Jagannath Kishore College

Purulia, West Bengal

SEM – 6

DSE P5

Animal Behavior and Chronobiology

Field Trip to Chandipur, Odisha

by **Department of Zoology**

Acknowledgement

I am obliged to Dr. Santanu Chattopadhyay, Principal of our Jagannath Kishore College, Purulia for inspiring us and letting us permission for the excursion in Chandipur, Odisha.

My profound gratitude and greatest obligation are extended to Dr. Partha Sarathi Saha, Head of Department of Zoology, Jagannath Kishore College in recognition to his guidance during this study and for giving me an excellent insight of the programme and its objectives.

I would also like to express regardful acknowledgement to Dr. Niloy Kundu, Mr. Biswarup Mahato, Mr. Shib Shankar Bhattacharyya, Ms. Kinjol Dutta and Mr. Aviram Mahato for their constant and warm encouragement and careful supervision.

Student

Signature

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Introduction;

Going on a educational trip means more than simply leaving the college grounds. Although educational trip should have a major educational objective, but the impact of educational trip can extend much further. The excursion gives us the scope to handle with the real world, that we had studied theoretically within class room. Therefore it can be said that the application of the theoretical knowledge to match and identify the real world specimens and events was the main significance of the educational trip.

Classical zoology tells about the classification and distribution of the animal world. We found a lot of invertebrates fila like Cnideria, Arthropod, Echinodermata as well as vertebrates have their large distribution in marine world.

It was always a great interest to us to know what happens under the sea. Therefore, we select costal area of Chandipur of Orissa to study the animal diversity of marine life.

Chandipur is a small resort in Baleswar district, Orissa, India (21.47° N 87.02° E). It is on the Bay of Bengal. The beach is unique in that the water recedes up to 5 kilometers during the ebb tide. Due to its unique circumstances, the beach supports bio-diversity, which we have mentioned later in this field report.

Biodiversity analysis along with the physical parameters of sea water in Chandipur beach made this excursion unique. It provided us the opportunity to experience the field work beyond textbook, which helped us to link up our theoretical knowledge to its real applications.

Objectives:

1. **Water analysis of Chandipur sea beach.**

2. **Study of faunal diversity and it's significance as bio-resources, in Chandipur sea beach.**

Group Members

Teachers:

1. **Dr. Partha Pratim Saha, Dr. Niloy Kundu, Mr. Biswarup Mahato, Mr. Shib Shankar Bhattacharyya, Ms. Kinjol Dutta (Dept. of Zoology, J.K. College, Purulia)**

Nonteaching Staff:

1. **Mr. Aviram Mahato**

Students: (Total 23)

- **Abhishek Mahato**
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- **Gouranga Sing Sardar**
- **Ishani Paul**
- **Jayadrath Mahata**
- **Subhrasri Roy**

Tour Itinerary:

Date	*Time*	*Event*
14.12.2021	8.00PM	Started from Purulia by Chakradharpur-howrah passenger to Howrah.
15.12.2021	4.00 AM	Reached Howrah
	6.00 AM	Started for Balasore by Dhouli Express
	9.30 AM	Reached Balasor and started for Chandipur by Auto.
	10.15 AM	Reached Chandipur.
	12.00 to 2.00 PM	Biodiversity study at Chadipur sea beach. (Rescued 5 horseshoe crab wrapped in fishing net)
	3.00 PM to 6.00 P.M.	Sea water analysis.
16.12.2021	5.00AM	Collection and analysis of Sea water.
	8.00 AM to 3.00 PM	Sight seen (Kuldiha Forest)
	5 PM to 6 PM	Collecting data on significance of the available species in sea bed. Water analysis
17.12.2021	5 AM to 10 AM	Visit to sea bed and water analysis.
	2.00 PM	Started for Balasore from Chandipur.
	3.30 PM	Strated for Purulia from Balasore by Nandankanan Express.
	10.30 PM	Reached Purulia safely.

