The Mouseion

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MNS OPENS NEW OFFICE AND SOUVENIR SHOP

By J.A.D. Corvera

Finally the UPV Museum of Natural Sciences has moved to its new office. The proposed refurbishing of the new museum office is now a reality. The space which was originally occupied by the Philippine National Bank (PNB) and later used by the UPV Cash Office was fully converted as an office of the MNS.

The opening of the new office was held simultaneously with the launching of the Museum Souvenir Shop on November 19, 2009.

The museum souvenir shop occupies the space at the entrance of the new museum office. The shop was opened to help in generating income to augment the operating expenses of the office. The souvenir shop will allow the visitors to bring mementos that will make their tour worthwhile. The items for sale include T-shirts, key chains, and cellphone accessories.

Chancellor Minda J. Formacion, Vice Chancellor Alice Ferrer, Faculty, REPS and staff from CFOS and other units graced the occasion.

The Museum of Natural Sciences may be a small office but we hope that it would continue with its vision and mission to serve the academic and non-academic community. May all our plans prosper for the next years to come! Cheers!

MNS Coordinator Presents Paper at the National Museum

By V.B. Garcia with reports from S.S. Garibay

Ms. Soledad S. Garibay, the Museum of Natural Sciences Coordinator presented a paper entitled: *"UPV Museum: Its Role and Impact to the Academic and Non-Academic Community"* during the 1st General Assembly of the Basic Museology Training Participants held at the National Museum, Manila last October 6 to 9, 2009. Her paper had discussed about the standards and best practices applied by the Museum in its display of collections. The paper had also included the role of the Museum of Natural Sciences to the academic and non-academic community.

The activity was organized by the Museum Education Division of the National Museum, headed by Ms. Elenita D.V. Alba. The assembly was held for the purpose of updating, validating and sharing museum knowledge and practices among the graduates of the Basic Museology Training and to find out what the graduates have been involved in after attending the said training. With this activity, the effectiveness of museum knowledge and skills application was also assessed. The three-day gathering was attended by old and new participants coming from the different museum and universities of the country from batch year 1997 up to year 2008. Part of its activities had included the tour of the National Museum galleries and Pasig River Cruise.

Ms. Garibay was optimistic that attendance to this kind of activities will allow continuity of the program for the MNS and will further strengthened linkages with the National Museum and other existing museums in the country.

WHO EATS WHOM:

By Marianne Hubilla-Travis
MS Fisheries Biology Graduate
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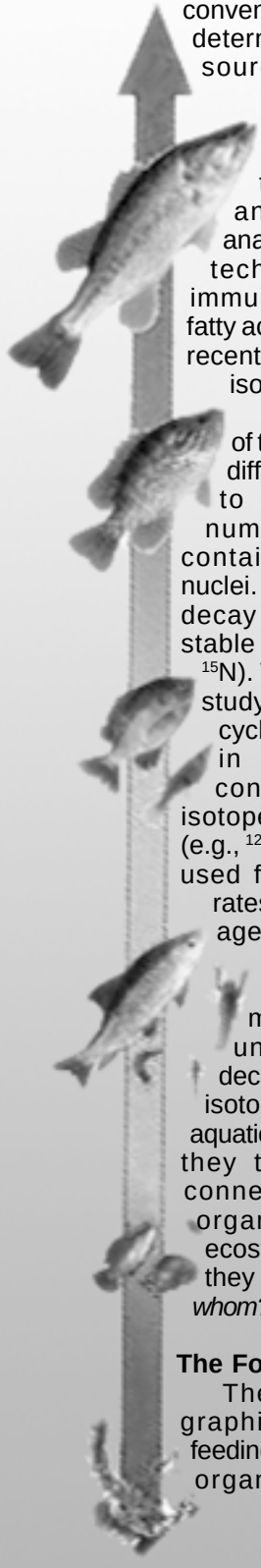
The Use of Stable Isotopes in Studying Aquatic Food Webs



In early times, aquatic biologists and ecologists used conventional techniques for determining diet and diet source. These include laboratory and field observations of feeding, radio-labeled tracing techniques, and gut content analyses. Contemporary techniques include immunological methods, fatty acid profiling, and most recently, the use of stable isotope analysis.

Isotopes are atoms of the same element that differ in atomic mass due to differences in the number of neutrons contained in the atom's nuclei. Isotopes that do not decay are referred to as stable isotopes (e.g., ^{13}C, ^{15}N). They are valuable for studying the origins and cycling of organic matter in the biosphere. In contrast, unstable isotopes or radioisotopes (e.g., ^{12}C, ^{14}N) are commonly used for studying cycling rates and for determining ages. These, however, cannot trace the origins of organic matter because they undergo radioactive decay. But how are stable isotopes used in studying aquatic food webs? How can they trace the invisible connections among organisms in aquatic ecosystems? Or how can they determine *"who eats whom?"*

The Food Web

The food web is a graphical description of feeding relationships among organisms in an ecosystem. Major components in a food web are the producers, consumers, and decomposers. There are two pathway, which refers to (1) primary production that is successively utilized by consumers; and (2) detrital food pathway, which incorporates microbial colonization of non-living organic matter and subsequent assimilation of these food components by detritivores and scavengers.

