Escritura científica

José M Planas Rivera, PhD, OTL
Catedrático– Retirado
Biología Celular y Molecular/ Virología

Objetivos

- Al finalizar el participante podrá:
  - Definir el concepto de escritura científica
  - Enumerar las propiedades y criterios de la escritura científica
  - Mencionar el propósito de la escritura científica
  - Distinguir entre los diferentes tipos de escritura científica
  - Conocer el ciclo de vida de la información escrita
  - Conocer las partes de un abstracto
  - Conocer las partes de un afiche

¿Qué es escritura científica?

Escritura científica: definición

"La escritura científica, es un estilo estructurado, tiene sus partes visibles para el lector como una introducción, metodología, conclusiones, entre otras"

Roberto Camana

"Los críticos sobre escritura técnica afirman que no es simplemente un tipo de escritura cultivada que evita el uso de un número de elementos literarios, sino que es una forma de expresión distinta gobernada por un conjunto de criterios estilísticos consistentes diseñados para transmitir datos objetivos"

Mª del Mar Duque García

Escritura Científica: Aspectos históricos

- Inicia en el siglo XIV DC
  - En el campo de la medicina
  - Inclusión de terminología científica
  - Inclusión de nuevos hallazgos de la ciencia

Image gallery:

Escritura científica: Propósito

- Comunicar
  - hallazgos científicos
  - aplicaciones de un hallazgo científico
  - Descubrimiento de nuevo conocimiento que avance nuestro entendimiento

Estructura científica: criterios

- Unión que existe entre el contenido y el estilo de la comunicación

“It is impossible to dissociate language from science or science from language, because every natural science always involves three things:

the sequence of phenomena on which the science is based;

the abstract concepts which call these phenomena to mind,

and the words in which the concepts are expressed.

To call forth a concept a word is needed; to portray a phenomenon, a concept is needed. All three mirror one and the same reality”.

(Lavoisier, 1968: 474)

Estructura científica: criterio

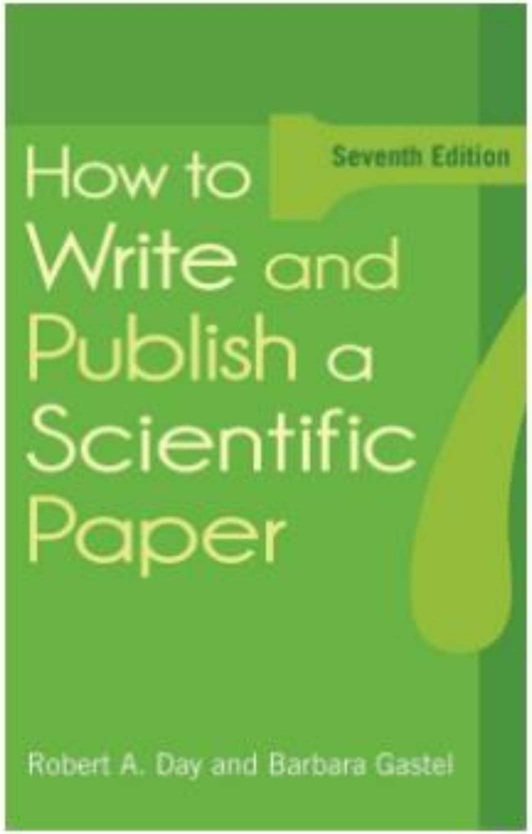
- Léxico (vocabulario)
  - Vocabulario técnico
  - Vocabulario sub-técnico
  - Vocabulario general
- Sintaxis
  - Asertivo
    - Voz pasiva → voz active
- Funciones
  - Definir
  - Clasificar
  - Describir

Escritura científica: Fundamentos

- Presenta los resultados de un proceso investigativo
  - Facilita la comprensión del mismo desde la perspectiva del lector
    - Estandarizados
      - Abstracto
      - Introducción
      - Materiales y métodos
      - Resultados o Discusión
        - Formato de tablas y gráficas, fotografías, figuras
      - Conclusión