The 460 km long coast area of Orissa has not been completely studied in terms of it's biodiversity. The part in the east coast of the Bay of Bengal consist of large brakish water lake i.e. Chlka, vast golden sand beaches of Puri and Konark,unique sea beaches of Chandipur, Dance mangrove forest of Bhitarkanik where thousands of Olive riddle turtle came every year to hatch their young ones. So far diversity of the coastal area has not been explored. Therefore, it renewed our interest to explore the virgin costal belt to unravel its biological wealth. We selected the particular area, Chandipur sea beach for our biodiversity study. The unique feature o that beach was that, the sea recedes by as much as five kilometers every day during low tide and returns to fill the emptiness during high tide. It happens twice in a day.

Considering its uniqueness of water levels, the beach supports a varied range of biodiversity. It was not rare to thus found a horseshoe crab or rd crabs crawling on the beach. In fact it was the breading ground of horseshoe crabs. In fact, we found five of them warped in fishing net. We rescued them in live condition and leave them in the sea water during the high tide. Along with the horseshoe crab anther creature which drew our attention that was Eupagurus sp. the hermit crabs of different size, were crawling with its symbiotic partner Sea animones. Beside those different types of mollusks, Balanus, prawns, star fish, common crabs etc were also observed in that unique sea beach of Chandipur during low tide. We measured the water parameters (dissolved 0_2, free CO_2 and pH) of that beach during low and high tide. Those physical parameters and the practical experience with marine animals enlighten our knowledge about the biodiversity of that costal region and also gave opportunity to analysis their potentials as a biological resource.

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OBJECTIVE 1: WATER ANALYSIS OF CHANDIPUR SEA BEACH.

A) Estimation of Dissolved Oxygen in the Sea Water sample:

- *Procedure:*

1. At first, 250 ml Sea Water is taking in sample bottle.
2. Then 1 ml. Of Manganous Sulphate solution followed by 1 ml. alkaline iodide solution are added.

3. A whitish or brownish precipitation is formed on introduction of the regents.
4. The bottle is vigorously inverted a few times for mixing up of the regents with the water sample.
5. Then the precipitation is allowed to settle down to about 1/3rd of the volume of the bottle.
6. After that, 1ml. of concentrated Sulphuric Acid is run along the neck of the bottle.
7. Then the bottle is vigorously and repeatedly inverted until the precipitation is dissolved.
8. Now, 50 ml. of the treated sample is taken in a conical flask
9. 0.0125 N (N/80) sodium thiosulphate solution is then run into conical flaskfrom a burette till the brown colouration of the sample becomes pale yellow.
10. Then 5 drops of starch solution is added and mixed well. The sample turns in to blue.
11. The titration is continued quickly but carefully until the first disappearance of the blue colour.

Data Sheet

Date	***Time***	***High tide/Low tide***	***Sample volume***	***Result***
15.12.2021	**3:00 p.m.**	**During High tide**	**50 ml.**	**1.27 mg/lit.**
17.12.2021	**4:50 a.m.**	**During Low tide**	**50 ml.**	**8.725 mg/lit.**

B) Estimation of free carbon-di-oxide in the Sea Water sample:

- *Procedure :*

1. 100 ml. of the sample water is taken in a conical flask.This is done with the minimum exposure of the sample in the air and without shaking on agitating the sample.
2. If the sample turns pink and remains so, on addition to indicator solution, there is no free carbon-di-oxide.

3. If the sample remains colourless, there is free carbon-di-oxide in the solution and the titration is followed.
4. The 0.0227 (N) sodium hydroxide titrant solutions is run into the sample drop by drop. Then the sample is swirled gently to mix.
5. The titration is continued until a persistent pink colour appears in the sample.

Data Sheet

Date	***Time***	***High tide/Low tide***	***Sample volume***	***Result***
15.12.2021	**3:00 p.m.**	**During High tide**	**100 ml.**	**No free Carbon-di-oxide is present**
17.12.2021	**4:50 a.m.**	**During Low tide**	**100 ml.**	**3.99 mg/lit.**

C) Determination of pH of Sea water sample:

- *Procedure:*

1. A small piece of pH indicator paper is cut off.
2. Then it is held with a foreep and is dippen into the sea water sample.
3. The developed colour is compared with the chart of pH scale and the data is recorded.

