North London Collegiate School Jeju

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FOBISIA Environmental Conference 2016

Field Trip

Saturday 21st May 2016

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FOBISIA Environmental Conference Field Trip

Saturday 21st May: 58 Students & 10 staff

Two themes:

1. Biodiversity – what is the biodiversity of molluscs (and other species if able to identify) on the beach? How does this compare with Ron's past records of biodiversity and how can we relate this to human effects on the marine environment?
2. Human impacts – primarily looking at marine debris and identifying the source of this and possible effects on the marine ecosystem and ultimately on humans

Activities

1. In your groups (see back page) you are to survey a particular area and collect and identify mollusc specimens (and other species if able to identify) and record your data. You should use the common species identification guide and Ron to help you with this. After doing this we can pool and compare data to get an overall picture for the habitat.
2. The second activity is to collect marine debris and classify this by type and by origin if possible. Likely origins: commercial fishing, recreational fishing, tourism, land-based industry/development, household litter etc. Likely types: plastic containers, lids, lighters, fishing floats, buoys, etc. You are then going to consider the impacts of this debris on the marine ecosystem and what can be done to reduce it.
   NB: We will take all collected marine debris with us.

You'll need to decide on the best way to record your data in this booklet.

Equipment

- Clipboards
- Pens
- Tape measures
- Buckets with lids
- Plastic bags for rubbish collected
- Nets, brushes and knife
- Quadrats
- Plastic trays (white?)
- 'Ziploc' bags
- Equipment to measure abiotic factors – thermometers, pH meters etc.

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Plan of the Day

9.00-10.00: Lecture on Jeju's Marine Environment and Challenges to Biodiversity by Ron Noseworthy in the PAC
10.00 -10.15: Questions following lecture
10.30: Assemble at buses & drive to field trip site
11.00: Arrive at site
11-11.20: Field trip briefing (JW)
11.20: Students divide into groups – see grouping page ** (each group attributed to a specific area of the site) and begin the survey of biodiversity in their area. Findings recorded in this booklet.
13.00: Groups meet to collate findings
13.30: Picnic lunch on beach
14.30: Students to survey the impact of humans by collecting and categorising the marine debris they find in their area
15.00: Meet to share and collate findings and consider the effects of marine debris: local and immediate, wider spread and longer term
15.30: Return to school on buses (option of visiting Starbucks/shops at Songaksan if time)

Task one: Assessment of Biodiversity.

- You need to assess the species diversity of the area to which you have been allocated (split into 4 groups, each with a different area).
- You will be given some basic guidance as to how to use simple sampling techniques by staff (belt transect, quadrat, nets etc.) but will have to decide which of these to use and how to use the equipment yourselves.
- On the next few pages are some guidelines to collection techniques – read these carefully.
- Once you have collected your species data, you have instructions on how to calculate species diversity using Simpson's Diversity Index (see appendix).
- You should also consider the abiotic factors in each area of the site – how will these affect the biodiversity? Will they change throughout the day? Over a 24hr period? Over a year? If you have equipment to do so, you can measure some of these (temp, humidity etc.).

Task two: Assessment of Human Impacts

- Students to consider how humans have impacted on the biodiversity of the site. To include impact of trampling, pollution (plastic rubbish and chemicals. Effluent from fish farms, water treatment plant etc.), collection etc. They look for evidence of these impacts

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- Students to collect as much marine detritus as they can and try to identify the source. Think about the immediate, short term and local impacts of this detritus and also the longer term impacts on a global scale.
- Students to consider what we can do at a local, regional and global scale to reduce the amount of marine detritus.
- Detritus collected in bags and removed from beach with us!

Rationale and Techniques for Collection

Why collect specimens?

Specimens are collected to assist with ecological surveys: biodiversity, ecology, distribution, dominance etc. (descriptive or comparative surveys). These are often used in ecological impact assessments so that effects on biodiversity can be monitored.

What equipment is needed?

