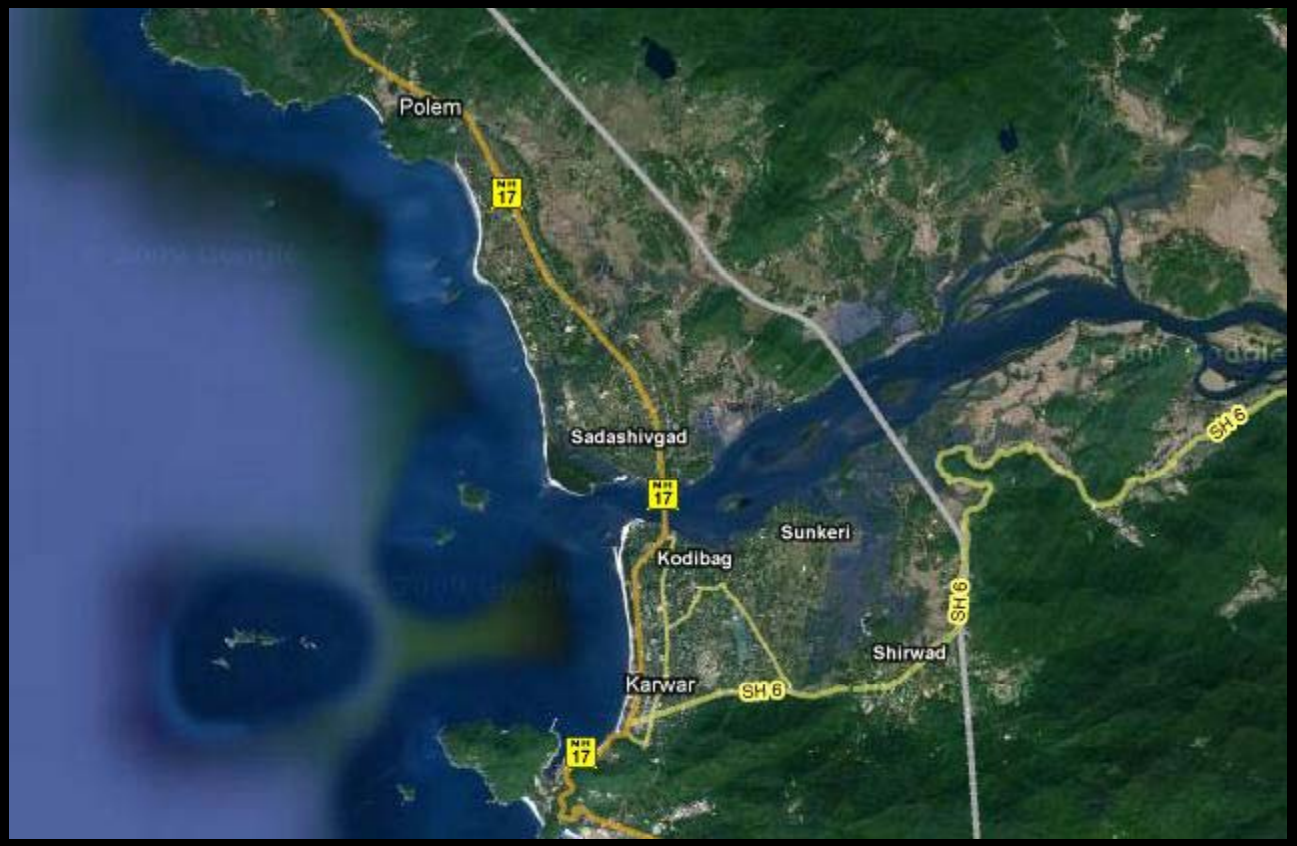
Coastal Wetland Monitoring



Dr. Prakash N. Mesta
prakashhonavar@gmail.com

- Coastal Ecosystem is diverse in nature
- Most of the world human population settled in Coastal region.
- Cities & Industries established in coast since time immemorial.

Different types of wetlands in coastal region (based on geology)
Transition zones of Estuaries (open/closed), Tidal Ponds and Lakes, Lagoons, Backwaters, Creeks, Mangroves, Mudflats, artificial aquaculture ponds, Semi saline Ponds, Fresh water Ponds, Lakes, Rivers, Dams,

Inter tidal regions (Rocky and muddy shores, tidal part of beaches) also considered by some as coastal wetlands.

Importance of Coastal Wetlands

- Wetland plants and soil are efficient water filters
- Nurseries for fish, crab, and other shellfish.
- Home to many different kinds of animals.
- Important habitats for numerous migratory birds.
- Reduce the severity of floods (natural detention areas).
- Buffers to reduce shoreline erosion and stabilize banks.
- Important role in coastal tourism.

Major Threats to Coastal Wetlands (Physical/Chemical)

- Industrial development, untreated effluents,,
- Over-fishing, Shipping Oil spills, Mine waste
- Urban land development ,
- Urban disposals, Encroachment, “Road-salt s”
- Construction of Aquaculture Ponds, Pesticides
- Destruction of Mangroves, Siltation.
- Blocking the fresh water inflow into wetland,
- Climate change
- Agriculture chemicals

