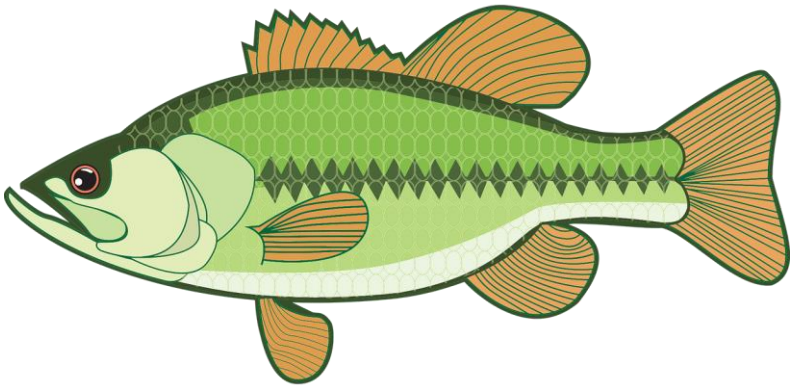
BIOPRODUCTS of MARINE ORIGIN

"OCEAN CONNECTIONS"



LESSON PLAN

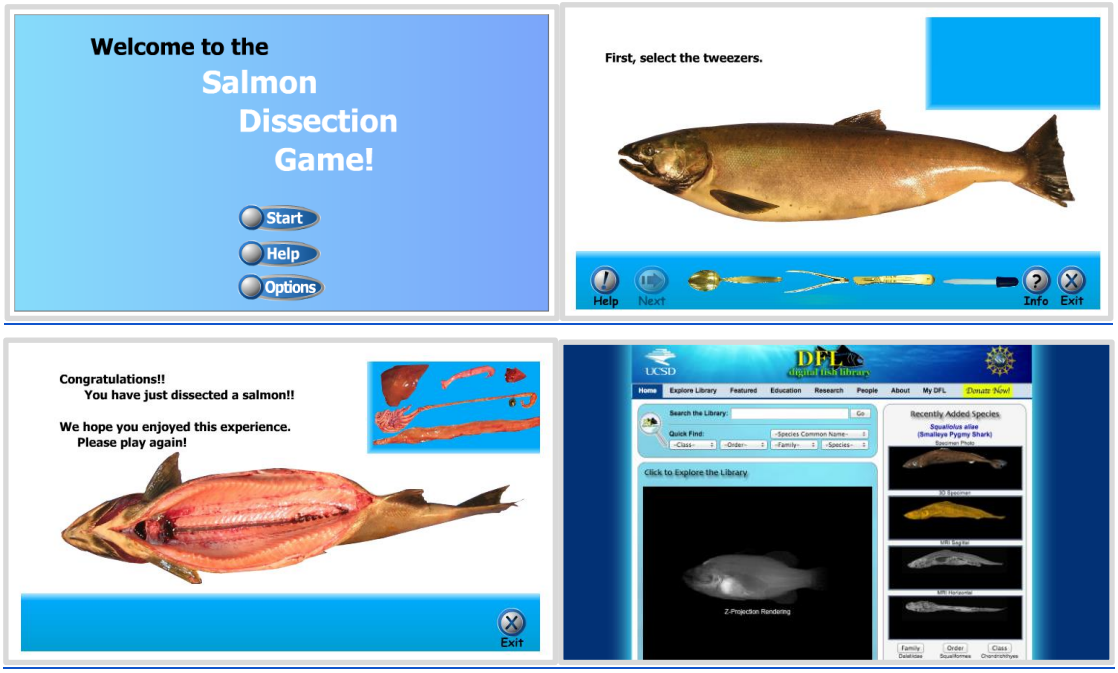
OBJETIVRS

- To improve in students the interest in knowing more about living beings in our oceans.
- Highlight the value of marine flora and fauna also through some of its by-products..
- Promote habits of respect for the environment..
- To develop skills for practical work in the science laboratory.

INTRODUCTION

Fish, molluscs, crustaceans and algae are very important for our diet but at the same time their use is optimized with a series of bioproducts that are used in different sectors and that in this unit we will study further.