Collecting bags, 'Ziploc' preferred - larger one for bigger shells, beach drift, and seaweed samples, and smaller bags for small shells. Vials for micros and fragile specimens. Knife for removing limpets and chitons. Container for chitons and live shells you wish to preserve. Small sieve for searching for micros and small species. (You may also have a brush and large bag for rock brushing.)

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Survey methods

When beginning a beach survey, check the driftline first. The dead shells in the drift will be, in most cases, the same species also found live offshore. In this way a good sample of the mollusc fauna of a particular area can be obtained, including many small species that would otherwise be unobtainable. Larger specimens can be collected individually, but smaller species, around one centimetre, and microshells, 5 mm or less, require special treatment. **Do not walk on the driftline but just below it** to avoid trampling the shells and other marine organisms. First, find a portion of the driftline that contains several small species; then carefully scoop some of the drift into a bag. Don't take it from only one area but, if the drift contains more small species, then take some from several places. Do not take a lot because this material has to be sorted to remove the shells. Keep the driftline material separate from the other material.

Then examine the intertidal area. Check first for the dominant (abundant or most common) species. Examining species abundance is important because species dominance can be different from one locality to another, and from the high intertidal (upper limit of high tide), mid intertidal, and low intertidal (to water's edge at low tide).

A good simple guide to determine species abundance is given below:

Abundant: You can't help seeing them when you look in the right place.
Common: A 10-minute search in the right place will find a few
Moderately common: A 10-minute search in the right place will probably find one
Uncommon: You will probably find one with an hour of searching
Rare: You might never find one.

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Next check the rock crevices for organisms that are nestling there, usually gastropods and some bivalves that attach themselves to the crevices. Turn over any loose rocks to check for molluscs; the intertidal area can be a good location for a wide variety of molluscs.

Next, it is best to do some shallow water collecting. If the tide is low, examine tide pools carefully. **Be very careful as wet rocks can be very slippery and do not go into the water if you can help it**. They will contain different groups of species, from the high to low intertidal, most species are usually found in the low intertidal pools. Check first the sides of the pools and any rocks that may be in them. Then carefully examine the bottoms of the loose rocks. Bring the rocks straight up from the water; do not turn over the rocks before you bring them up or the specimens on the undersides of the rocks may wash off. If there is any sand or loose material at the bottoms of the pools, use a sieve to obtain some material and check for specimens. You may wish to collect algae samples to obtain the many small species inhabiting this environment. If there are different types of algae, eg. coralline algae and seaweeds, place them in separate bags.

Avoiding entering the water, check the sides of rocky areas along the water's edge, and especially crevices where many species may hide. A low, open coastline with a large number of rocks and small boulders is usually a productive area. First, examine the surfaces of the rocks before turning them over. As in the tidepools, bring the rocks straight up and check the undersides only when you have taken the rocks out of the water. You may also do rock brushing. Use a small flat brush with fairly strong but flexible bristles and a large bag. Hold the rock over the open bag and then brush the surface of the rock with slow, even strokes. Do not brush quickly because the specimens may be flicked off the rock and lost. When working with larger rocks, it is best to have someone hold the rock while another person brushes.

Working with collected material

Decide what needs to be done with the material collected. Live specimens may be preserved in 70% ethanol. Micros and small species may be kept in ethanol for two weeks and then dried. Larger, live-taken shells may be boiled and the animal removed with a sewing needle or dental pick. With gastropods, keep the operculum (the "door" in the aperture of the shell) together with each specimen. Place them on a paper towel and leave them to dry.
After identifying the specimens, prepare labels for each lot (all specimens of a species from a particular area). The labels should contain the name of the species, the survey locality, the habitat, the name of the collector, and the date of collection. Try to be as detailed as possible. Good data makes a collection more scientifically valuable.

Data collection

Use these two pages to record your data!

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Map

This map shows the location of the field trip site, which we have nicknamed 'Hammer Bay' due to its distinctive shape. There are other bays in the same area that we may also visit, time and weather permitting.