Data Sheet

Date	***Time***	***High tide/Low tide***	***Result***
15.12.2021	**3:00 p.m.**	**During High tide**	**6.0**
17.12.2021	**4:50 a.m.**	**During Low tide**	**6.0**

OBJECTIVE 2: STUDY OF FAUNAL DIVERSITY AND IT'S SIGNIFICANCE AS BIO-RESOURCES, IN CHANDIPUR SEA BEACH

Faunal components found in Chandipur sea beach.

Phylum	***Animals***
Cnidaria	Sea Anemone
Arthropoda	Horseshoe crabs Crab, Balanus, Red crab, Common crab, Hermit crab, Tiger prawn.
Molluska	Different types of gastropods and bivalves
Echinodermata	Star fish, Sea urchin
Chordata	Puffer fish

Description of different faunal elements, were found in Chandipur beach

Horseshoe Crabs

Systematic Position: According to Ruppert & Bernes

Phylum: Arthropoda

Subphylum: Chelicrata

Class: Merostomata

Genus: Limulus

Specimen: *Limulus sp.*

General Ideas:

Horseshoe crabs live primarily in and around shallow ocean waters on soft sandy or muddy bottoms. They occasionally come onto shore to mate. The entire body of the

horseshoe crab is protected by a hard carapace. It has two compound lateral eyes, each composed of about 1,000 ommatidia, plus a pair of median eyes that are able to detect both visible light and ultraviolet light, a single endoparietal eye, and a pair of rudimentary lateral eyes on the top. The latter become functional just before the embryo hatches. Also, a pair of ventral eyes is located near the mouth, as well as a cluster of photoreceptors on the telson. The horseshoe crab has 5 additional eyes on top of its shell. Despite having a relatively poor eyesight, the animals have the largest rods and cones of any known animal, about 100 times the size of humans and their eyes are a million times more sensitive to light at night than during the day. The mouth is located in the center of the legs, whose bases are referred to as gnathobases and have the same function as jaws and help grind up food. The horseshoe crab has five pairs of legs for walking, swimming, and moving food into the mouth, each with a claw at the tip, except for the last pair. The long, straight, rigid tail can be used to flip the animal over if turned upside down, so a horseshoe crab with a broken tail is susceptible to desiccation or predation. Behind its legs, the horseshoe crab has book gills, which exchange respiratory gases, and are also occasionally used for swimming. As in other arthropods, a true endoskeleton is absent, but the body does have an endoskeletal structure made up of cartilaginous plates that support the book gills. They are more often found on the ocean floor searching for worms and mollusks, which are their main food. They may also feed on crustaceans and even small fish.

The Asian horseshoe crab, *Tachypleusgigas* (Müller), also known as Asian king crabs belongs to the family Limulidae.. They have been classified in Phylum Arthropoda; subclass Xiphosura and phylo-genetically more related to Arachnida thanto Crustaceans [1-2].

Distribution in India:

It is the only marine primitive invertebrate which is widelydistributed on earth. There are only four species of horseshoe crabs in existence in the worldtoday. These are *Limulus polyphemus, Tachypleusgigas, Tachypleustridentatus, and Carcinoscorpiusrotundicauda* In Asia, *T. gigas*are distributed from Bay of Bengal to South-West of Japan. The horse-shoe crabs in the Bay of Bengal are the widely distribution in Asia and their species distribution, shapes and behaviours are very interesting. There are some reports about the distribution and spawning activities of horseshoe crabs of Odisha and West Bengal in India [3].

Significance:

These creatures are sometimes called “living fossils” because they have changed little from their fossilized relatives; the earliest species identified is approximately 450 million years old. They evolved from trilobites about 550 million years ago, and keep similar shapes for more than 200 million years.