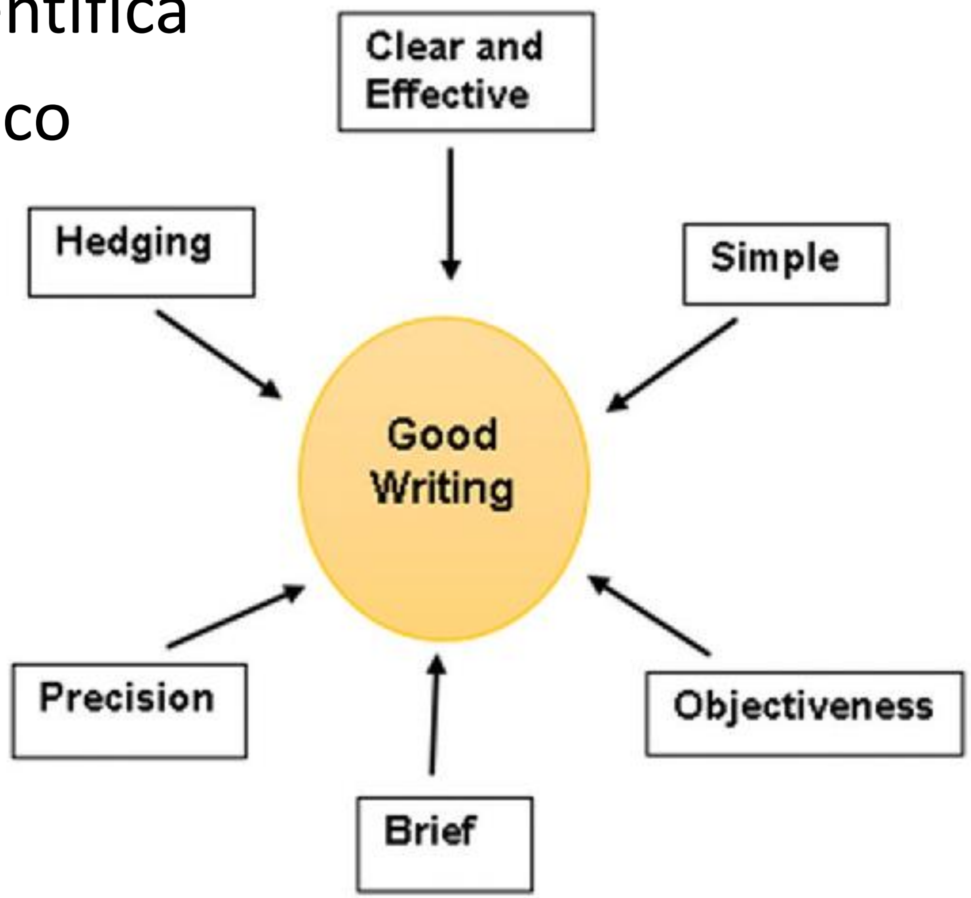
Proceso dinámico

Uso de voz activa



Escritura científica: Propiedades

- Objetiva
- Precisa
  - Especificidad
- Clara
- Breve o Concisa
- Medible
  - Sostenida en datos
- Verificable
- Universalidad
- Transparente
- Expresa lógica científica
- Pensamiento critico
- Estructurada
- Referenciada
- Colaborativa