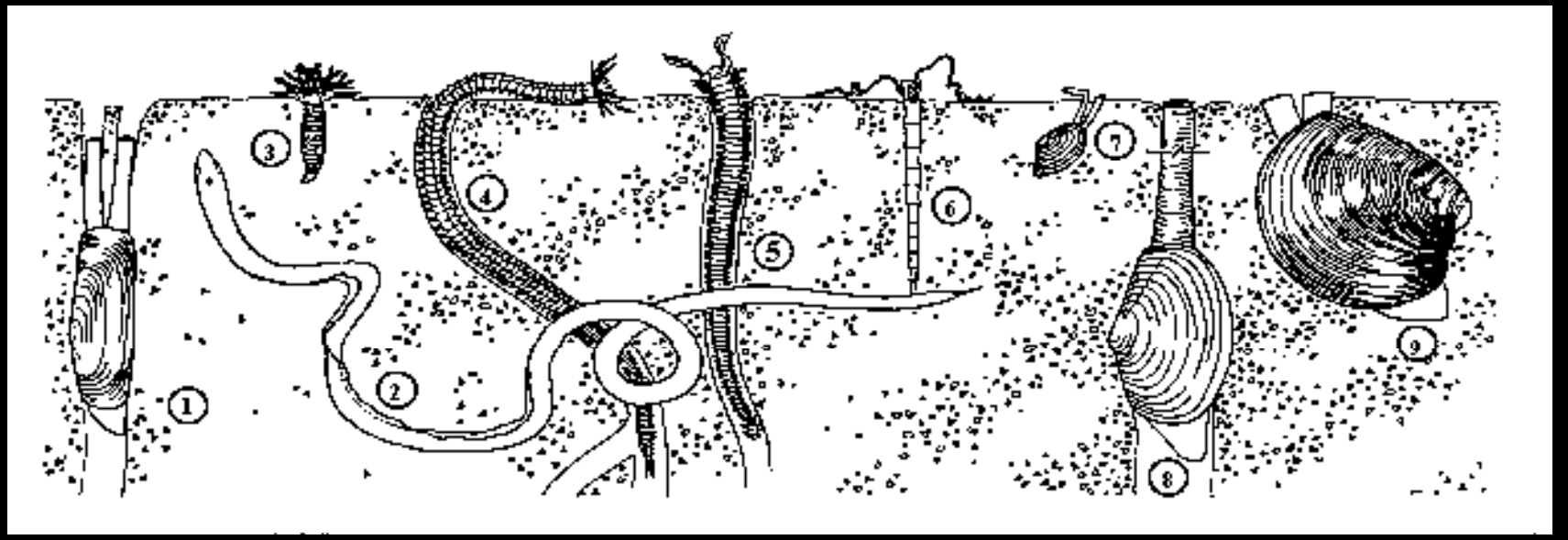
Coastal Wetland Restoration

Wetland health management requires good planning

Important to have base line data on wetland and its surroundings environment,

Benthic environment of the Coastal wetlands is the one of the Important factors of coastal ecology

Benthos Study Needs and Importance



The **benthos** refer collectively to all aquatic organisms which live on, in, or near the bottom (substratum) of water bodies. Organisms inhabiting running and standing waters, of both salt and freshwater habitats.

The terms **benthic** and **benthos** are derived from the Greek for "depths of the sea" but the terms are also used in freshwater biology too.

The benthos can be categorized in various ways

"phytobenthos" - primary producers

"zoobenthos“ - all consumers

"Benthic microflora" – decomposer

Basis on size (organisms that can pass through mesh/sieve)

Megabenthos - size < 1 mm (1000 µm) – *megafauna*

Macrobenthos - size > 1 mm & < ½ mm (500 µm) – *macrofauna*

Meiobenthos - size > ½ mm & > 0.063 mm (63 µm) - *meiofauna*

Microbenthos - size < 0.063 mm or < 35 µm *microfauna*

These dimensions vary from researcher to researcher

Micro-habitats of benthos

infauna - in the sediment

epifauna - attached to the bottom or substrate, or moving within the sediment; or mobile on the sediment surface

demersal - fish that feed on the benthic infauna and epifauna

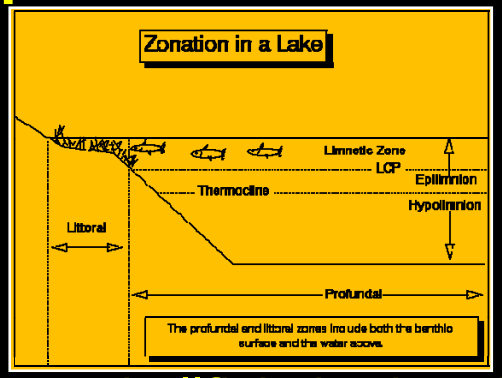
According to the zone that they live in

Littoral benthos

sublittoral benthos

Profundal benthos

abyssal benthos - (>500 m)



benthic habitats include coral reefs, kelp forests, shellfish beds, shallow submerged mudflats, rocky hard-body habitats, rippled sandflats etc.. The benthic zone refers to both freshwater, brackish, and saltwater environments.

Needs of Study ?

The benthos represent all animals phyla.

Benthos are considered as Bio-indicators

Benthos integrate environmental conditions

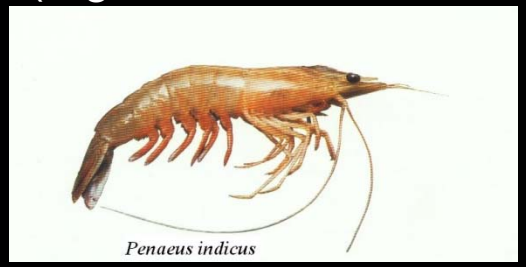
Ability to aid certain species in withstanding the effects of pollution

Benthos are important as fish food, Food for humans also

Benthic organisms are also important members of the lower food web

Megafauna

(e.g. Crabs, Mollusks, Starfish, Benthic fishes, Crustaceans, Sponges)



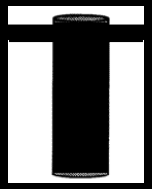
Sampling :- Drag nets & Trawls are used , The trawls are towed at a constant speed and the speed and duration of trawling is used to estimate the area sampled & organisms are weighed

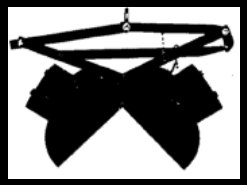
Preservation :- species are fixed in 5% buffered formaldehyde. For molecular studies, tissue has to be fixed in ethanol.

Macrofauna

(e.g. Polichaeta, Ampipoda, stomatop etc)

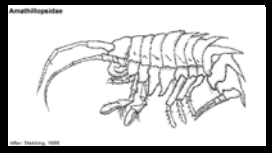
Sampling :- The corers, Sediment grabber, typically sample an area of 10cm²

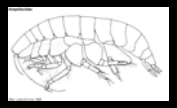


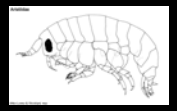


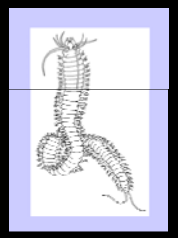
Preservation :- samples then treated with 1:500 Rosebengal Formaldehyde solution , then sieved over a 500 µm mesh sieve. The residues are then fixed and preserved in 10 % buffered formalin and later transferred in 70% ethanol.

Ampipoda

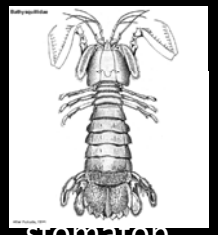




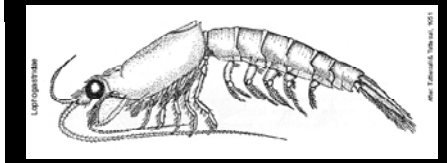




Polichaeta



stomatop



Mysidae

Meiofauna

(e.g. Foraminifera, Turbellaria, Archiannelida, Nematodes, Ostracods)

Sampling :- with tube cores of various sizes. Samples then treated with 1:500 Rosebengal Formaldehyde solution

Preservation :- carefully sieved over a 42 (or 64) µm mesh sieve. The residues of the finer sieve are fixed in 4% buffered formaldehyde or ethanol.