The horseshoe crab has been useful in different way to human. They are commonly used as bait and in fertilizer. Beside that the compound eyes of the horseshoe crab can polarize light and the crystal lining cones concentrate it tenfold, that is an adaptation to suit their continuous living in translucent and dark muddy water. The vision is also sensitive to infrared and ultraviolet lights. This helps horseshoe crab to find their way on cloudy days when the sun cannot be seen and a small patch of clean sky is enough for the animal to locate the sun’s position. The principle has been very useful in developing a compass for navigating in polar regions like Antarctica where magnetic compass is found not reliable. The celestial navigation is also difficult because in that regions as the sun and stars are not visible in the long polar twilight. Beside this design of eye structure has also been successfully adopted in solar energy collection.[4]

In recent years, medical science has found this valuable creature as a potential source of a bioactive substance, a diagnostic reagent, the Limulus Amoebocyte Lysate (LAL) from its blue blood. That reagent is highly sensitive and useful for the rapid and acute assay of gram-negative bacteria.

Our observation:

- Horseshoe crab were plenty available at Balaramgari beachAlong the northeast coast of India, and they normally migratetowards the shore in large numbers coinciding with the tidal height and grain size of the sediment and spawn in nests made in sand at Balaramgari beach but now the habitat has almost shifted to Balaramgari estuary to nearestuary where less human activity are there in same district Balasore.
- Horseshoe crabs were incidentally caught largely by trammel net used for prawn fishing, mechanized trawler nets, monofilament gill netting on the mudflats [5]. **We also rescued**

a group of 5 crabs on the first day, warped with fishing net and that was a great experience to us.

- Currently, the availability of horseshoe crabs (*T.gigas*) are restricted to smaller areas of coast of Balasore. In this connection, it is suggested to declare those remaining breeding part of horseshoe crabs as a conservation reserve. Efforts should be made to protect their breeding beaches from.

Hermit Crab

Systematic Position: According to Ruppert & Bernes

Phylum: Arthropoda

Subphylum: Crustacea

Class: Malacostraca

Genus: Eupagurus

Specimen: *Eupagurus sp.*

General Ideas:

"Hermit crab" the name is applied to a decapods crustacean that occupy empty gastropod (snail) shells for protection of their soft abdomens. The name has been in use due to based on the solitary lifestyle of these crabs. But present findings showed that hermit crabs certainly do not live in seclusion. In fact, due to their use of gastropod shells, whole communities are found associated with hermit crabs, includes species that attach to the shells, bore into the shells, live within the lumen of the shells of the hermit crab.

Bodies of hermit crabs divided into two segments: cephalothorax and abdomen. The cephalothorax is encased by a carapace consisting of three thick cuticle layers. The abdomen is soft and coiled to the right and body colour is typically reddish or brown and protected by their

occupied gastropod shells. Eggs of the hermit crabs are generally black in colour. Females carry eggs until they hatch (2 months, on average). Developmental stages of the hermit crab include four zoeal (39-47 days) and a glaucothoe/megalopa larval stage (13 days) before reaching adulthood.

Distribution in India:

These crabs live along coasts in almost all types of sea beds, including rocky and shell bottoms, in sea grass beds, and sandy sediments, but excluding muddy bottoms. Hermit crabs were reported from near-shore North Atlantic waters of northwestern Europe, from the white sea to the British Isles, including the north, Baltic and Barents seas. They are found as far south as Portugal, including in the Mediterranean Sea. From India a taxonomic survey conducted by researchers from the Department of Aquatic Biology and Fisheries under the University of Kerala has revealed that Kerala coast is the home to a rich diversity of hermit crabs, also reported the presence of 40 species of hermit crabs, including one new species *Ciliopagurusgrandis* [6].

