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An Ethnobotanical Survey of Medicinal Plant Usage in Salvador de Bahia, Brazil

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Introduction:

Ethnobotanical research aims to document the use of plants, especially associated with medicinal use in various cultures. It explains the connection between medicinal plant use and culture. This research attempts to document which medicinal plants were used for which specific conditions and how the practice is viewed by that particular culture.

Brazil is a country with a high amount of biodiversity, accounting for 10% of all species existing on the planet. Mention the Amazon (Figure1) (1). It has approximately 55,000 species spread over six different biomes (2). Ethnobotanical research is necessary in Brazil in order to document and conserve the various plants present. Efforts have been initiated in order to preserve the medicinal plants located in Brazil because globalization has lead to the destruction of the plants habitat and a change in cultural setting. **This research focuses on an Ethnobotanical study specifically in Salvador de Bahia, Brazil to analyze the use of medicinal plants by individuals ranging from ages 18 to 65.**

Figure 1: Amazon in Brazil, which illustrates the vast amount of biodiversity.

Method and Materials:

This research study was conducted along the coast of Salvador de Bahia, Brazil. In particular questionnaires were distributed in cities, such as Amaralina, Pelourinho, Brotas, and Rio Vermelho. This area ranged in economic status from upper class to lower class. However, many questionnaires were distributed at local colleges and at Steve Biko Institute, which is a program that helps Afro-Brazilians get into college. As shown in Figure 2 below, Salvador is located in the northeastern region of Brazil. This is located along the coast of the Atlantic Ocean, exposing it to a vast variety of vegetation and plants

References:

1. Inoue, Shunsuke.; Hashimoto, Goro. (2004) Utilization of Medicinal and Edible Plants in Brazil. *Foods Food Ingredients Journal of Japan* 209.5 24-30.

Figure 2: The ethnobotanical study was conducted in Salvador de Bahia, Brazil (arrow), in the northeastern region, along the coast of the Atlantic Ocean

Results:

The surveyed population consisted of mainly lower class citizens. The gender distribution was fairly even, with 56% women participants and 44% men (Figure 3). Also, Figure 5 shows the amount of people that used medicinal plants on a consistent basis. The results indicated that 92% of the individuals answered yes to using medicinal plants on a regular basis and 8% answered no (Figure 4).

The most commonly used medicinal plant in Salvador de Bahia was the *Boldo Leaf* (Figure 5) and its major use is for digestive issues (Table 1). The next common medicinal plants were various teas, such as green tea and lemon grass tea. They can be used for insomnia and to lower cholesterol levels. Knowledge about many of these medicinal plant remedies were acquired from older family members, such as a grandmother or parent. Few survey participants indicated that they gained their knowledge of the plants from books or conducting personal research. However, this response was very uncommon. Even the 8% of the individuals that reported no use of medicinal plants were aware of their uses.

Figure 5: Boldo Leaf, which was listed as the most commonly used medicinal plant by our 25 participants

Figure 3: Gender Distribution survey of the 25 participants

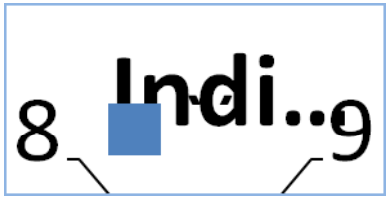

Figure 4: Percentage of survey participants that use medicinal plants consistently.

Table 1: Description of medicinal plants identified by 25 survey participants. Uses are based on how often they appeared on the questionnaires.

Name of Plant	Frequency	Uses	Scientific Name	Where is it Found?
Boldo Leaf	15	Digestion, protects liver, constipation, debilitation, dizziness, gastritis, gonorrhea, hepatitis, insomnia,	*Peumus, boldus*	Brazil, Chile, Asia, Mexico, Europe, United States
Cha Verde (Green Tea)	12	Inhibit cancer growth, lowers cholesterol levels, arthersclerosis	*Camellia sinensis*	China, France, Brazil, United States, India
Aurora Plant	10	Pain reliever, relaxation	*Kalanchoe, fedtschenkoi*	Brazil
Mastruz Tea Powder	8	Rid of intestinal parasites, worms and amoeba, coughs, asthma, bruises and bronchitis	*Chenopodiuma mbrosioides*	Brazil, Central South America
Erva Cidreira (Lemon Grass Tea)	8	Sedative properties, insomnia and anxiety, normalize menstrual, intestinal constipation	*Melissa officinalis*	Brazil, South Asia, Thailand, Cambodia
Chamomile	7	Insomnia, nervous conditions, anti-inflammatory, arthritis	*Matricaria chamomile*	Brazil, Germany

Based on our results, the majority of the participants were aware of medicinal plants and their uses. This conclusion can be drawn because 92% of the individuals surveyed indicated that they use medicinal plants on a consistent basis. Those that don't use medicinal plants were still knowledgeable of various types and their uses. This is likely related to their culture and their environment. The environment of Brazil is full of diverse plants and herbs. This may have a correlation with medicinal plant familiarity because the biodiversity allows them to have greater access to a variety of plants. Several questions remained unanswered in this study. For example, it was not clear whether these medicinal plants are more effective than modern medicine. Modern medicine is becoming more and more popular in developed nations. However, in Brazil medicinal plants are frequently used in place of modern medicines to relieve common diseases, such as cold, arthritis or injuries. In 2007 Brazil herbal medicine revenue was equivalent to 160 million US dollars (3).