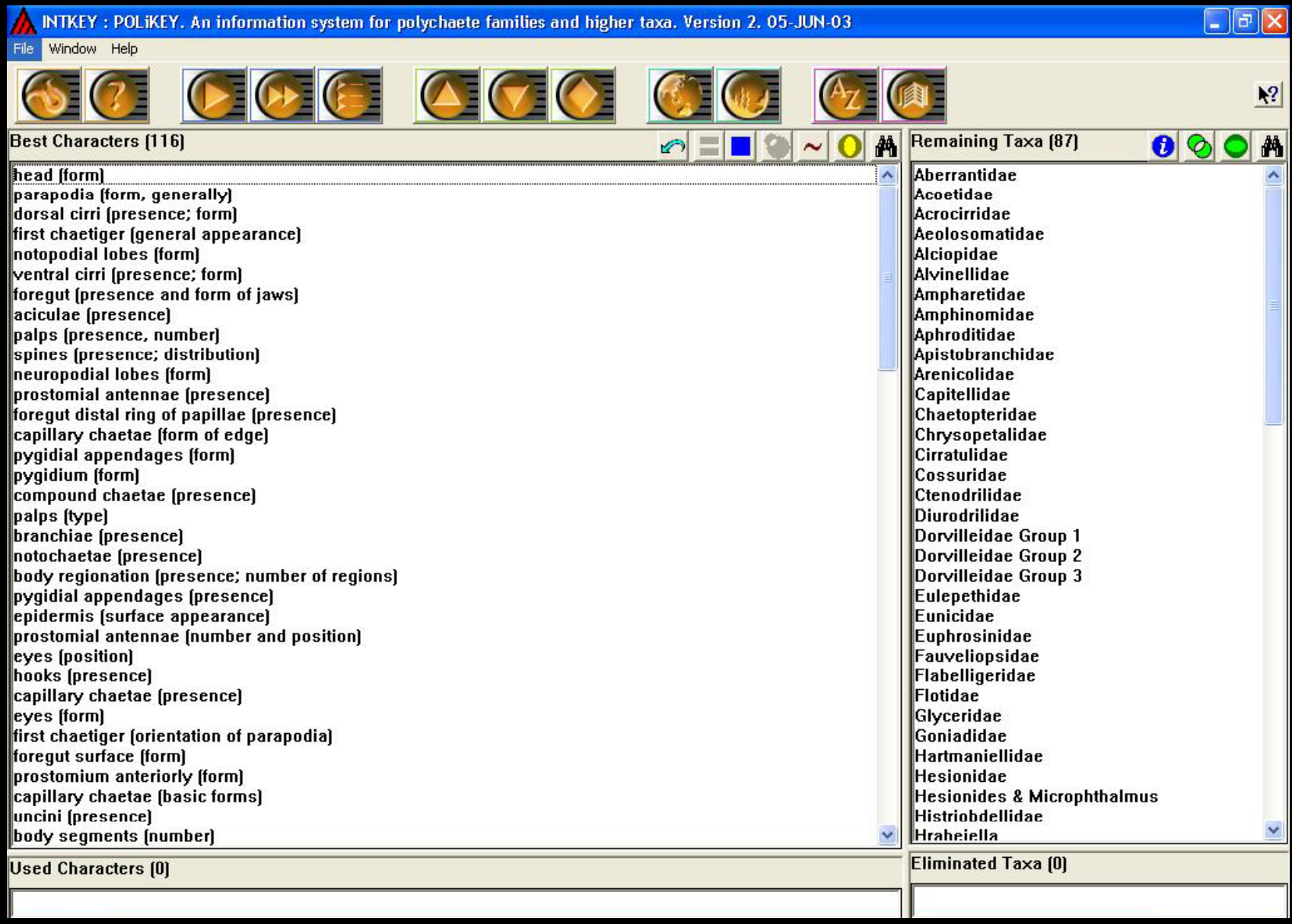
Other techniques of sorting (Fresh samples used)
Stirring , Elutriation, Sea water ice, Bubbling technique

Microfauna

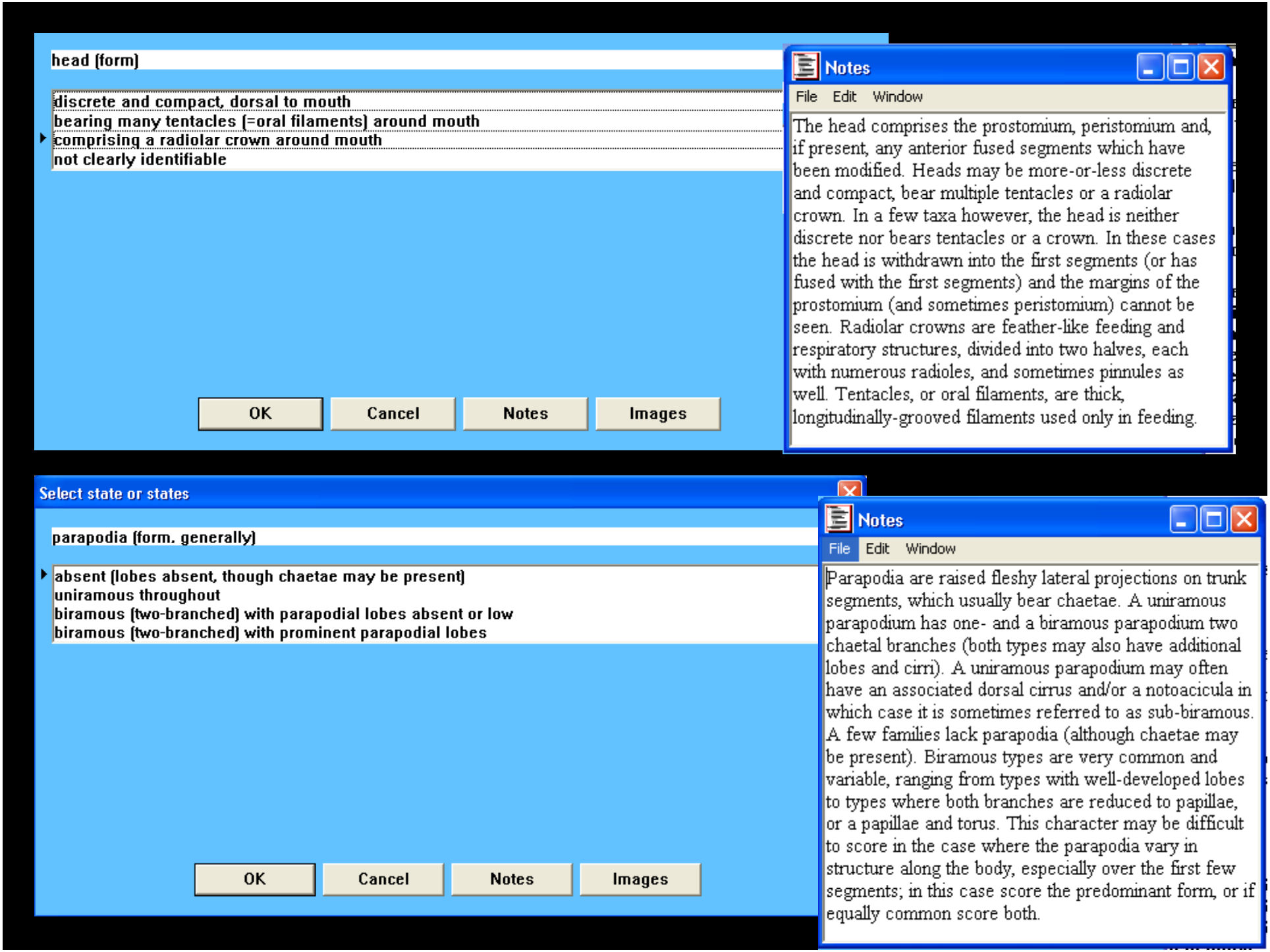
(e.g. Bacteria,)