Songaksan and surrounding coastline

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Appendix

Simpson's Diversity Index

A community dominated by one or two species is considered to be less diverse than one in which several different species have a similar abundance. Simpson's Diversity Index is a measure of diversity which takes into account the number of species present, as well as the relative abundance of each species. As species richness and evenness increase, so diversity increases.

$$D = 1 - \left(\frac{\Sigma\, n(n-1)}{N(N-1)} \right)$$

n = the total number of organisms of a particular species

N = the total number of organisms of all species

The value of ***D*** ranges between 0 and 1. With this index, 1 represents infinite diversity and 0, no diversity.

For instance, to calculate Simpson's Index for the bay, an area must be sampled using quadrats placed randomly or systematically. The number of species within each quadrat, as well as the number of individuals of each species should be noted. There is no necessity to be able to identify all the species, provided they can be distinguished from each other. If we want to compare two different areas (e.g. sandy beach and rocky shore) we can compare the values of D.

As an example, let us work out the value of ***D*** for a single quadrat sample of ground vegetation in the sand dunes at Hammer Bay. Of course, sampling only one quadrat would not give you a reliable estimate of the diversity of the dune flora. Several samples would have to be taken and the data pooled to give a better estimate of overall diversity. The method used to optimise the sampling is the **Optimum Quadrat Size technique**.

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Species	**Number (n)**	**n(n-1)**
Sea holly	2	2
Sand couch	8	56
Sea bindweed	1	0
Sporobolus pungens	1	0
Echinophora spinosa	3	6
Total	**15**	**64**
	N = 15	**Σ n(n-1) = 64**

Putting the figures into the formula for Simpson's Index:

$$D = 1 - \left(\frac{\Sigma\, n(n-1)}{N(N-1)} \right)$$

$$D = 1 - \left(\frac{64}{15(14)} \right)$$

Simpson's Index of Diversity = 0.7

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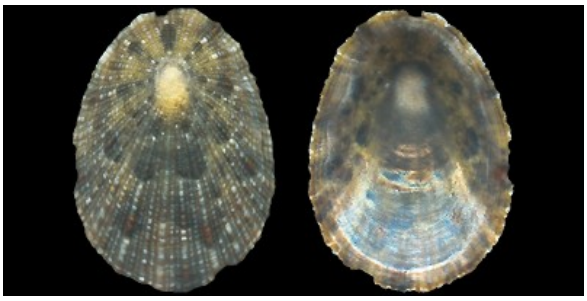
GUIDE TO SOME COMMON MARINE MOLLUSC SPECIES OF JEJU ISLAND

Acanthopleura japonica (Lischke, 1873)

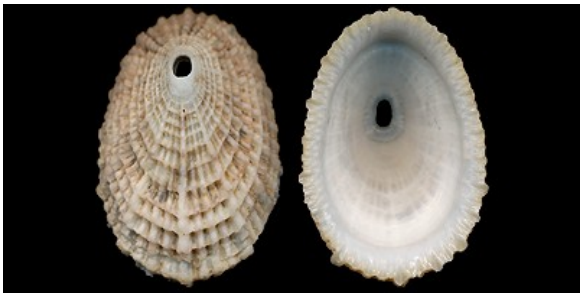
Cryptoplax japonica Pilsbry, 1901

Cellana nigrolineata (Reeve, 1854)

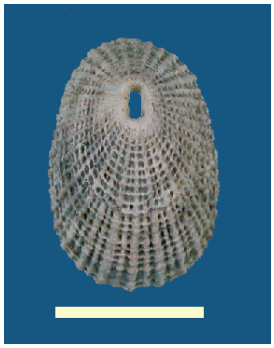


Cellana toreuma (Reeve, 1854)

Patelloida saccharina lanx (Reeve, 1855)