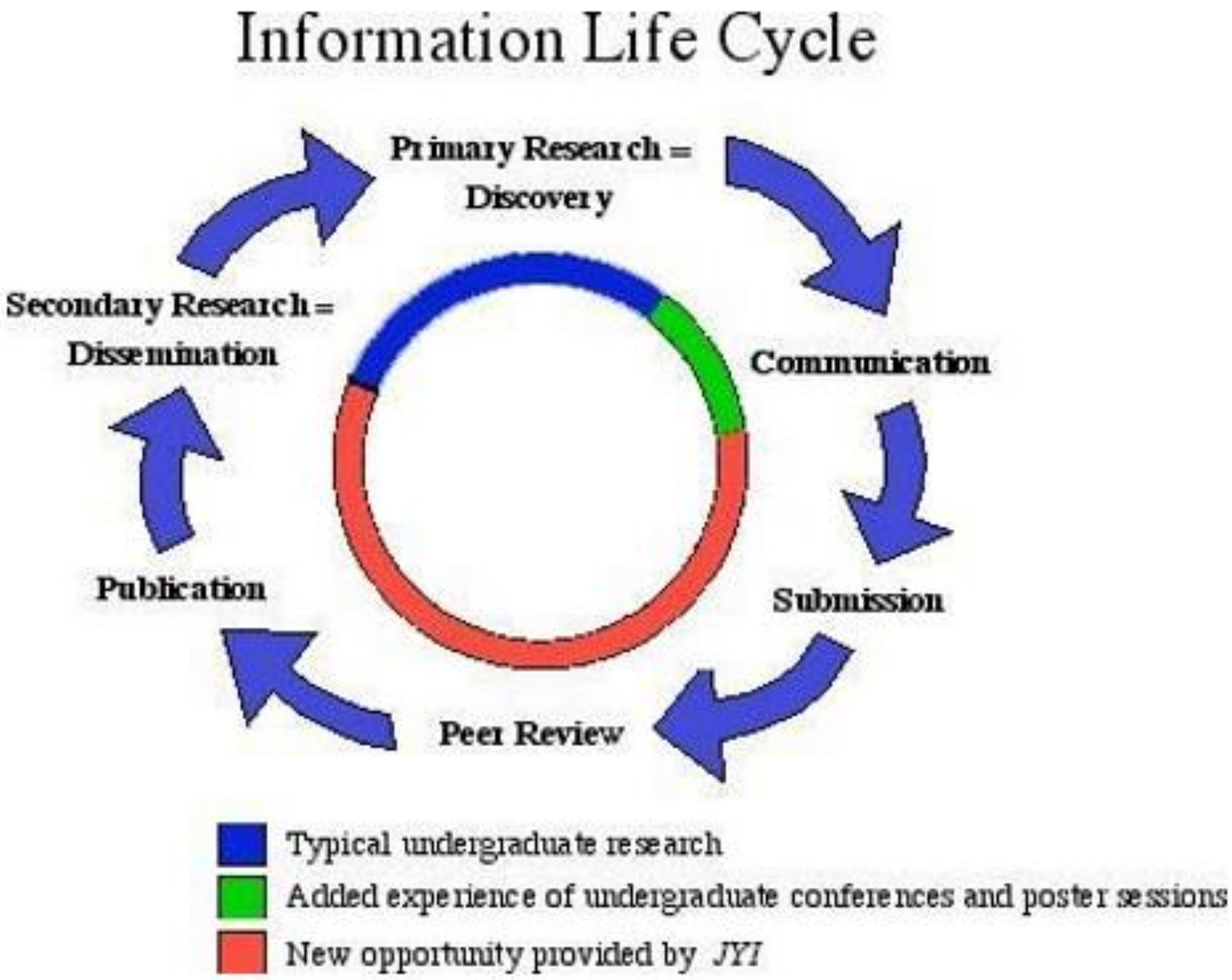


Types of Scientific Writing

	Public	Not public
Peer-reviewed	•Original research papers •Reviews •Meeting abstracts •Conference reports	•Grant Applications •Fellowship proposals
Not peer-reviewed	•Books, chapters •Book reviews •Teaching materials •Theses/dissertations •Editorial comments •Letters to the editor •Research reports (sometimes) •Web pages	•Correspondence •Confidential reports

Tipos de escritura científica

Ciclo de vida de la información científica



http://605483.shop.netsuite.com/s.nl/c.605483/it.I/id.1/.f

Escritura científica: Abstracto

- Presenta un resumen de la idea a comunicarse
- Consiste de:
    - Una o dos oraciones introductorias
    - Presenta el problema en una oración
    - Presenta la hipótesis en una oración
    - Menciona la metodología utilizada una o dos oraciones
    - Menciona los resultados obtenidos una o dos oraciones
    - Menciona las conclusión en una oración
    - Menciona la importancia y contribución a la ciencia en una o dos oraciones
- No mas de 250 palabras
- Sigue todas las características y propiedades de la escritura científica

Escritura cientifica: abstracto - Ejemplo

Abstract

Rocky seashores are ecosystems that foster multiple life forms ranging from algae to gastropods to echinoderms. These organisms have an impact in our daily life as they serve as food, biological indicators and are a source of chitin and other substances. Their ecosystems have been threatened by contaminants coming from river runoff that alter the nitrates, ammonium and phosphate levels of the ocean. River runoff carries contaminants from fertilizers, pesticides and soil erosion that serve as an external selective pressure that can induce mutations. Our project explores the relationship between genetic polymorphism, as reveled by Restriction Fragment Length Polymorphism (RFLP) of the mitochondrial 16s rRNA gene, of ***Nerita peloronta*** and the zonation and water quality at Surfer's Beach, Aguadilla in Puerto Rico. Water quality will be determined by phosphate, nitrate, and ammonium concentration in it. The ***Nerita peloronta*** zonation will be correlated with physicochemical parameters such as: humidity, pH, salinity and temperature. Horizontal and vertical zonation will be examined, establishing two transepts and 10 quadrants per transepts. Mitochondria will be isolated from snail muscle and mitochondrial DNA isolated by enzymatic digestions. 16s rRNA gene will be amplify using specific primers and digested by Taq 1, Nsp 1, Sfu 1 restriction enzymes. Educational and social impact of this project are: mentoring undergraduate students, enhance and developing scientific method skills, learning of basic molecular analysis tools and develop of scientific communication skills thru oral presentations on scientific meetings, posters and abstract.

Genetic Polymorphysim of Nerita peloronta
at Surfer's Beach, Aguadilla, Puerto Rico