Microbiological techniques

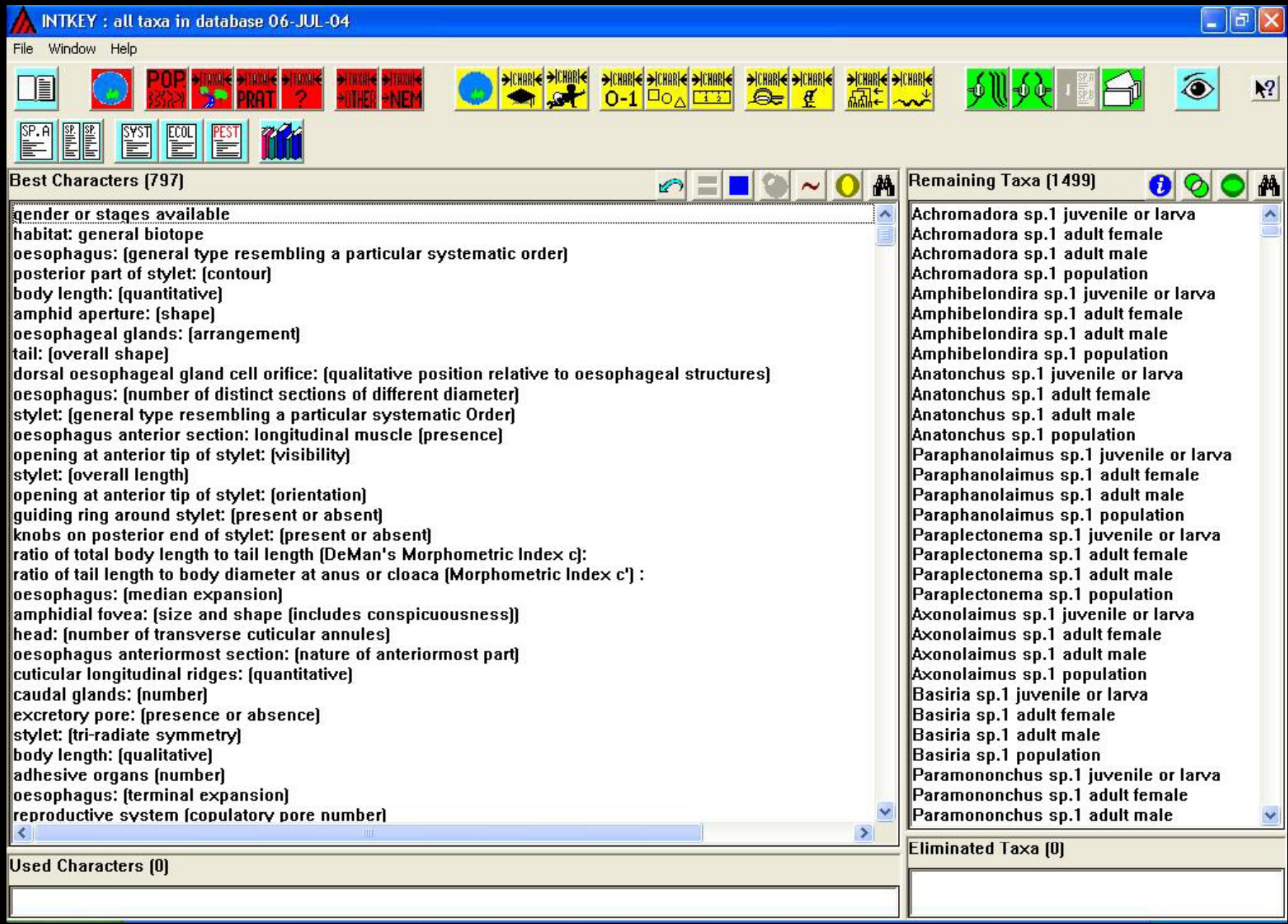
Identification (Interactive keys & Printed keys & Manuals)