To explore the topic, we will start working with a virtual fish dissection laboratory ***(Annex 1)*** and a **digital repository** where we can search for fish by family and observe them in a **3D simulator**.



ACTIVITIES

1. Research in the literature on what they are, how they are obtained and what the following bioproducts are used for:
    a. chitin
    b. chitosan
    c. collagen
    d. jelly
    e. ambergris
    f. Vitamin A
    g. vitamin D
    h. hyaluronic acid
    i. guanine
    j. sterols.

2. Match the bioproducts of activity 1 with the images ***in Annex 2.***
3. Create *infographics* or *conceptual maps* of the bioproducts with the information and images of the previous activities.
4. Virtual display of biomolecules: collagen (http://biomodel.uah.es/model5/inicio.htm#colageno).
5. Laboratory practice: obtaining chitin and chitosan ***(Annex 3)***.
6. Laboratory practice: agar-agar spherification ***(Annex 4)***.

EVALUATION

LEARNING STANDARDS	1	2	3	4
FQB1.2.1 Stablish relationship among scientific research with some simple technological application of everyday life.				

FQB1.4.2. Identify the material and basic laboratory instruments and know their way of use for the realization of experiences, respecting safety standards and identifying attitudes and preventive action measures.				
FQB1.5.1. Select and understand in a guided way relevant information in a text of scientific dissemination, and transmit the conclusions obtained using oral and written language with propriety..				
FQB1.5.2. identify the main characteristics linked to the reliability and obxectividade do flow of information existing on the Internet and other media dixitais.				
FQB1.6.1. carry out small research courses on some subject object of study, applying the scientific method and using the ICT to obtain and select information and presentation of conclusions..				
FQB1.6.2. Participate, value, manage individual and team work and respect others`work.				
FQB3.3.1. Classify some products of daily use according to their natural or synthetic origin.				
FQB3.3.2. Identify and match products from the chemical industry and their contribution to improving the quality of people's life.				
FQB3.4.1. Propose measures and attitudes, at the individual and collective level, to mitigate environmental problems of global importance.				

CONCLUSIONS

To end we propose a Kahoot with questions and answers of what students have achieve and learned throughout the unit.

REFERENCES

1. Guía de valorización de subproductos de acuicultura (VALACUI) AZTI: https://www.azti.es/wp-content/uploads/2018/12/AZTI_guia_VALACUI101218online.pdf
2. Valorización de subproductos en la industria alimentaria del Centro de Excelencia y ANFACO CECOPESCA: http://www.eoi.es/fdi/sites/default/files/Presentaci%C3%B3n_ANFACO_Valorizaci%C3%B3n%20subproductos.pdf

3. Guía de aprovechamiento de subproductos de pescado para obtención de productos funcionales bioactivos (Ministerio de agricultura, alimentación y medio ambiente): https://www.mapa.gob.es/es/pesca/temas/calidad-seguridad-alimentaria/06-Guia_Subproductos_tcm7-248616_tcm30-285791.pdf
4. Estado actual del aprovechamiento de subproductos de la industria pesquera mediante la obtención de productos de alto valor añadido del CSIC: http://digital.csic.es/handle/10261/90302
5. Activos cosméticos de origen marino de OFFARM: https://www.elsevier.es/es-revista-offarm-4-articulo-activos-cosmeticos-origen-marino-13069607
6. El océano y sus recursos IX. La Pesca de Biblioteca digital: http://bibliotecadigital.ilce.edu.mx/sites/ciencia/volumen2/ciencia3/081/htm/oceano.htm
7. Ingredientes de origen animal en cosmética: https://auraverda.wordpress.com/2016/10/03/ingredientes-de-origen-animal-en-cosmetica/
8. Obtención de quitina y quitosano a partir de exoesqueletos de crustáceos patagónicos: caraterización y aplicaciones: http://www.bioeconomia.mincyt.gob.ar/wp-content/uploads/2014/12/4.-Obtenci%C3%B3n-de-quitina-y-quitosano-a-partir-de-exoesqueleto-de-crust%C3%A1ceos-patag%C3%B3nicos-caracterizaci%C3%B3n-y-aplicaciones-J.-Dima.pdf
9. Simulaciones de biopolímeros: http://biomodel.uah.es/model5/inicio.htm
10. Digital fish library: http://www.digitalfishlibrary.org/
11. Salmon dissection game: http://portlandfreeschool.weebly.com/dissect-a-salmon.html