Halobacteria as a Source of Food Coloring Pigments

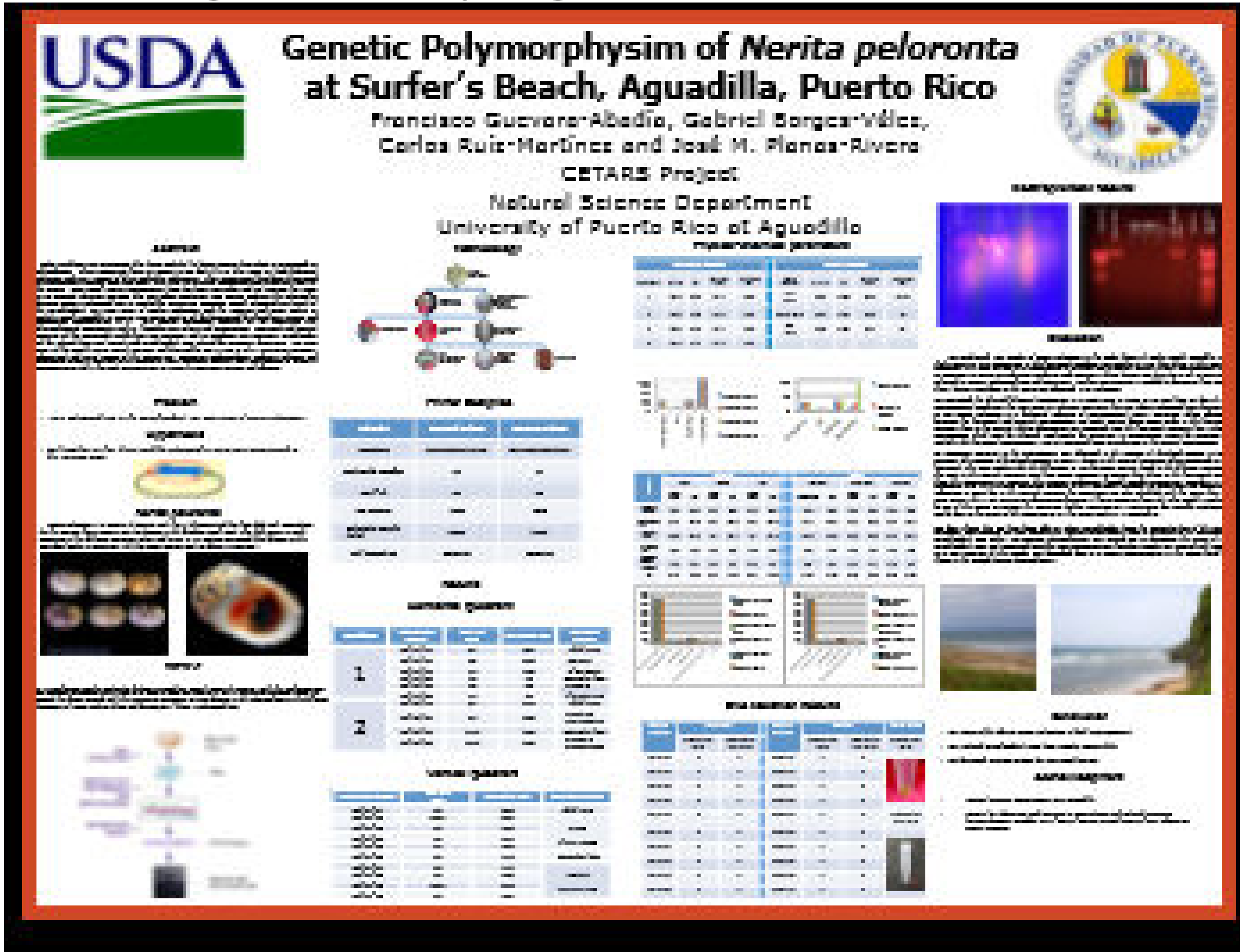
Carlos R. Detrés Román, David M. Pérez Pardo,
Carlos Ruiz-Martínez and José M. Planas-Rivera
CETARS Project
Natural Science Department
University of Puerto Rico at Aguadilla

Abstract

Food coloring is an important aspect of the food industry. It improves the appeals of food, serve as a freshness indicator and improves the sensorial values of the food. Actually, they come from synthetics, natural or by fermentation, being the synthetic ones the most used. Artificial food coloring agents can cause harm to human health and their synthesis are expensive, therefore, we address this problem asking: Can halobacteria produce pigments that can be used as food coloring? We hypothesize that indeed halobacteria can produce canthaxanthin and bacterioruberin, derivatives from β carotene through a fermentation process in enough quantities at a less expensive cost than the synthetic ones. We will harness these beta carotenoids pigments produce by Halobacteria and use them as food coloring that can be beneficial to our health. In order to do so, we will grow four different halobacterias allowing them to form pigments, collect the cells, lyse them and analyze the carotenoid pigments produced by Thin Layer Chromatography (TLC). Further purification will be carry out by High Pressure Liquid Chromatography (HPLC) using a Nucleosil 100 C18 (125 x 4.0mm) column. This research explores the use of halobacterias as a source of food coloring pigments, reducing the production cost and it will impact the food industry today.

Escritura cientifica: Afiche

- Comunica los avances de una investigación en progreso
- Consiste de:
  - Título
  - Abstracto
  - Introducción
  - Problema e hipótesis
  - Metodología
  - Resultados
  - Discusión
  - Conclusiones
  - Agradecimientos



Genetic Polymorphysim of *Nerita peloronta* at Surfer's Beach, Aguadilla, Puerto Rico

Francisco Guevara-Abadía, Gabriel Borges-Vélez,
Carlos Ruíz-Martínez and José M. Planas-Rivera
CETARS Project
Natural Science Department
University of Puerto Rico at Aguadilla

Abstract

Rocky seashores are ecosystems that foster multiple life forms ranging from algae to gastropods to echinoderms. These organisms have an impact in our daily life as they serve as food, biological indicators and are a source of chitin and other substances. Their ecosystems have been threatened by contaminants coming from river runoff that alter the nitrates, ammonium and phosphate levels of the ocean. River runoff carries contaminants from fertilizers, pesticides and soil erosion that serve as an external selective pressure that can induce mutations. Our project explores the relationship between genetic polymorphism, as revealed by Restriction Fragment Length Polymorphism (RFLP) of the mitochondrial 16s rRNA gene, of ***Nerita peloronta*** and the zonation and water quality at Surfer's Beach, Aguadilla in Puerto Rico. Water quality will be determined by phosphate, nitrate, and ammonium concentration in it. The ***Nerita peloronta*** zonation will be correlated with physicochemical parameters such as: humidity, pH, salinity and temperature. Horizontal and vertical zonation will be examined, establishing two transepts and 10 quadrants per transepts. Mitochondria will be isolated from snail muscle and mitochondrial DNA isolated by enzymatic digestions. 16s rRNA gene will be amplify using specific primers and digested by Taq 1, Nsp 1, Sfu 1 restriction enzymes. Educational and social impact of this project are: mentoring undergraduate students, enhance and developing scientific method skills, learning of basic molecular analysis tools and develop of scientific communication skills thru oral presentations on scientific meetings, posters and abstract.