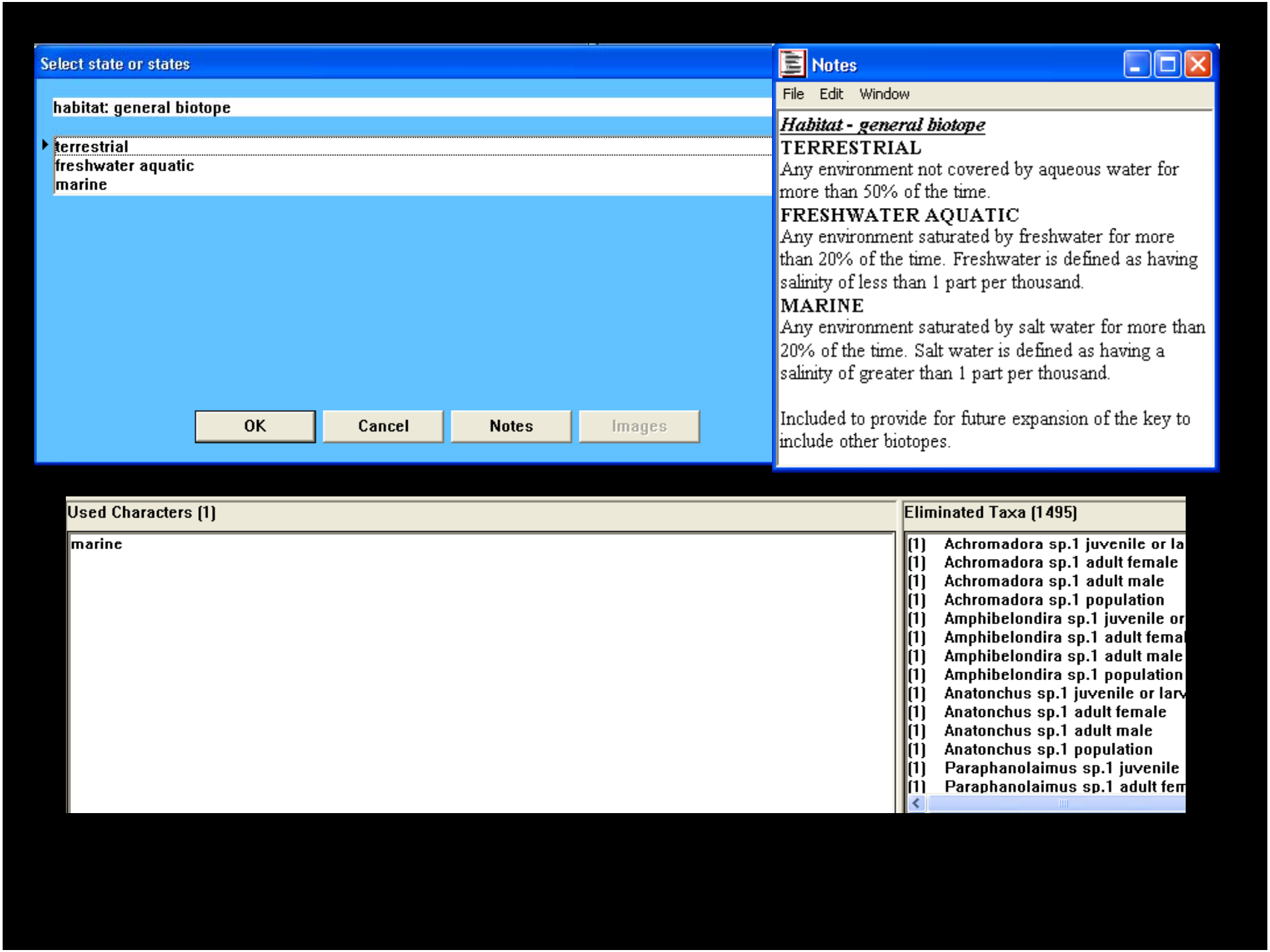


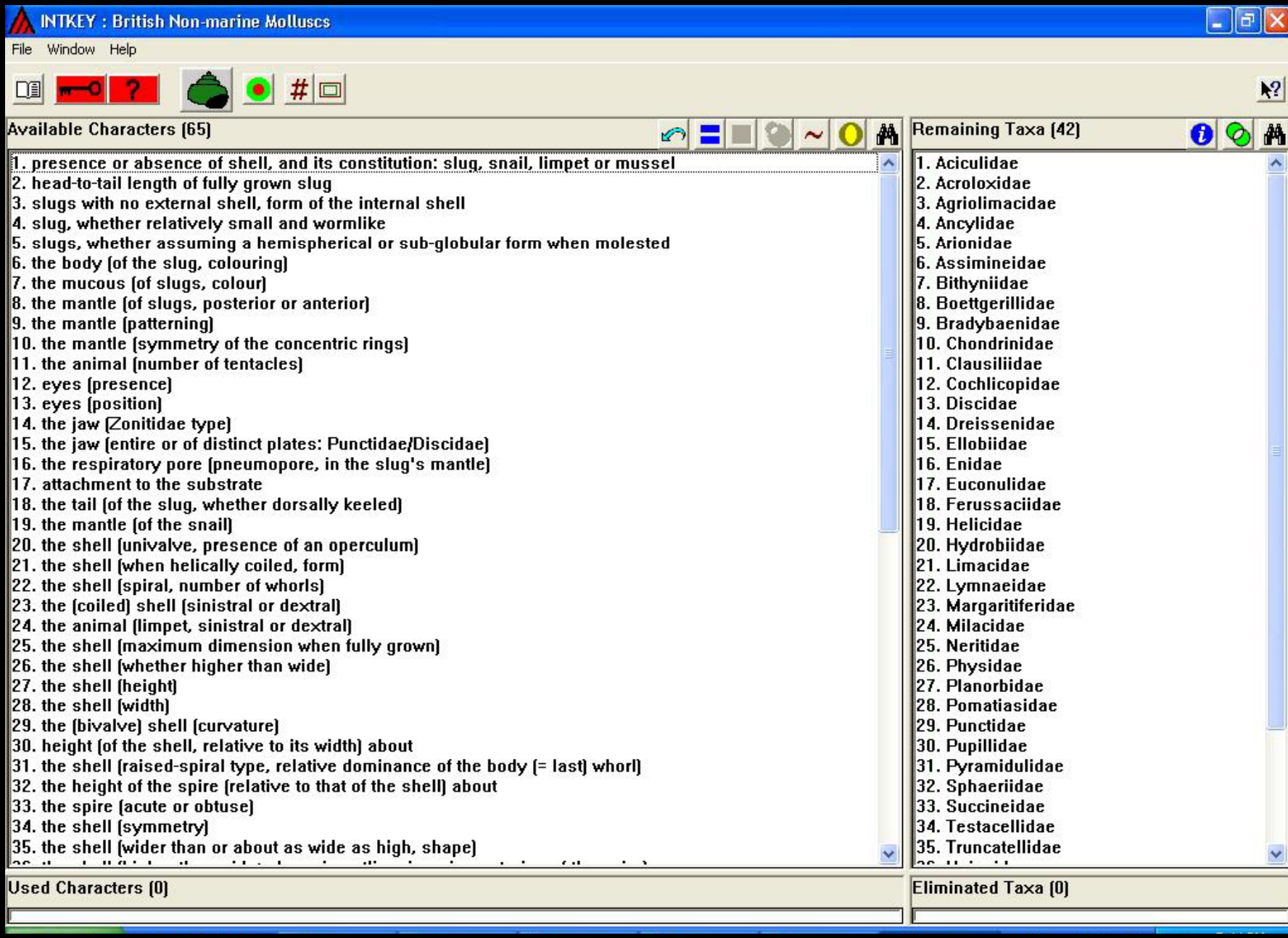
http://delta-intkey.com/www/install.htm

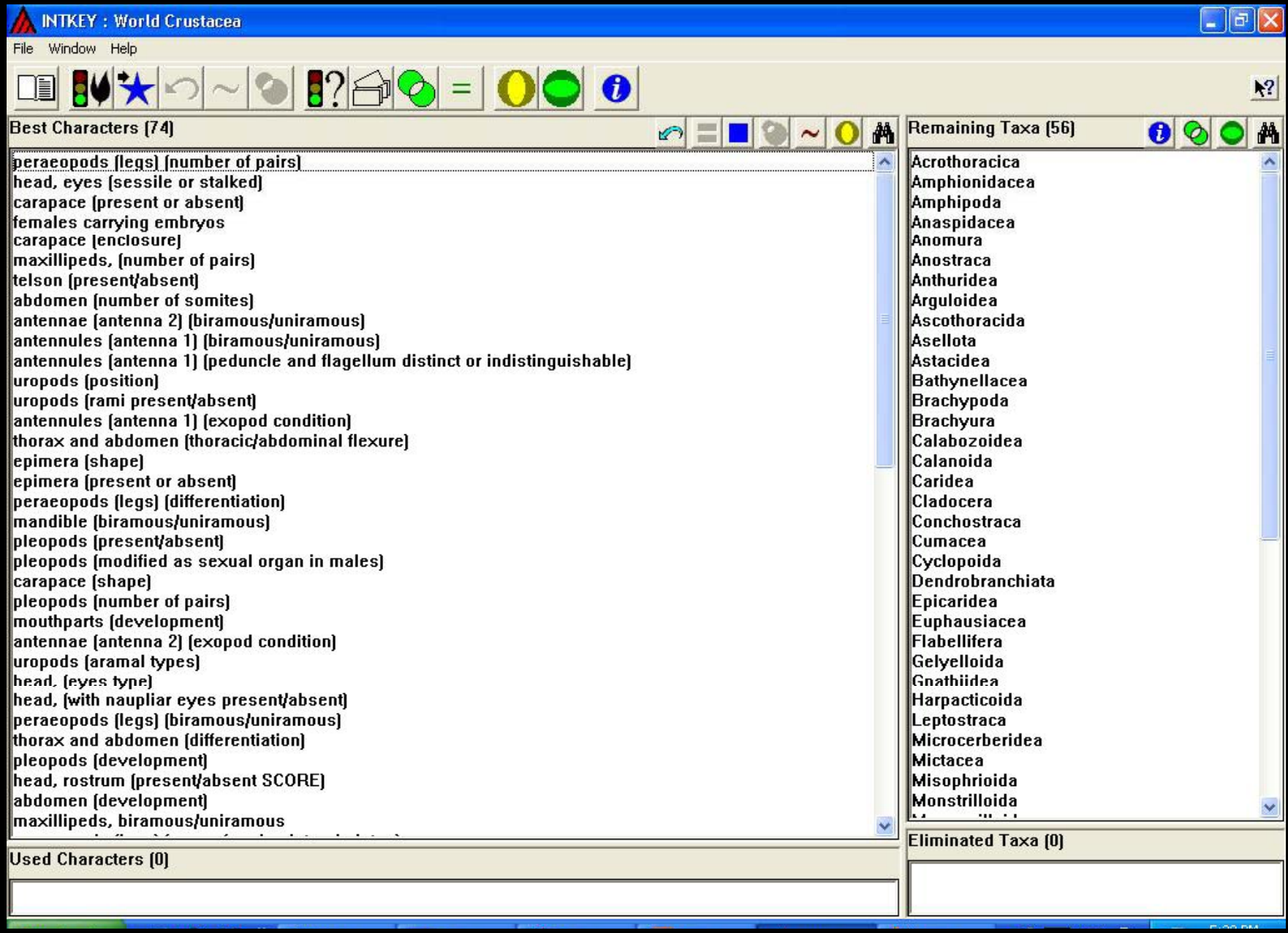

head (form)
discrete and compact, dorsal to mouth
bearing many tentacles (=oral filaments) around mouth
comprising a radiolar crown around mouth
not clearly identifiable
OK
Cancel
Notes
Images
Notes
File Edit Window
The head comprises the prostomium, peristomium and, if present, any anterior fused segments which have been modified. Heads may be more-or-less discrete and compact, bear multiple tentacles or a radiolar crown. In a few taxa however, the head is neither discrete nor bears tentacles or a crown. In these cases the head is withdrawn into the first segments (or has fused with the first segments) and the margins of the prostomium (and sometimes peristomium) cannot be seen. Radiolar crowns are feather-like feeding and respiratory structures, divided into two halves, each with numerous radioles, and sometimes pinnules as well. Tentacles, or oral filaments, are thick, longitudinally-grooved filaments used only in feeding.
Select state or states
parapodia (form, generally)
absent (lobes absent, though chaetae may be present)
uniramous throughout
biramous (two-branched) with parapodial lobes absent or low
biramous (two-branched) with prominent parapodial lobes
OK
Cancel
Notes
Images
Notes
File Edit Window
Parapodia are raised fleshy lateral projections on trunk segments, which usually bear chaetae. A uniramous parapodium has one- and a biramous parapodium two chaetal branches (both types may also have additional lobes and cirri). A uniramous parapodium may often have an associated dorsal cirrus and/or a notoacicula in which case it is sometimes referred to as sub-biramous. A few families lack parapodia (although chaetae may be present). Biramous types are very common and variable, ranging from types with well-developed lobes to types where both branches are reduced to papillae, or a papillae and torus. This character may be difficult to score in the case where the parapodia vary in structure along the body, especially over the first few segments; in this case score the predominant form, or if equally common score both.