Most energy comes from the sun. Plants, also called producers, convert that energy into food through a process called **photosynthesis**. Photosynthesis is a process which uses water, carbon dioxide, and sunlight energy to make sugars. Plants do this in special cells called **chloroplasts**. These are usually green because of a pigment called chlorophyll. Most photosynthesis happens in a plant's leaves, which is why they are green. When an animal eats a plant, some of the energy gets passed from the plant to the animal.

Carbon Sources in Aquatic Ecosystems

Carbon sources refer to food resources available in an ecosystem. They can come from outside (allochthonous) the aquatic system or carbon sources from within (autochthonous) the system such as plants, microbial matter, soil, and sediments. In streams and small lakes, allochthonous sources of carbon are dominant, whereas in large lakes and oceans, autochthonous sources dominate.

Aquatic organisms feed on either autotrophic or non-autotrophic carbon sources or both. Autotrophic sources refer to photosynthetic organisms such as aquatic plants and grasses. Plants that produce three-carbon molecules as initial products in carbon fixation are called C3 plants, whereas those that produce four-carbon molecules are referred to as C4 plants. C3 plants are commonly found in cooler areas and in higher latitudes or elevations. C4 plants typically thrive in warmer habitats at lower latitudes and elevations. Alternatively, non-autotrophic carbon sources are those that do not undergo photosynthesis such as particulate organic matter (POM) or detritus; and sediment organic matter (SOM), which consists of organic constituents in soil.

Basic Principles of Stable Isotope Analysis

Stable isotopes provide a natural way to follow and trace details of element cycling. Elements of particular interest in today's environment are those that cycle tightly with organic matter. These include carbon (C), nitrogen (N), sulfur (S), oxygen (O), and hydrogen (H). In aquatic systems, most studies focused on C and N elements as they are linked in organic matter cycling. Isotopic values of these elements are expressed in ä ('delta') and ‰ ('parts per thousand') notations. Food web investigation with isotopic analysis is based on two principles. First, the $ä^{13}C$ values of animals reflect what they have assimilated—referred to as the source indicator. Second, $ä^{15}N$ values of animals increase 3–4‰ per trophic level—an indicator of trophic position.

In order to analyze aquatic food webs, potential carbon sources in an aquatic system of interest must be collected following a standard procedure. Samples must be dried, pulverized into fine powder, and weighed into tin capsules using a microbalance. Samples in tin capsules are analyzed using an isotope-ratio mass spectrometer interfaced with an elemental analyzer available in other countries such as USA, Japan, and Germany.

A scatter plot of $ä^{13}C$ and $ä^{15}N$ values of aquatic organisms is used to evaluate their carbon sources and trophic positions in the food web. Sources of organic carbon that they have assimilated are indicated by their relative positions on the *x*-axis ($ä^{13}C$ values), while trophic levels or positions are indicated by their relative positions on the *y*-axis ($ä^{15}N$ values). Generally, the $ä^{13}C$ values of C4 plants range from -14.0 to -12.0‰ and -22.0 to -35.5‰ for C3 plants. Thus, consumers with $ä^{13}C$ values of <-20‰ typically feed on C4 plants. Moreover, the $ä^{15}N$ values of consumers

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HORSESHOE CRAB: A Present Trilobite

By Cornelio M. Selorio, Jr.
IMFO-CFOS

A horseshoe crab is a strange creature with an armored shell and spiked tail. It belongs to the phylum Arthropoda and class Merostomata, which means, “legs attached to mouth”. Though they are called “crabs”, a quick look at their taxonomy shows that they are not.

Horseshoe crab is one of the living fossils that flourish in this planet. They evolved in the shallow seas of the Paleozoic Era (540 -248 million years ago) with other primitive arthropods called trilobites, a long extinct animal which is a close relative of the horseshoe crab. The devastating changes that happened to the planet had led to the extinction of many animals and plants; but horseshoe crab survived such time of change.

This invertebrate belongs to the Family Limulidae that includes four species of horseshoe crabs all over the world, namely: 1) *Limulus polyphemus*, which can be found along the eastern coast of North and Central America, and three Indo-Pacific species, 2) *Tachypleus gigas*, 3) *T. tridentatus* and 4) *Carcinoscorpius rotundicauda*. All four species are similar in terms of ecology, morphology and serology. Horseshoe crabs can be found in the Philippines specifically in Palawan Islands.

The horseshoe crab lays eggs ashore. A newly laid horseshoe crab eggs are opaque, pastel-green and about 1.5 mm in diameter. It takes eight to ten years for the horseshoe crab to reach adulthood. It is speculated that this crab can live up to 20 years or more.

To avoid predators, the horseshoe crab’s main strategy is to feed and spawn at night time that is why the population of the crabs on the shore is hundred times more than during the day. During high tide when large predators are present nearby, the juvenile horseshoe crabs bury themselves in the sand for protection. At low tide, young horseshoe crabs emerge from the sediment but are cautious of the predator on the shore.