Problem

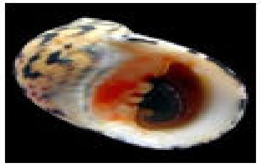
- Exist polymorphism in the mitochondrial 16s RNA gene of Nerita peloronta?

Hypothesis

- We hypothesize that there could be polymorphic variations represented in the 16sRNA gene.

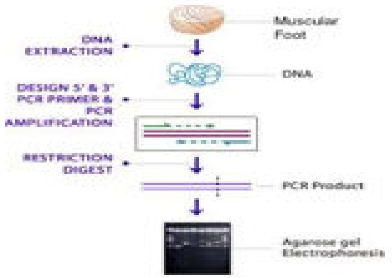
Nerita peloronta

Nerita peloronta is a species of marine snail that is characterized for there dark red operculum, for this reason these species are also known as the bleeding tooth snail. The shell varies in each organism, it has different patterns, colors and sizes. It is a marine gastropod that belongs to the Neritidae family, it possesses gills like most marine snail to obtain its nutrient .

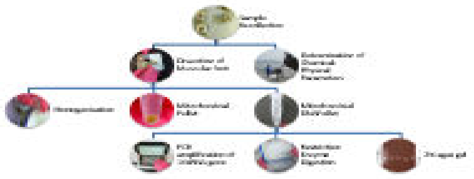


PCR-RFLP

It is a technique used in molecular biology to amplify a specific gene of interest. With this technique one can observe polymorphism in DNA or a specific gene by treating it with a restriction enzyme. Once the sample has been treated with the restriction enzymes, we can observe in the electrophoresis the different fragments of DNA, analyze them and determine if there is polymorphism.



Methodology



Primer Designee

Criterias	Forward Primer	Reverse Primer
Sequence	CGCCTGTTTAACAAAAACAT	ATAACTATTTACTTTTAATCC
Nucleotide Number	20	21
Tm (°C)	46	43
GC content	35%	24%
Molecular Weight (g/M)	6068	6354
Self Annealing	Negative	Negative

Results

Horizontal Quadrant

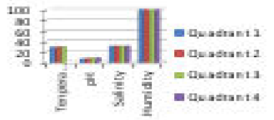
Quadrant	Identification number	Shell Size (mm)	Foot Weight (mg)	Descriptive Statistics
1	FG-H1-01	27	342	Shell Size
	FG-H1-02	24	335	$\bar{x}$ = 18.5
	FG-H1-03	19	104	S^2 = 5.0892
	FG-H1-04	18	77	Muscular foot
	FG-H1-05	14	55	$\bar{x}$ = 90.5
	FG-H1-06	15	32	S^2 = 142.229
2	FG-H2-01	27	315	Shell Size
	FG-H2-02	25	266	$\bar{x}$ = 25.25 S^2 = 1.08012
	FG-H2-03	25.5	358	Muscular foot
	FG-H2-04	24.5	284	$\bar{x}$ = 299.5 S^2 = 40.2854

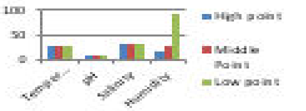
Vertical Quadrant

Identification number	Shell Size (mm)	Foot Weight (mg)	Descriptive Statistics
FG-V1-01	26	483	Shell Size
FG-V1-02	26.5	632	
FG-V1-03	24	324	$\bar{x}$ = 24
FG-V1-04	24	322	
FG-V1-05	25	269	S^2 = 1.11056
FG-V1-06	24	275	Muscular foot
FG-V1-07	24	191	
FG-V1-08	24	286	$\bar{x}$ = 323
FG-V1-09	26.5	415	
FG-V1-10	24	397	S^2 = 121.273

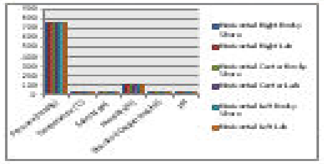
Physical-chemical parameters

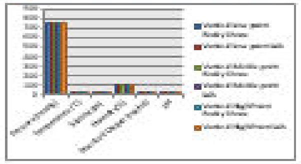
Horizontal Transept						Vertical Transept				
Quadrant	T in °C	pH	Salinity (ppt)	Humidity (%)		Rock location	T in °C	pH	Salinity (ppt)	Humidity (%)
1	29.2	8.27	31.1	100		High point	29.5	8.49	34.2	17-18
2	29.4	7.79	31.8	100		Middle point	29.5	8.38	34.0	27
3	30.0	7.72	31.1	100		Low point	29.4	8.00	34.1	91
4	29.2	8.8	31.2	100						