Significance:

Hermit crabs form a very important link in the food web of the oceans as scavengers anddetritovores and the major food of carnivorous fishes, including economically valuable species of fishes. They are fascinating specimens for zoologists, are used as an ideal experimental organism to study environmental influences. They are also used as pet keeping in aquarium. Thus it's ecological and economical value and unexplored research opportunities, represents the hermit crabs as an important organism in the living sea-world. No such information is available regarding the toxicity of Hermit crab. It is likely that the secretion of Hermit crab may have biomedical importance that needs special attention of the pharmacologists and toxinologists.

Our observations:

- Research on hermit crab mainly included the study of hermit crab community symbionts and their extensive behavioral studies. Findings on hermit crab symbionts showed that arthropods, flatworms and polychaetes are mostly found free-living within the lumen of

inhabited shells. Almost all cnidarians, bryozoans and sponges are found attached to the shell. Some of these species benefit hermit crabs by alleviating the need of the host to switch into new shells as they grow because the epibionts (symbionts found living on the shell) grow with them. But boring species (mainly polychaetes) negatively impact hosts by reducing shell strength and thus making hosts more susceptible to predation.

- The behavioral research mainly focused on their intelligent selection of suitable discarded shells as their 'home'. Several hermit crab species, both terrestrial and marine, use 'vacancy chains' to find new shells: when a new, bigger shell becomes available, hermit crabs gather around it and form a kind of queue from largest to smallest. When the largest crab moves into the new shell, the second biggest crab moves into the newly vacated shell, thereby making its previous shell available to the third crab, and so on [7].

Sea anemone

Systematic Position: According to Ruppert & Bernes

Phylum: Cnidaria

Class: Anthozoa

Genus: Diadumene

Specimen: *Diadumene sp.*

General Ideas:

Sea anemones are brightly coloured, classified under the phylum Cnidaria, inhabit coastal waters throughout the world, but are particularly abundant in tropical oceans. They are distributed in intertidal to deep oceans and live attached with rocks, sea floor, shells and some forms burrow in the mud or sand. They are radial symmetric with columnar body have a single body opening, mouth which is surrounded by tentacles. However, body shape of the sea anemones is often related to the habitat in which they live. Sea anemones are solitary polyps

and are considerably larger and heavier than the polyps of hydrozoans. There are over 1000 species of sea anemones reported worldwide. The size is usually about 2.5-10 cm across, but few grow up to 1.8 meter across. They are carnivorous, prey upon small fishes, sea urchins, shrimps, crabs, worms with their nematocysts. Scattered record on temperate sea anemones surviving many decades in commercial aquaria, and the life span of small sea anemone is calculated based on actuarial tables to be over 300 years [8].Sea anemones reproduce both sexually by external fertilization followed by the development of planktonic Planula larva and settled down as single polyp, and asexually by budding, binary fission and pedal laceration.

Distribution in India:

As evinced by scant literature, though India having 7600 km long coastline, studies on sea anemones in Indian waters are very limited, except the studies made by Annandale (1907) [8], Panikkar (1939) and Parulekar (1990) [9]. Parulekar (1990) has enumerated 40 species of sea anemones belonging to 33 genera under 17 families from India. The actiniarian sea anemone fauna of India is so far known from few places viz. West Bengal (Port Canning), Orissa (Chilkalake), Tamil Nadu (Adyar backwaters and Gulf of Mannar), Kerala (Cochin backwaters and Ashtamudilake), Gujarat (Gulf of Kachchh), Maharashtra (Mumbai, Malvan), Goa, northern Karnataka and Andaman and Nicobar Islands. Further study conducted by the Zoological survey of India in 2014 revealed another 15 species of Actiniarian sea anemones belonging to 11 genera and 8 families from 6 regions of Andaman and Nicobar Islands [10].

Significance:

The sea anemones are received more attention for their potential uses in drugs and pharmaceuticals as well as sentinel organisms for ecological monitoring of estuarine and marine environment and also played a role in the marine aquarium trade. Sea anemones are susceptible to overexploitation due to their long-life spans, slower relative growth rates, and lower reproductive rates. Despite these facts, global trade in marine ornamentals is a rapidly expanding industry involving numerous countries around the world.