Economic Importance

People have used horseshoe crabs for centuries. The telson was used as spear tip and shells as containers by the native tribes. Today, some fishers use it as bait to harvest other commercial fisheries species. Bait fisheries are the largest user of this invertebrate. Recently, they have been used in scientific research that has contributed significantly to human health. The clotting reaction of the animal’s blood is used in the widely used Limulus Amoebocyte Lysate (LAL) test to detect bacterial endotoxins in the pharmaceutical tests for several bacterial diseases. There are still some research investigations on the protein from the horseshoe crab blood to be used as novel antibiotics.

The devastating changes that happened to the planet had led to the extinction of many animals and plants; but horseshoe crab survived this time of change.

Threats are commonly anthropogenic in nature. Aside from harvesting, habitat destruction is another issue in endangering the population of the horseshoe crab. The decline of the population of the horseshoe crab can endanger the shorebird and sea turtles populations as well. These animals depend on horseshoe crab as their food.

Due to lack of information and knowledge regarding horseshoe crab population, the management policies implementation is limited on rules and regulations. At present, the worldwide population is declining and one of the four species, *L. polyphemus* is categorized as near threatened by World Conservation Union (IUCN).

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A Visit to the UPV Museum

By: Shyne P. Rebato
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Time flies too fast and I am now in my third year in this University. But what is funny is that it was just my first time to explore the UPV Museum of Natural Sciences (MNS) which is located at the ground floor of the library building. Why so? During the past years, I used to only pass by and glance at that part before going directly to the library. I went in there one time but I just stared at those specimens without even reading the names and the story behind those things. The first time I saw a turtle, I thought it was fake and went out without even asking if it is true or not. I remember when my classmates talked about that turtle, it was during my freshman year here. They said it was true. When I learned it was really true, I went back to the museum to look and touch it. I was like a kid that time. After that, I just glanced at the museum but was not able to explore it again.

It was through our Aquatic Science I class that we were able to use the new MNS Audio Visual Room, where students can watch films like ABS-CBN's "Educating Ni-mo", a movie about a fish from a drawing that explored the aquatic ecosystem. Through the film, we were able to know the different species under the sea and the oceans as well as rivers. Problems of exploitation were also pointed out. It is sad to know about it, but it is a reality. These things are really happening these days. We must be accountable for our actions. If only people know that out of the hundred eggs that a turtle lays, only a few turtle will survive. If only people know the consequences of the diminishing mangrove ecosystems, then they will not cut them down ever again. These mangrove forests can serve as the spawning and feeding grounds for some species in the ocean. Without the mangroves, where will they lay eggs? Will they survive? Or will it lead to their extinction? The corals, which need many years to grow, are exploited by humans. Marine creatures are therefore greatly affected.

After watching the film, we went inside the display area and explored the museum collections there. I discovered that the dolphin's skull was actually a remnant of a stranded dolphin which was found dead along the shoreline of Miagao. Another thing I have learned is that Pandaca pygmea is no longer the smallest fish but rather considered now as the smallest freshwater fish. Many other specimens are also found there including fossils of shells and a lot more. This only shows the richness of our aquatic ecosystems.

The museum guide also showed us the different fishing nets used to gather fishes. The nets have different designs used for different kinds of fish. It was so nice to learn about these things. It was a great experience.

Truly, the aquatic ecosystems are very rich systems with many different fishes, plants, and other animals that have to be protected.

List of Donated Materials and Biological Specimens for Year 2009

1. Brochure and Galleries Guide from National Museum, Manila entitled "Ang Pambansang Tipunan ng Sining ng Pilipinas" and the "Museum of the Filipino People"
2. One photocopied reference material on Marine Mammals from IFPDS.
3. Two specimen of Vermiculated Sailfin Catfish, *Pterypgoplichthys disjunctivus,* donated by Marianne Hubilla-Travis.
4. Three species of seahorse, *Hippocampus comes, H. kuda, H. barbouri,* donated by SEAFDEC, AQD Seahorse Staff 2009

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correspond to their trophic level or position. The trophic position ranges from 1 to 5 (depending on food chain length). Herbivores usually have trophic positions between 2 and 2.9, 3 to 3.9 for omnivores, and 4 and above for piscivores. The scatter plot is valuable for identifying the major carbon sources supporting aquatic organisms in an ecosystem, determining diet and trophic positions of aquatic organisms in relation to habitat types, investigating water quality using ^{15}N isotopes, and others.

A Promising Field in the Country and Its Future

With the never ending crisis in Philippine fisheries, such as the depletion of aquatic resources due to overfishing, habitat destruction, pollution, and extensive culture of introduced exotic species; assessment based on other perspectives must be done. Stable isotope ecology is one promising field that may provide answers to many of the ecological problems yet unsolved. This could be another way of conserving wildlife and saving our vanishing aquatic flora and fauna.

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