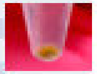


[illegible]	Horizontal							Vertical					
	Right		Center		Left			Low point		Middle point		High point	
	Rocky Shore	Lab	Rocky Shore	Lab	Rocky Shore	Lab		Rocky Shore	Lab	Rocky Shore	Lab	Rocky Shore	Lab
Pressure (mmHg)	773	763	773	763	773	763		773	763	773	763	773	763
Temperature (°C)	27.1	20.9	27.1	20.8	27.1	20.6		27.1	20.7	27.1	20.8	27.1	20.8
Salinity (ppt)	38.6	33.2	31	33.1	31	33.2		32.0	33.9	32.7	33.3	31.1	33.3
Humidity (%)	100	100	100	100	100	100		100	100	100	100	100	100
Dissolved Oxygen (mg/L)	6.8	5.6	4.9	5.5	4.8	5.2		6.8	6.7	6.5	5.3	6.8	5.5
pH	8.21	7.86	8.21	7.92	8.21	7.87		8.26	7.88	8.26	7.90	8.26	8.09

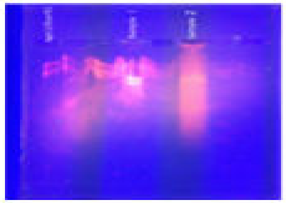


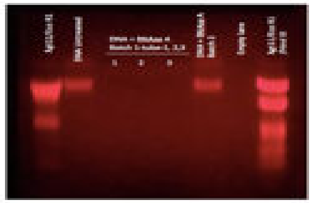


DNA Isolation Results

Sample Number	Horizontal			Sample Number	Vertical		Pellet Image
	Mitochondrial Pellet	Mitochondrial DNA Pellet			Mitochondrial Pellet	Mitochondrial DNA Pellet	Mitochondrial Pellet
FG-H1-01	+	+		FG-V1-01	+	+	
FG-H1-02	+	+		FG-V1-02	+	+	
FG-H1-03	+	+		FG-V1-03	+	+	
FG-H1-04	+	+		FG-V1-04	+	+	
FG-H1-05	+	+		FG-V1-05	+	+	Mitochondrial DNA Pellet
FG-H1-06	+	+		FG-V1-06	+	+	
FG-H2-01	+	+		FG-V1-07	+	+	
FG-H2-02	+	+		FG-V1-08	+	+	
FG-H2-03	+	+		FG-V1-09	+	+	
FG-H2-04	+	+		FG-V1-10	+	+	

Electrophoresis Results





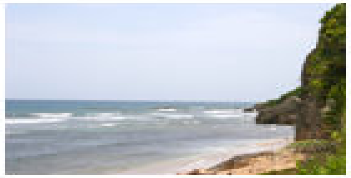
Discussion

We recollected our sample of *Nerita peloronta* at the rocky shores of Surfer Beach, Aguadilla. The shells varies in size, organisms in the horizontal quadrant are smaller in size than those in the vertical quadrants. This may be due to a combination of physical and chemical factors in each environment, such as exposure to water, UV radiation, predation and nutrients. These factors can also play a roll in variations reflected as genetic polymorphism and mutations. Further investigation is needed to determine how much these factors contribute to the variations observed in *N. peloronta*.

We measured the physical-chemical parameters in a given point in time, so we can have an idea of the environmental conditions that can serve as selective pressures that can induce polymorphism, allowing us to use *Nerita peloronta* as a biological indicator of environmental stress. Variations where observed between the horizontal and vertical environment, pH levels varies, being more acidic in the horizontal transept than in the vertical. These observation was expected since the horizontal transepts has a closed environment which may be affected significantly by variations in temperature cause by exposure to sunlight. The horizontal environment is not as protected from UV radiation as the vertical environment.

An important variation in the environment was observed in the amount of dissolved oxygen in each transept. The amount of dissolved oxygen in water is larger in the vertical transept, when compared to the horizontal. This may explain why the difference in size between Neritas found in the different transepts. The ones in the vertical transept may have more exposure to oxygen than those in the horizontal, given them the opportunity to increase their energy production through aerobic respiration. Humidity is the parameter that has the most variation, because in the horizontal transept the organisms are completely submerge in water but in the vertical transept the organisms are only splashed, with the water that the wave carries. This is an interesting observation, because if these organism have gills why would it prefer to be out of the water. To answer this question, further investigation is necessary, but possible explanation can be due to the nature of the organism or to the water quality it is exposed to.

Our data shows that we have been able to isolate mitochondria from the muscular foot of the *Nerita peloronta*. Furthermore, we have successfully isolated mitochondrial DNA as reflected by the presence of mitochondrial DNA pellet. 1% Agarose electrophoresis was carried out to determine the status of the mitochondrial DNA. Gel suggested possible RNA contamination, therefore sample was treated with RNAse A, to our surprise, all the sample was degraded, due to a DNAse contamination in the RNAse batch as shown in the second electro electrophoresis.



Conclusion

- We successfully obtain *Nerita peloronta* in both environments.
- We Isolated Mitochondrial DNA from sample successfully.
- We designed 16sRNA primer for PCR amplification.