Our observations:

- ***Identified species:*** We found a huge numbers of sea anemones in the Chandipur coastal region. And most of them were Diadumene sp., very likely resemble the reporting of ZSI in 2014 [10].

- ***Symbiotic relation with hermit crab:*** Hermit crabs and sea anemones share an unusual and intimate underwater relationship. Young hermit crabs will often pick up a young sea anemone to attach to their shell and they become partners for life. The relationship of the hermit crab and sea anemone serves both a multitude of purposes.

  Hermit crabs and sea anemones have a symbiotic relationship. It's a stable connection that sidesteps the typical prey and predator relationship found in nature. The type of symbiosis they engage in is called commensalism. Commensalism means one organism benefits and the other organism isn't harmed by the partnership. Neither the hermit crab nor the sea anemone is negatively affected by their symbiotic and commensalistic relationship

The hermit crab gains protection from predators by its relationship with the sea anemone. The sea anemone spreads out long stinging threads over the hermit crab like a bright pink curtain. The anemone also extends its stinging tentacles out as additional protection. A hermit crab is less likely to be eaten by a larger predator fish if he has an anemone onboard.

Since the sea anemone will eat just about anything in the sea, it gets to eat whatever tidbits the hermit crab leaves behind. The hermit crab does the work of capturing pray and the sea anemone cleans up the leftovers. It's a steady food supply for the sea anemone.

Sea anemones move very little. An added benefit of hitching a ride on a hermit crabs shell is getting exposed to a much larger area to forage for food. While the hermit crab is trolling around on the sea floor, the anemone can make use of the time traveling on his mobile home to trap and collect plankton and small fish.

- ***Asexual reproduction:*** we observed the asexual reproduction of Sea anemone. It asexually reproduces during harsh conditions. We collect a sea anemone and put it within a plastic vial with sea water along with a hermit crab. There was a very little space remained in that container after putting the crab. We leave that container in the room temperature overnight untouched. In the next morning surprisingly, we didn't find that sea anemone within that container, in that place we observed some baby anemone attached on the bottom of the container.

Sea Urchin

Systematic Position: According to Ruppert & Bernes

Phylum: Echinodermata

Subphylum:

Class:

Genus: Echinus

Specimen: *Echinus sp.*

General Ideas:

Sea Urchins are perhaps the most capricious fantastic of all echinoderms. They look like prickly balls or small rolled-up hedgehogs. Their size varies from four to twenty five centimetres. They are widely distributed in all shallow and coastal waters in the cracks and crevices of rock pools or amidst soft seaweeds. The deep-water forms are gregarious, covering large areas of the bottom. In appearance a sea urchin is very different from an armed starfish; yet it has the same fundamental structure. Especially it is a starfish and its globular form is the result of its five radial arms having bent upwards and united along their margins and tips.

In starfish the skeletal plates are only loosely connected by fibrous tissues but in a sea-urchin the plates are fused to form a hard shell enclosing all the soft parts of the animal including the tube-feet. The mouth however is uncovered. In life the plates are covered with slime outside and within and also between each plate. In a growing urchin these plates are continually thickened by a deposit of fresh limy matter formed by the action of slime and sea water. Additional plates are also added where the tips of the arms converge. Radiating upwards from the mouth along the arms are five bands of small holes through which the tube-feet can project. The pincers (pedicellarias) in a sea-urchin are most specialized than those of starfish in that they are stalked and have three jaws. The spines covering the entire body are brittle, long, sharp and movable. They aid the tube-feet in locomotion. It is a sight to see a sea-urchin moving on the tips of its spines, putting forth here and there its whiter elastic tube-feet. When some of the tube-feet shoot

and touch the ground, those already in contact with the ground are pulled back. In a short time the protruded ones are withdrawn and the retracted ones projected and through this operation of the tube-feet coming out and going in the animal progresses. The enemies of sea-urchins are large fishes.