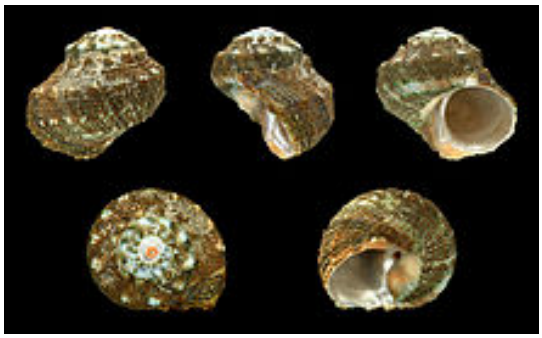


Diodora (Diodora) sieboldi (Reeve, 1850)



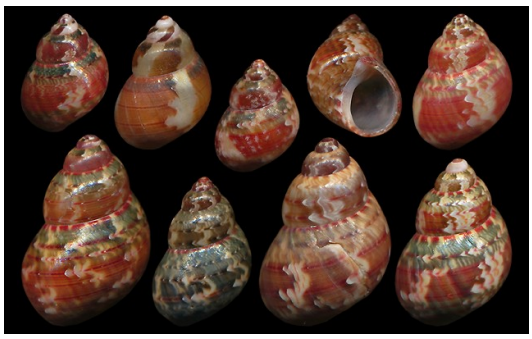
Diodora (Elegidion) quadriradiata (Reeve, 1850)

Turbo (Batillus) cornutus Lightfoot, 1786



Turbo (Lunella) coronatus coreensis (Recluz, 1853)

Astralium haematragum (Menke, 1829)



Phasianella solida (Born, 1780)

Chlorostoma lischkei Tapparone-Canefri, 1874

Omphalius pfeifferi carpenteri (Dunker, 1882)

Monodonta (Monodonta) australis Lamarck, 1822

Umbonium (Suchium) costatum (Valenciennes in Kiener, 1838)

Nerita (Theliostyla) albicilla Linnaeus, 1758

Nerita (Heminerita) japonica Dunker, 1860

Cerithium kobelti Dunker, 1877

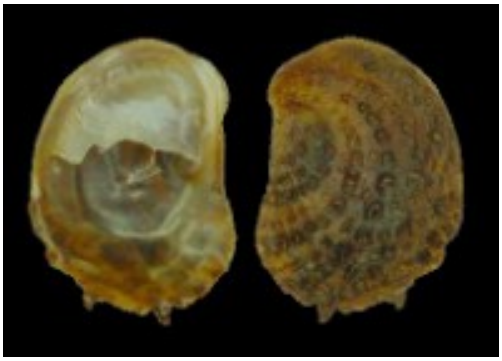
Rhinoclavis (Proclava) kochi (Philippi, 1848)

Batillaria cumingii (Crosse, 1862)

Littorina brevicula (Philippi, 1844)

Nodilittorina radiata (Souleyet, 1852)

Hipponix conica (Schumacher, 1817)



Crepidula (Bostrycapulus) gravispinosus Kuroda and Habe, 1950

Serpulorbis imbricatus (Dunker, 1860)

Purpuradusta gracilis (Gaskoin, 1848)

Erosaria helvola (Linnaeus, 1758)

Glossaulax didyma didyma (Röding, 1798)

Ergalatax contracta (Reeve, 1846)

Thais (Reisha) bronni (Dunker, 1860)

Thais (Reisha) clavigera (Kuster, 1860)

Japeuthria ferrea (Reeve, 1847)

Euplica scripta Lamarck, 1822

Pyrene flava (Bruguiere, 1789)

Mitrella (Mitrella) bicincta (Gould, 1860)

Anachis miser miser (Sowerby II, 1844)

Hima (Reticunassa) fratercula (Dunker, 1860)

Hastula strigilata (Linnaeus, 1758)

