

## **Exploring STEM through Afro-Mexican cuisine**

**Goal:** To explore the Afro-Mexican culture through food and how the biomolecules present in the food connects to various uses and health benefits.

**Target student population:** This lesson could be utilized at the high school and college level. The extension options related to STEM would be suitable for an AP or college-level biology or chemistry course. The cultural extension options could be used by high school social studies classes or various college-level courses including those in Ethnic studies, History and sociology for example.

### **Objectives/Learning outcomes:**

1. Students will be able to discuss how the food items came to Mexico and when they began to be utilized by the Afro-Mexican populations.
2. Students will be able to identify at least one biomolecule present in the food item and provide a functional connection to a health benefit/medical use.
3. Students will be able to explain how the food item is utilized in Afro-Mexican populations.
4. Students will be able to understand the molecular complexities of food

### **Lesson plan:**

1. The instructor should review the OER material titled "[Exploring Afro-Mexico Through Food and Science](#)" to ensure their understanding of the material. From a STEM perspective, the food selected have a variety of bioactive compounds, however the OER is highlighting the major components. See the extension activities for further expansion of this area.
2. There are nine different areas to be explored (3 student activities for each food x 3 food items), therefore groups should be created accordingly based on class size.
3. Depending on the course objectives which this lesson is being utilized for, a generalized introduction for the relevant material should be provided to the students. (5 – 10 minutes)
4. Each group will be assigned/choose a food (peanuts, pepper leaf or chiles) and a section of the food item to review (introduction/history, biochemistry and health benefits/medical uses, and recipes).
5. During their review of the materials (10 – 15 minutes), each group can further enhance the information provided by doing the following (15 – 20 minutes):

- a. Introduction and history: The students can utilize the internet to research 2 additional facts (not present in OER material) about their food item and its relationship to Afro-Mexicans or about the Afro-Mexican culture.
  - b. Biochemistry and health benefits/medical uses: Utilizing the internet, the students can search for articles that show studies connecting the biomolecule(s) mentioned in the OER to a particular benefit and/or use.
  - c. Recipes: The students can look up restaurants which serve these dishes and/or dishes which utilize their food item with Mexican and/or African influences.
6. Once the students have had time to review their assigned materials and further enhance the provided information, the students should present/discuss their findings with the larger group/class. (30 – 45 minutes)
7. This discussion could expand into students talking about how food plays a role in local culture from their native countries and if there are any traditional uses for these food items for health or medicinal purposes.

#### **Ideas for extension of base activity:**

These activities could be utilized as a group assignment, independent research, honors project, experiential learning as some ideas.

#### **Culture related**

1. The students could explore how the food items highlighted here are utilized in their own culture. They could provide a historical context for their use, along with various recipes. Connections based on various socio-economic factors could be highlighted between the Afro-Mexicans and their culture.
2. Have students explore Afro-descendant populations from other countries and identify food items that are used frequently. They could use the same areas of investigation that were used or modified as necessary for the course.
  - a. This would begin by having the student(s) explore areas where there are populations of Afro-descendant people. A good starting point would be to focus on countries in the Americas (North, Central and South) along with West Indian countries. The Black Studies Across the Americas OER page at BMCC can serve as a starting point.
  - b. Once the population/country has been selected, the student(s) would need to utilize various avenues of research (social media, research librarians, internet searches, professor at your school or nearby college with research experience in

Afro-descendant populations, etc.) to explore the cuisine of the selected population.

- c. Have the student(s) select 1 or 2 food items to further expand upon. Ideally one item would be indigenous to the country while a second could have been transported in from outside sources. Key areas to highlight about the food would be how the Afro-descendant population utilize the item differently from mainstream cuisine and/or the African influences (recipe, cooking style) on how the food it utilized.
- d. If STEM incorporation is wanted/needed, the student(s) can explore the various bioactive compounds present in the food item and determine their functional properties (how it works/what it does). These functional properties could be used to provide insight into the benefits of the food item.
- e. The material could be presented in a variety of ways depending on the intention of the assignment and resources available.

#### **STEM related**

3. The students can take the biomolecules identified so far and further develop information about how these molecules exert their mechanism of action within the cells. From there, they can make inferences about the benefits that those molecules would confer.
4. Each of the foods highlighted have other bioactive compounds present in them which we did not explore. Students can explore the compounds utilizing primary literature searches, focusing on review articles. Once identified, the students can explore the functional properties of that compound from a second literature search.
  - a. Student(s) can initially utilize a web search to identify various biomolecules present in the food item or utilize the references provided in the section of the OER which they are focusing on.
  - b. Once a few molecules have been identified, students can utilize databases such as PubMed or Science Direct to search for research and/or review articles which examine the molecules identified. It would be recommended to check with the library to determine what resources the students may have access to in this area of research.
  - c. If the articles do not specifically list functional benefits of the biomolecule, a secondary search with the biomolecular name and functional properties or health benefits or medical uses should be used.