There are three types of sea-urchins - the true Sea-urchins which are globular, Cake-urchins with almost circular and flattened bodies, and Heart-urchins shaped like a heart. Sea-urchins are coloured differently in purple, green, ochre and blue. Under each type there are several interesting forms along Indian coasts.

Distribution in India:

The species *Temnopleurus toreumaticus* is commonly found on costal region of Chennai, Orissa and Andaman Nicobar Island in India. It is slightly conical in shape about four centimeters in diameter. The shell is grayish brown covered with somewhat long and reddish spines banded white. Stomopneustesvariolaris is a big urchin with very long and thick spines mounted on tubercles and coloured purple. They are found at extreme low tide clinging to rocks. Among Cake-urchins several species of the genus Echinodiscus are common. They are recognized by the pair of oblique slits continuous with or near to the hind margin of the shell. One of the commonest Indian Heart-urchins is Echinolampas, having a slanting appearance and prominent petal markings.

Significance:

Sea urchins are not only important for their ecological roles in their environment, but are found to be very beneficial to humans as well. Besides food, for 100 years, developmental biologists have valued the sea urchin as an experimental model organism. MBL Investigators use the sea urchin as a model for studies on the basic mechanisms of development and cell division. Such studies have helped us better understand reproduction and diseases like cancer [11].

Sea urchins are "solution feeders" meaning that they absorb most of the nutrients they need directly from the seawater in which they live. Because they are sensitive to dissolved pollutants

(especially heavy metals) and other irritating substances, sea urchins are also popular laboratory animals for toxocologic studies.

Since the turn of the century, the sea urchin's embryo has been used to establish the chromosome theory of heredity, the description of centrosomes, parthenogenesis, and fertilization. Work within the last 30 years established such important phenomena as stable mRNA and translocation control, isolation and characterization of the mitotic apparatus, and the realization that the major structural proteins of the mitotic apparatus are microtubules. Sea urchin studies provided the first evidence of actin non-muscle cells.

Currently, studies with sea urchins are important for understanding fertilization, cell division, and gastrulation. Cell biological phenomena such as exocytosis, endocytosis, cell surface receptors, and the control of cell growth have involved studies with sea urchins.

Recent studies have demonstrated that the flagellar apparatus of the sea urchin sperm obtains its energy from a unique phosphocreatine cycle. Along with this, the study of sperm has been taken to space, by using sea urchin's sperm to see how it reacts in space. The sea urchin egg also provided the first demonstration of the amiloride-sensitive NA+ -H+ exchanger, which is an important component of pH regulation in all cells and is a special target for growth factor action in mammalian cells.

The sea urchin embryo has been used to determine how the genome is differentially transcribed during development. This system has several experimental advantages; a gene transfer system has been accomplished; there is a large collection of cloned genes; there are gene markers for every cell type; and a large quantity of synchronized embryos can be used.

Starfish

Systematic Position: According to Ruppert & Bernes

Phylum: Echinodermata

Subphylum: Asterozoa

Class: Asteroidea

Genus: Asteropecten

Specimen: *Asteropecton sp*

General ideas and distribution in India:

Starfish found in Chandipur beach belongs to genus Asteropecten. That me be *Asteropectenindicus*, distributed throughout the east coastal reagion of India. Grey to ash-coloured specimens with oral side whitish. Edge of the body defined by well developedsupero-marginals and infero-marginals covered by small spinelets or tubercles. Supero-marginal plates broader than elongated and smaller than corresponding infero-marginals. Infero-marginals slightly project outward along the interadials. Aboral surface paxilliform. Paxillae of moderate size and closely packed, each with 10-16 spinelets arranged in transverse rows across each arms. 17-18 paxillae across the base of the arm (when base length of the arm (br) 13mm). Larger paxillae at the base of the arms and its size decreases towards the arm tip. A single madreporite located in the interradius separated from supero-marginals by two rows of paxillae. Two actinal intermediate plates in longitudinal series on each side of interradius. Supero-marginals provided with small warts like spines on the upper edge. Upper edge of infero-marginals provided with one large spine and 3-4 smaller spines below it. The larger spine spatulate rather than pointed. Five arms with broad base and blunt tips. Ambulacra with two rows of podia devoid of suckers and a tuft of ambulacral spines arranged in a single row along each side.