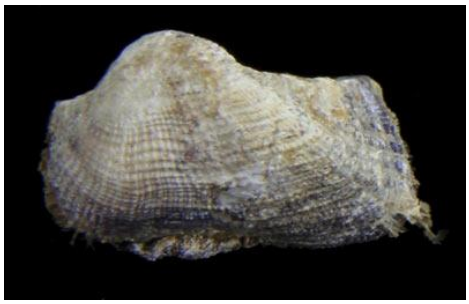
Haloa japonica (Pilsbry, 1895)

Siphonaria japonica (Donovan, 1824)

Siphonaria sirius Pilsbry, 1894

Septifer virgatus (Wiegmann, 1837)

Brachidontes mutabilis (Gould, 1861)



Arca avellana Lamarck, 1819

Barbatia (Ustularca) stearnsii (Pilsbry, 1895)

Scapharca inaequivalvis (Bruguiere, 1789)

Oblimopa japonica (A. Adams, 1863)

Glycymeris aspersa (Adams and Reeve, 1850)

Ctenoides annulata (Lamarck, 1819)

Ctenoides lischkei (Lamy, 1930)

Crassostrea gigas (Thunberg, 1793)

Saccostrea kegaki Torigoe and Inaba, 1981

Chlamys irregularis (Sowerby II, 1842)

Spondylus barbatus cruentus Lischke, 1868

Chama fraga Reeve, 1846

Cardita leana Dunker, 1860

Acrosterigma burchardi (Dunker, 1877)

Mactra chinensis Philippi, 1846

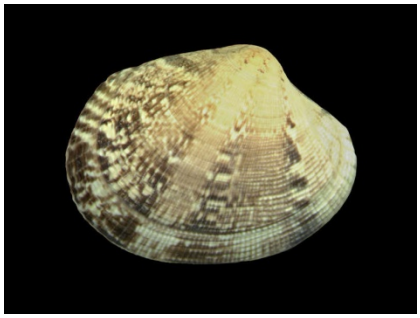
Coecella chinensis Deshayes, 1855

Heteromacoma irus (Hanley, 1845)

Nuttalia olivacea (Jay, 1856)

Bonartemis histrio histrio (Gmelin, 1791)

Bonartemis histrio iwakawai Oyama and Habe, 1961



Ruditapes philippinarum (Adams and Reeve, 1850)

Ruditapes aspera (Quoy & Gaimard, 1835)

Gomphina (Macridiscus) aequilatera (Sowerby I, 1825)

Irus irus (Linnaeus, 1758)

Group 1	Group 2	Group 3	Group 4
Ahyoun (Jessica) Cho	Adam Husairi	Cailey Seo	Aliyah Zulkarnain
An-An Panjaphakdee	Chris Mooyoung Lee	Do Hun (Kevin) Lee	Andrea Young
Azqeya Masle	Dayana Kula	Earn Chandavimol	Dylan Zayd
Daniel Kim	Eugene Park	First Wattanarungsrikajorn	Fangjie (Jim) Li
Ellie Baek	Hojun (Danny) Ryu	Isabella Spina	Hangyeol Chris Lee
Fa Saensiribanphot	Jammie Thaineua	Ji Hwan Kim	Hyuk (Joshua) Chang
Janice Jeonghyeon Huh	Jin Chun	June Song	Mimi Jirarattanarangsee
Jung Eun Ahn	Junyeop (Jay) Shim	Mei Yan Soh	Minjune (Eric) Song
Min Su Steve Kang	Kitty Kidd	Mind Rathlertkam	Nayeon (Nancy) Kwon
Minjoo Jeong	Nikhil Khare	Naja Srifeungrang	Shannon Yew
Nichole Gill	Saehyun (Nancy) Park	Sal Yein Lee	Soyoung (Bora) Kwon
Yeonju Shin	Winnie Yothinwatcharawete	Taeho Lee	Sujung (Claire) Yoo
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Ying Jia Cheng	Yvette Kim	Yeseo Kim	Sunho Justin Yang
			Tae-Kyu (Ted) Kim