INTKEY : POLiKEY. An information system for polychaete families and higher taxa. Version 2. 05-JUN-03
File Window Help
Best Characters (110)
parapodia (form, generally)
dorsal cirri (presence; form)
first chaetiger (general appearance)
foregut (presence and form of jaws)
notopodial lobes (form)
ventral cirri (presence; form)
aciculae (presence)
pygidial appendages (form)
palps (presence, number)
spines (presence; distribution)
foregut distal ring of papillae (presence)
compound chaetae (presence)
prostomial antennae (number and position)
palps (type)
capillary chaetae (form of edge)
prostomial antennae (presence)
notochaetae (presence)
pygidium (form)
branchiae (presence)
neuropodial lobes (form)
Remaining Taxa (74)
Aberrantidae
Acoetidae
Acrocirridae
Aeolosomatidae
Alciopidae
Amphinomidae
Aphroditidae
Apistobranchidae
Arenicolidae
Capitellidae
Chaetopteridae
Chrysopetalidae
Cirratulidae
Cossuridae
Ctenodrilidae
Diurodrilidae
Dorvilleidae Group 1
Dorvilleidae Group 2
Dorvilleidae Group 3
Eulepethidae
Used Characters (1)
head discrete and compact, dorsal to mouth
Eliminated Taxa (13)
[1] Alvinellidae
[1] Ampharetidae
[1] Fauveliopsidae
[1] Flabelligeridae
[1] Flotidae
[1] Pectinariidae
[1] Poeobiidae
[1] Sabellariidae
[1] Sabellidae
[1] Serpulidae
[1] Terebellidae
[1] Tomopteridae
[1] Trichobranchidae


INTKEY : all taxa in database 06-JUL-04
File Window Help
POP
PRAT
?
OTHER
NEM
0-1
SP. A
SYST
ECOL
PEST
Best Characters (797)
gender or stages available
habitat: general biotope
oesophagus: (general type resembling a particular systematic order)
posterior part of stylet: (contour)
body length: (quantitative)
amphid aperture: (shape)
oesophageal glands: (arrangement)
tail: (overall shape)
dorsal oesophageal gland cell orifice: (qualitative position relative to oesophageal structures)
oesophagus: (number of distinct sections of different diameter)
stylet: (general type resembling a particular systematic Order)
oesophagus anterior section: longitudinal muscle (presence)
opening at anterior tip of stylet: (visibility)
stylet: (overall length)
opening at anterior tip of stylet: (orientation)
guiding ring around stylet: (present or absent)
knobs on posterior end of stylet: (present or absent)
ratio of total body length to tail length (DeMan's Morphometric Index c):
ratio of tail length to body diameter at anus or cloaca (Morphometric Index c') :
oesophagus: (median expansion)
amphidial fovea: (size and shape (includes conspicuousness))
head: (number of transverse cuticular annules)
oesophagus anteriormost section: (nature of anteriormost part)
cuticular longitudinal ridges: (quantitative)
caudal glands: (number)
excretory pore: (presence or absence)
stylet: (tri-radiate symmetry)
body length: (qualitative)
adhesive organs (number)
oesophagus: (terminal expansion)
reproductive system (copulatory pore number)
Remaining Taxa (1499)
Achromadora sp.1 juvenile or larva
Achromadora sp.1 adult female
Achromadora sp.1 adult male
Achromadora sp.1 population
Amphibelondira sp.1 juvenile or larva
Amphibelondira sp.1 adult female
Amphibelondira sp.1 adult male
Amphibelondira sp.1 population
Anatonchus sp.1 juvenile or larva
Anatonchus sp.1 adult female
Anatonchus sp.1 adult male
Anatonchus sp.1 population
Paraphanolaimus sp.1 juvenile or larva
Paraphanolaimus sp.1 adult female
Paraphanolaimus sp.1 adult male
Paraphanolaimus sp.1 population
Paraplectonema sp.1 juvenile or larva
Paraplectonema sp.1 adult female
Paraplectonema sp.1 adult male
Paraplectonema sp.1 population
Axonolaimus sp.1 juvenile or larva
Axonolaimus sp.1 adult female
Axonolaimus sp.1 adult male
Axonolaimus sp.1 population
Basiria sp.1 juvenile or larva
Basiria sp.1 adult female
Basiria sp.1 adult male
Basiria sp.1 population
Paramononchus sp.1 juvenile or larva
Paramononchus sp.1 adult female
Paramononchus sp.1 adult male
Used Characters (0)
Eliminated Taxa (0)


Select state or states
habitat: general biotope
terrestrial
freshwater aquatic
marine
OK
Cancel
Notes
Images
Notes
File Edit Window
Habitat - general biotope
TERRESTRIAL
Any environment not covered by aqueous water for more than 50% of the time.
FRESHWATER AQUATIC
Any environment saturated by freshwater for more than 20% of the time. Freshwater is defined as having salinity of less than 1 part per thousand.
MARINE
Any environment saturated by salt water for more than 20% of the time. Salt water is defined as having a salinity of greater than 1 part per thousand.
Included to provide for future expansion of the key to include other biotopes.
Used Characters (1)
marine
Eliminated Taxa (1495)
(1) Achromadora sp.1 juvenile or la
(1) Achromadora sp.1 adult female
(1) Achromadora sp.1 adult male
(1) Achromadora sp.1 population
(1) Amphibelondira sp.1 juvenile or
(1) Amphibelondira sp.1 adult fema
(1) Amphibelondira sp.1 adult male
(1) Amphibelondira sp.1 population
(1) Anatonchus sp.1 juvenile or larv
(1) Anatonchus sp.1 adult female
(1) Anatonchus sp.1 adult male
(1) Anatonchus sp.1 population
(1) Paraphanolaimus sp.1 juvenile
(1) Paraphanolaimus sp.1 adult fem