Significance:

Starfish are probably the most important predator in the shallow ecosystem. They eat basically anything that they can come across. Their feeding activities control the whole ecosystem. It comes back to the concept of a keystone species – if that species is affected, it's going to have a disproportionately greater effect on the whole ecosystem because you're removing a key component.

A starfish's outer body contains a non-stick material with the ability to treat inflammatory human diseases such as arthritis and hay fever. The non-stick material achieves its curative abilities by repelling bacteria and viruses that cause diseases in human beings. The medical benefits impact positively on human lives by helping eliminate pain and create medical research ideas such as using the non-stick material to prevent human tissue damage [12].

Balanus

Systematic Position: According to Ruppert & Bernes

Phylum: Arthropoda

Subphylum: Crustacea

Class: Cirripedia

Genus: Balanus

Specimen: *Balanus sp.*

General ideas:

Balanus is a genus of barnacles in the family Balanidae. The genus is known in the fossil record from the Jurassic to the quaternary periods. Fossil shells within this genus have been found all over the world.

We have found *Megabalanus sp*. (possibly*Megabalanustintinnabulum*) is a species of large barnacle in the family Balanidae. It is the type species of the genus. small groups of barnacles resemble clusters of miniature bells.

Megabalanussp. is a large barnacle, barrel shaped or narrowly conical, up to 5 centimetres (2 in) tall and 6.5 cm (2.6 in) in diameter. It is distinguished from other members of the genus by having ungrooved growth ridges on the scutum and by the parietes having no spines or spiny projections. The parietes can be either rough or smooth, and they are sometimes slightly folded. The basal margin of the shell is either straight or slightly sinuous. The colour is a pale shade of reddish or bluish purple, sometimes streaked longitudinally with a darker or lighter shade and sometimes with transverse bands of colour.

Distribution in India:

Megabalanus sp. is of tropical origin. It is common on both the eastern and western coasts of India. It has spread to other parts of the world attached to the hulls of ships. It is also found on reefs, bedrock, boulders and timber structures down to about 40 meters (130 ft) deep.

Significance:

Antibacterial activity of balanus, against harmful bacteria to humans were reported. Beside the previously mentioned animals, other species which were also available are common crab, different types of mollusk mostly bivalve and gastropods, tiger prawn, different types of hydrozoa etc. [13].

Conclusion

From this study, it may be concluded that the distribution of various organisms found at this place has direct relation with the dissolved O_2, pH, Carbon-di-oxide concentration of the sea water. Our study during afternoon and early morning suggests that not all organisms are available in those two different times. We had estimated free Carbon-di-oxide and dissolved Oxygen in the sea water sample there and observed that both the concentrations of free Carbon-di-oxide and dissolved Oxygen in the sea water sample during low tide were higher than that of during high tide. Very likely we observed the high quantity of the marine animals in the beach

during low tide. It was due to the proper balance of O_2 and CO_2 in the water during low tide. Although no such change in pH was observed during high and low tide.

Biodiversity study is a matter of time. Collection of data and its analysis are the time taking process. We had only two days in our hand. Therefore, the collected data was not sufficient to draw a conclusion about the distribution of those animals we have found. But that was quite enough to study their abundance, behavior, living process and collecting knowledge about their ecological, economic and biomedical importance, which had been represented in this report.

It was observed that a plenty amount of sea anemone was found in the sea bed and sea and biomedical research already showed the anti-inflammatory and anti-cancer property of sea anemone extract [14]. Sea urchin spine also has bioactivity against inflammation and pain [11]. Prawns itself is a economical important product. Dead Horseshoe crabs were used as bio-fertilizer. Therefore, after analyzing the collected data and information, it can be said that the faunal components of the Chandipur sea beach is a very potential bio-resource and that can be fueled different research and developmental areas in future.

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Photo Gallary