Acknowledgment

- Natural Science Department, UPR Aguadilla
- Center for Education and Training in Agriculture and Related Sciences (CETARS)Award Number 2008-02146, USDA-CSREES-HSI Education Grant Program

Halobacteria as a Source of Food Coloring Pigments

Carlos R. Detrés Román, David M. Pérez Pardo,
José M. Planas-Rivera, PhD, and Carlos Ruíz-Martínez, PhD
CETARS Project
Natural Science Department
University of Puerto Rico at Aguadilla

Abstract

Food coloring is an important aspect of the food industry. It improves the appeals of food, serve as a freshness indicator and improves the sensorial values of the food. Actually, they come from synthetics, natural or by fermentation, being the synthetic ones the most used. Artificial food coloring agents can cause harm to human health and their synthesis are expensive, therefore, we address this problem asking: Can halobacteria produce pigments that can be used as food coloring? We hypothesize that indeed halobacteria can produce canthaxanthin and bacterioruberin, derivatives from β carotene through a fermentation process in enough quantities at a less expensive cost than the synthetic ones. We will harness these beta carotenoids pigments produce by Halobacteria and use them as food coloring that can be beneficial to our health. In order to do so, we will grow four different halobacterias allowing them to form pigments, collect the cells, lyse them and analyze the carotenoid pigments produced by Thin Layer Chromatography (TLC). Further purification will be carry out by High Pressure Liquid Chromatography (HPLC) using a Nucleosil 100 C18 (125 x 4.0mm) column. This research explores the use of halobacterias as a source of food coloring pigments, reducing the production cost and it will impact the food industry today.

Problem

- Can halobacteria produce pigments that can be used as food coloring?

Hypothesis

- We hypothesize that indeed halobacteria can produce canthaxanthin and bacterioruberin, derivatives from β carotene through a fermentation process in enough quantities at a less expensive cost than the synthetic ones.

Food coloring pigments

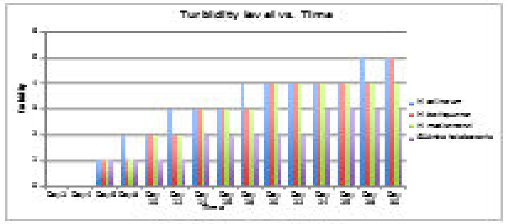
Natural
- Red
  - Red beet juice
  - Paprika
- Orange
  - Kesar orange/mango
  - Annatto
- Yellow
  - Turmeric
- Green
  - Chlorophyll
- Blue-violet
  - Anthocyanin

Synthetic
- Yellow 5 and 6
- Red 3 and 40
- Citrus Red 2
- Orange B
- Green
- Blue 1 and 2

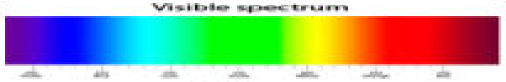
Fermentation
- Monascorubramine
- Astaxanthin
- Arpink red
- β-carotene
- Riboflavin
- Betanin
- Canthaxanthin
- Cyanidin and Peonidine
- Lycopene
- Zeaxanthin
- Isorenieratene

Methodology

Results

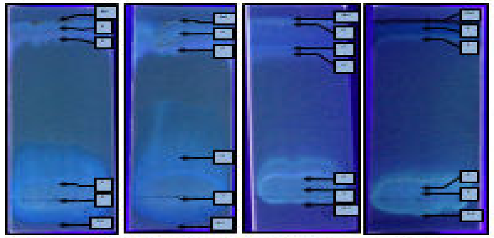


Visible spectrum



Halobacteria

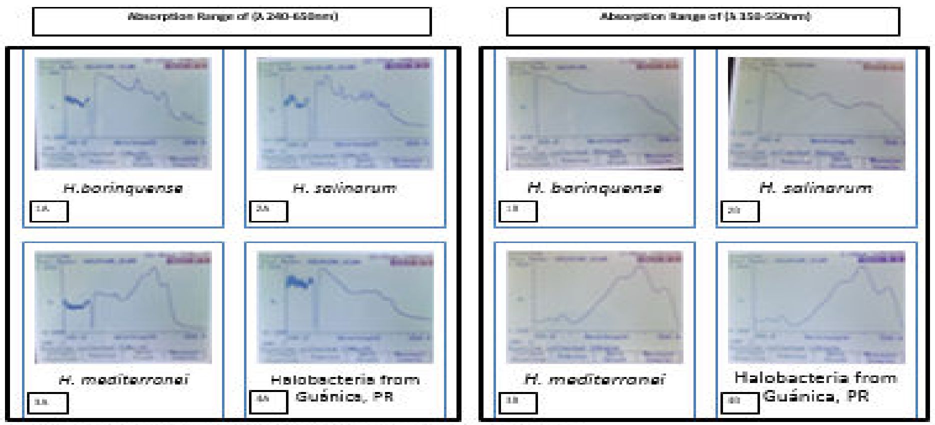
Thin Layer chromatography



H. boriquense			H. salinarum			Guánica halobacteria			H. mediterranei		
Band	Distance (cm)	Rf	Band	Distance (cm)	Rf	Band	Distance (cm)	Rf	Band	Distance (cm)	Rf
SolF	[illegible]		Sol	[illegible]		Sol	[illegible]		Sol	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
OriP	0		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			Ori	0		Ori	0		Ori	0	