Appendix 1. WORK SHEET: VIRTUAL DISSECTION LABORATORY

Name_____ Surname_____Year 2 Secondary

Copy the URL http://portlandfreeschool.weebly.com/dissect-a-salmon.html You will access a virtual laboratory where you can dissect a salmon. Pay special attention to the material you use and the steps you follow in the task to perform the activities on this sheet.

A. Complete the following table, naming the laboratory material used for dissection, explaining what it is for and indicating what its hazards are and the standards or recommendations for safe use:

DRAWING				
NAME				
UTILITY				
RISKS				
SAFE DRIVING				

B. Write in the correct order the organs of the fish that are removed and placed in the tray

LIVER	1º	
HEART	2º	
EYES	3º	
SWAT BLADDER	4º	
BOWELS	5º	
STOMACH	6º	

What other elements are removed from the fish, but not placed on the tray, during dissection?

C. Make a scheme that briefly explains the procedure followed for dissection:

Appendix 2. IMAGES

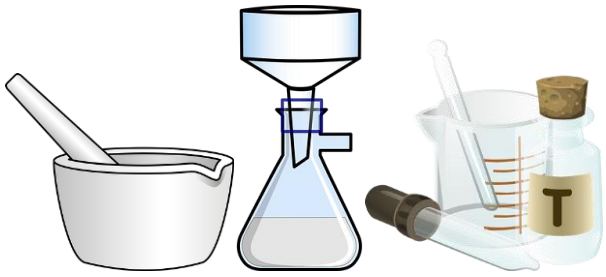
Appendix 3. LABORATORY SCRIPT: OBTAINING QUITINA AND QUITOSANO

Objetives:

- Apply calculations for the preparation of solutions..
- Acquire skills for handling laboratory equipment and for carrying out simple chemical reactions

Theoretical introduction: chitosan is formed from chitin after deacetylation. When chitin is subjected to the action of a very concentrated alkaline medium, and at moderate temperatures, the deacetylation reaction occurs. We will obtain it from exuvias, composed mainly of chitin, to try to transform them into chitosan through the following procedure:

Materials: exuvias, hidróxido de sodio, agua destilada, balanza, espátula, vidrio de reloj, mortero, papel de filtro, embudo, matraz aforado de 25 mL y frascos de vidrio.



Process:

1. We prepare 25 mL of solution with 13 M molarity of NaOH - for this we have to calculate the amount of NaOH necessary, weigh it with the scale and the clock glass and place it in the volumetric flask together with the distilled water.
2. Crush the exuvias until a fine powder (chitin) is obtained. add the chitin to the NaOH solution and leave it at a room temperature for a week.
3. After two weeks, we filter and dissolve in distilled water.

Data: M(Na) = 23; M(O) = 16; M(H) = 1

Fórmulas: $Molarity = \frac{(number\ of\ moles\ of\ solute)}{(liters\ of\ solution)}$; $número\ of\ moles = \frac{Dough}{Molar\ mass}$

Appendix 4. LABORATORY SCRIPT: SPARK WITH AGAR-AGAR

Objetives:

- Stablish relationship among science to everyday life, particularly with cooking.
- Acquire skills for the safe handling of physics and chemistry laboratory equipment

Theoretical introduction: spherification with agar agar is a cooking technique in which to obtain spheres the agar agar obtained from algae is used as a gelling agent.

Materials: agar-agar, oil, water-based colored solutions, dropper, plastic or glass containers and perforated spoon or strainer.

Process:

1. Prepare the colored solutions with water base and mix them with the corresponding amount of agar-agar.
2. Cool the oil for half an hour in the freezer.
3. Load the dropper with the solution and drop it in the cold oil
4. We collect the spheres with the help of a perforated spoon.