyps have eight pinnate tentacles (with featherlike side branches). Typically secrete a soft matrix (not stony) that hold polyps as a colony………………………………………. …………………………….Subclass **Octocorallia (Alcyonaria)**

**13b** Tentacles not eight in number, and not pinnate………..…..…………………Subclass **Hexacorallia (Zooantharia)**……..**14**

**14a** Solitary polyps……………………………………………….……..…Order **Actiniaria**

**14b** Typically colonial secreting stony matrix that hold polyps as a colony…………..……..…..

………………………………..…………………….............................Order **Scleractinia**

**15a** Less than 1 mm long, meiofauna (between sand grains or in mud), with a spiny cuticle divided into plates. With an anterior protrusible head………… Phylum **Kinorhyncha**

**15b** Not an animal less than 1 mm long, and not with a spiny cuticle divided into plates and an anterior protrusible head………………………………………………………………….. **16**

**16a** Body largely or entirely enclosed within two external “valves” or shells which hinge together on one side. Neither body nor any appendages are segmented……………………………. **17**

**16b** Body is not enclosed within two external valves which hinge together on one side. Body or appendages may or may not be segmented………………………………………………….**18**

**17a** Body is composed of a large gill used for filter feeding, a foot which can protrude from the shell, a visceral mass, and a mantle which secretes the shell. Foot is used for digging or for secreting proteinaceous byssal threads which are used for attachment to the substrate …………………………………………………..Phylum **Mollusca,** Class **Bivalvia**

**17b** Attached to the substrate by a fleshy stalk which protrudes from one of the valves. Filter feed using a lophophore. Do not have large, separate gills nor a protrusible foot. ……………………………………………………………………Phylum **Brachiopoda**

**18a** Pelagic, with a tadpole-like body which secretes a gelatinous "house" used for filter feeding. Currents through the house are generated by beating of the tail ……………………… …….……... Phylum **Chordata**, Subphylum **Urochordata**, Class **Larvacea**

**18b** Not pelagic and tadpole-shaped, living in a gelatinous house……………………………… **19**

**19a** Highly motile animals, bodies soft and covered with a mantle; have well-developed eyes and 8-10 arms or tentacles…………………… Phylum **Mollusca** Class **Cephalopoda**

**19b** Do not have a soft body covered with a mantle; do not have well-developed eyes… …………………………………………………………………………………….……….**20**

**20a** Body composed of a central disk (not always distinct) with (usually 5 or more) large projecting rays (arms). Body surface may be hard, membranous, leathery, or spiny….....  **21**

**20b** Body not composed of a central disk with large projecting rays (arms)…………………..  **22**

**21a** Rays thickest at base where they meet with one another and taper gradually outward. Underside of rays has a well-developed ambulacral groove with tube feet. Usually five rays (though sometimes to 25 or more). Move by attaching and reattaching tube feet....Phylum……………………………….. ……………………………………………....**Echinodermata**, Class **Asteroidea**

**21b** Rays composed of interlocking ossicles and usually adjoin abruptly to central disk without tapering. Usually no more than 5 rays, though they may branch repeatedly in basket stars. No ambulacral groove on underside of rays. Move by lifting themselves along by the rays………………………………..Phylum **Echinodermata**, Class **Ophiuroidea**

**22a** Body round or oval, and surrounded by rigid interlocking plates that form a globular or platelike “test”. Covered with tube feet, and in some with movable large hard spines ……………………………………...Phylum **Echinodermata**, Class **Echinoidea**

**22b** Body not composed of a rigid test of interlocking plates covered with movable spines and tube feet…………………………………………………………………………………….. **23**

**23a** Attached, colonial, composed of many tiny individuals (nearly microscopic) each of which is encased in a surrounding calyx (maybe boxlike, oval, vaselike, or tubular in shape), feeds with a lophophore, and has a U-shaped gut. Colony may be erect and bushlike, leaflike, or a flat crust, and composition may be flexible or calcified………………. Phylum **Bryozoa**

**23b** Not a colony of nearly microscopic individuals feeding with a lophophore and a U-shaped gut……………………………………………………………………………………….…  **24**

**24a** Shell composed of 8 overlapping dorsal plates running anterior to posterior. Ventral side is a long muscular foot……………….....Phylum **Mollusca**, Class **PolyPlacophora**

**24b** Shell is a single piece………………………………………………………………………..**25**

**25a** Having an elongated, tapering, tusk-like shell, open at both ends, one end of which protrudes from the sediment…………………………. Phylum **Mollusca**, Class **Scaphopoda**

**25b** Having a single coiled, cap-shaped, earlike, or irregularly tubelike shell of calcium carbonate …………………………………………….. Phylum **Mollusca**, Class **Gastropoda**