TLC of pigment extract [illegible] for H. boriquense, H. salinarum, halobacteria from Guánica, P.R., and H. mediterranei run on silica gel plates [illegible] viewed over UV lamp.
Sol: Solvent front
Ori: Original pigment streak

UV-Vis spectrum



UV-Vis spectra for Halobacteria pigment extracts at (λ 240-650nm) for A and (λ 350-550nm) for B in acetone:ethanol [illegible]

Discussion

The turbidity of the media was used as an indicator of growth for the four halobacteria. The turbidity shows growth, which led us to the extraction of pigments (Table 1). Thin Layer Chromatography for the halobacteria demonstrated 4-5 bands, which corresponds to the numbers of carotenoid pigments produced by the organisms. Guánica halobacterium was the only one that showed 5 bands. The production of 5 pigments can be attributed to the adaptation of this archaeon to provide itself with more protection from radiating conditions manifested in the tropical territories, such as Puerto Rico. By sharing a similar retention factor of (Rf = 0.90) it is possible that the four species probably produce a common pigment. *H. boriquense*, *H. mediterranei* and Guáncia halobacteria have a common Rf of 0.10 and 0.11. In addition, *H. boriquense* and *H. mediterranei* presented a band with a similar Rf value. *H. salinarum* and Guánica halobacteria presented a similar case, as did *H. salinarum* and *H. mediterranei*. In the other hand, *H. salinarum*, *H. boringuense* and Guánica halobacteria presented unique bands, which means that these bands are pigment present only in these organisms when compared between the four.

Our spectra are divided into 2 groups: broad range and narrow range. The broad range represents absorbance at the full visible light spectrum range and the narrow range, the absorbance range for carotenoid pigments. In the broad range UV-Vis spectra (λ 240nm-650nm), there is a pattern involving 3 prominent peaks in 1A, 3A, and 4A within the carotenoid absorption range (λ 350-550nm); 2A presented 8 prominent peaks in this same range. For the three before-mentioned spectra, there were 2 peaks found within 490-560nm—light absorbed at this range excludes red-colored light, confirming that the halobacteria produce red pigments; 2A expresses 3 peaks in the same range. The three spectra also present a peak in the 430-490nm range—where orange light is reflected—suggesting that this pigment belongs to the β-carotene group; 2A presents 3.5 of these peaks and also presents 1.5 peaks within 400-430nm, reflecting yellow light. In the narrow range UV-Vis spectra (λ 350nm-550nm), the same pattern is observed; 1, 3, and 4B are similar—3-4 peaks—whereas, 2B differs—9.5 peaks. As in panel A, the three similar spectra express 2 peaks within λ 490-560nm suggesting the presence of red pigments, 1 peak within λ 430-490nm suggesting the presence of orange pigments, yet no peaks within λ 400-430nm suggesting the absence of yellow pigments. Breaking the pattern, 2B expresses 3 peaks in the range for red pigments, 3.5 peaks in the orange pigment range, and 2.5 peaks in the yellow pigment range.

These results suggest the possibility that our halobacteria produce Bacterioruberin (red pigment), and β-carotene (pigments ranging from yellow to orange) which are also produced by another halobacterium, *Haloruburm* sp. TB2126 (Naziri et al, 2014).

Conclusion

The halobacteria produce carotenoid pigments, which makes them a candidate for being a source of food coloring pigments.

References

Acknowledgment

- Center for Education and Training in Agriculture and Related Sciences (CETARS) Award Number 2008-02146, USDA-CSREES-HSI Education Grant Program
- Natural Science Department, University of Puerto Rico at Aguadilla
- Dr. José M. Planas-Rivera, Dr. Carlos R. Ruiz-Martínez
- Lab technician: Ms. Nayda Meléndez

Referencias

- Eslava-Schmalbach, J.; Gomez-Duarte, O. G. 2013. Revista Colombiana de Anestesiología. 41(2):79-81

- Rodriguez de Fonseca, Belen. Escritura Cientifica. Facultad de Fisica. Universidad Complutense de Madrid. https://www.ucm.es/data/cont/media/www/pag-90674/taller%20escritura.pdf

- Gordillo Alfonso, A. 2017. La escritura científica: una revisión temática. Signo y Pensamiento, vol. XXXVI, núm. 71, pp. 52-64 Pontificia Universidad Javeriana Bogotá, Colombia. https://www.redalyc.org/pdf/860/86054913003.pdf

- https://sites.google.com/site/fundamentosdeinvestigacionsht/unidad-3-herramientas-de-comunicacion-oral-y-escrita-en-la-investigacion/3-3-caracteristicas-del-lenguaje-cienti

- https://www.semanticscholar.org/paper/Overview-and-principles-of-scientific-writing-Prayag/77afc4b18723bf33e3a8c88c72285bfd77e6a009/figure/0

- https://studylib.net/doc/8696633/10-characteristics-of-scientific-writing

¿Preguntas?