INTKEY : British Non-marine Molluscs
File Window Help
Available Characters (65)
1. presence or absence of shell, and its constitution: slug, snail, limpet or mussel
2. head-to-tail length of fully grown slug
3. slugs with no external shell, form of the internal shell
4. slug, whether relatively small and wormlike
5. slugs, whether assuming a hemispherical or sub-globular form when molested
6. the body (of the slug, colouring)
7. the mucous (of slugs, colour)
8. the mantle (of slugs, posterior or anterior)
9. the mantle (patterning)
10. the mantle (symmetry of the concentric rings)
11. the animal (number of tentacles)
12. eyes (presence)
13. eyes (position)
14. the jaw (Zonitidae type)
15. the jaw (entire or of distinct plates: Punctidae/Discidae)
16. the respiratory pore (pneumopore, in the slug's mantle)
17. attachment to the substrate
18. the tail (of the slug, whether dorsally keeled)
19. the mantle (of the snail)
20. the shell (univalve, presence of an operculum)
21. the shell (when helically coiled, form)
22. the shell (spiral, number of whorls)
23. the (coiled) shell (sinistral or dextral)
24. the animal (limpet, sinistral or dextral)
25. the shell (maximum dimension when fully grown)
26. the shell (whether higher than wide)
27. the shell (height)
28. the shell (width)
29. the (bivalve) shell (curvature)
30. height (of the shell, relative to its width) about
31. the shell (raised-spiral type, relative dominance of the body (= last) whorl)
32. the height of the spire (relative to that of the shell) about
33. the spire (acute or obtuse)
34. the shell (symmetry)
35. the shell (wider than or about as wide as high, shape)
Remaining Taxa (42)
1. Aciculidae
2. Acroloxidae
3. Agriolimacidae
4. Ancylidae
5. Arionidae
6. Assimineidae
7. Bithyniidae
8. Boettgerillidae
9. Bradybaenidae
10. Chondrinidae
11. Clausiliidae
12. Cochlicopidae
13. Discidae
14. Dreissenidae
15. Ellobiidae
16. Enidae
17. Euconulidae
18. Ferussaciidae
19. Helicidae
20. Hydrobiidae
21. Limacidae
22. Lymnaeidae
23. Margaritiferidae
24. Milacidae
25. Neritidae
26. Physidae
27. Planorbidae
28. Pomatiasidae
29. Punctidae
30. Pupillidae
31. Pyramidulidae
32. Sphaeriidae
33. Succineidae
34. Testacellidae
35. Truncatellidae
Used Characters (0)
Eliminated Taxa (0)


INTKEY : World Crustacea
File Window Help
Best Characters (74)
peraeopods (legs) (number of pairs)
head, eyes (sessile or stalked)
carapace (present or absent)
females carrying embryos
carapace (enclosure)
maxillipeds, (number of pairs)
telson (present/absent)
abdomen (number of somites)
antennae (antenna 2) (biramous/uniramous)
antennules (antenna 1) (biramous/uniramous)
antennules (antenna 1) (peduncle and flagellum distinct or indistinguishable)
uropods (position)
uropods (rami present/absent)
antennules (antenna 1) (exopod condition)
thorax and abdomen (thoracic/abdominal flexure)
epimera (shape)
epimera (present or absent)
peraeopods (legs) (differentiation)
mandible (biramous/uniramous)
pleopods (present/absent)
pleopods (modified as sexual organ in males)
carapace (shape)
pleopods (number of pairs)
mouthparts (development)
antennae (antenna 2) (exopod condition)
uropods (aramal types)
head, (eyes type)
head, (with naupliar eyes present/absent)
peraeopods (legs) (biramous/uniramous)
thorax and abdomen (differentiation)
pleopods (development)
head, rostrum (present/absent SCORE)
abdomen (development)
maxillipeds, biramous/uniramous
Used Characters (0)
Remaining Taxa (56)
Acrothoracica
Amphionidacea
Amphipoda
Anaspidacea
Anomura
Anostraca
Anthuridea
Arguloidea
Ascothoracida
Asellota
Astacidea
Bathynellacea
Brachypoda
Brachyura
Calabozoidea
Calanoida
Caridea
Cladocera
Conchostraca
Cumacea
Cyclopoida
Dendrobranchiata
Epicaridea
Euphausiacea
Flabellifera
Gelyelloida
Gnathiidea
Harpacticoida
Leptostraca
Microcerberidea
Mictacea
Misophrioida
Monstrilloida
Eliminated Taxa (0)

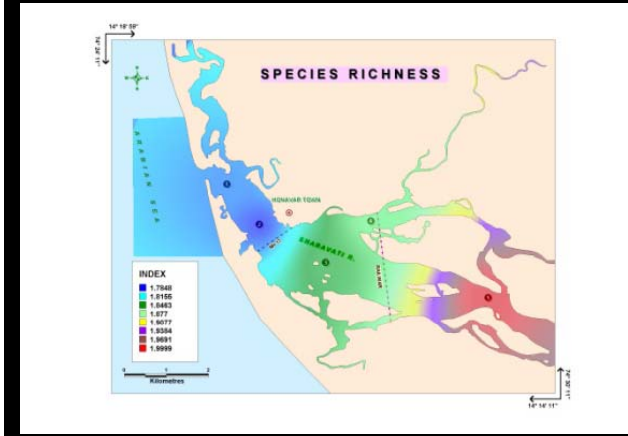
Points to new workers

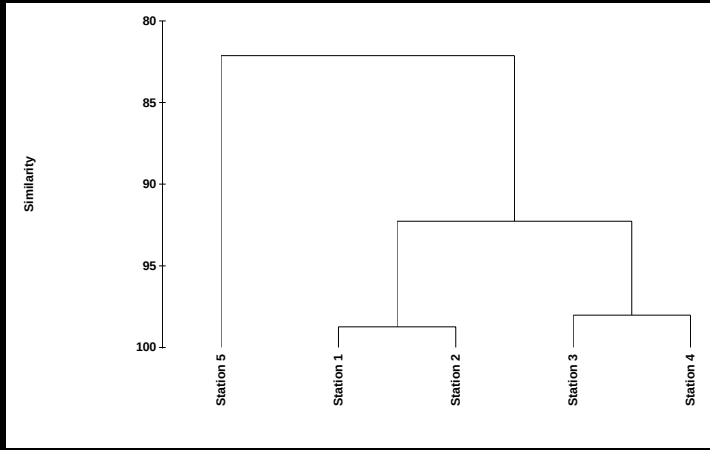
Sampling designing is important. Know your sampling sites, Zonation.

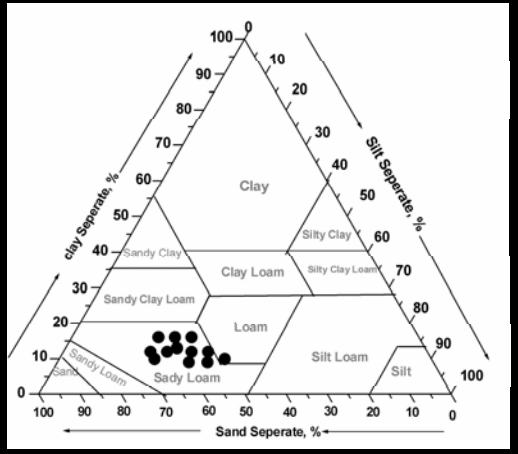
Do not store samples with out sorting of animals & proper labeling

Relate with a biotic factor of benthic environment like –
Sediment temp., Sediment pH, Sediment nutrient, Bottom water Temp. Sediment Texture, Sand, Silt, Clay etc…

Note GPS readings in decimal Degree (for GIS work)







Thank you