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I would like to thank the GSTEM office at Spelman College for providing the resources to complete this research project. I would also like to thank my research mentor Dr. Mentewab Ayalew for guiding me through this research project. I would also like to thank Dr. Erica Williams for assisting with translating all of the questionnaires and consent forms. Lastly, I would like to thank Javier Escuerdo and Brasil Cultural for providing an enriching study abroad experience and allowing me to conduct my research in Salvador de Bahia, Brazil.

A Comparative Study of Health Practices and Attitudes and their Effect on the Number of Incidences of Reproductive Health Issues in Women

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Abstract

Women of African descent worldwide suffer from a variety of problems related to income level that can lead to the difference in health care access and attitudes among this population. Health care access and health practices worldwide have different effects on reproductive health issues in women. Diseases such as breast cancer, cervical cancer, ovarian cancer, fibroid tumors, ovarian cysts, and breast cysts differ in incidence level in low-income and high-income countries. The purpose of this study is to gain an international perspective on reproductive health issues by comparing Black women in a high income country: the U.S. and a low income country: Brazil. Using a survey, we were able to compare reproductive health related issues with income and health care access in two areas. Ten women from Salvador, Bahia and Atlanta, Georgia were given a survey based on demographics, health care accessibility, family history, personal history, and knowledge of gynecological health issues. The survey demonstrated an apparent divide in income between the two areas. The income difference correlated with the lack of health care access in low-income countries compared to high- income countries. There is a higher incidence of breast cancer in the Atlanta area demonstrated in family history of subjects. Despite the fact that access to health care is less difficult in the U.S. than in Brazil, women's health issues are more frequent in the U.S. The study also revealed less knowledge concerning the Human Papillomavirus (HPV) in Salvador than the U.S. and limited distribution of the HPV vaccine in Bahia. This leads us to believe that the level of health care access contributes to detection levels and the difference in incidence numbers in the U.S. than in Brazil. Also, there is more reason to be cautious of an increase in cervical cancer cases in low-income countries that do not take precautionary measures with vaccines and screenings.

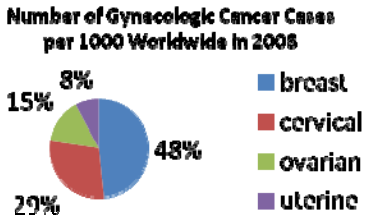

Figure 1. Gynecologic cancer cases worldwide

Methods

Questionnaires containing 18 questions (Table 1) were designed to assess participants' demographics, healthcare accessibility, family health history, personal health history, and gynecological health knowledge. They were given to 10 women from the Atlanta, Georgia area and the Salvador, Bahia area. The completed questionnaires were classified by monthly household income, access to the nearest healthcare center, family history of certain reproductive heath issues, gynecological personal health history, and knowledge of the HPV and vaccine. For the purpose of evaluating the effect health care access and practices have on incidences of health issues in women, each classification was compared to income and healthcare accessibility.

Results

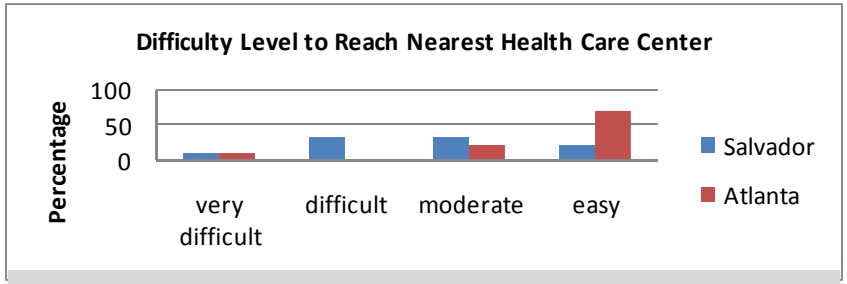

Figure 2. Results from survey data, addressing participants difficulty to reaching the nearest health care center.

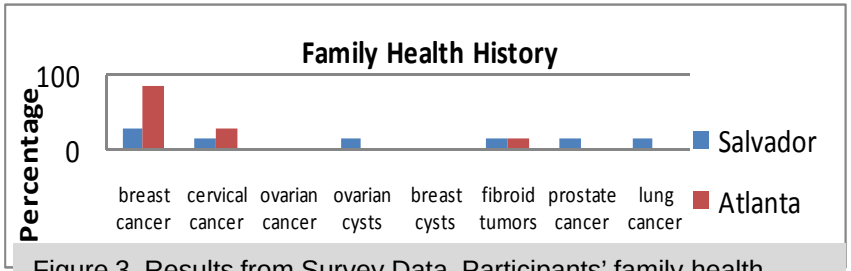

Figure 3. Results from Survey Data, Participants' family health history for gynecologic disease.

Table 1: Complete List of Survey Questions 1-18	
1. What is your current marital status?	10. Have you ever been diagnosed with cervical cancer, breast cancer, ovarian cancer, fibroid tumors, ovarian cysts, and/or breast cysts?
2. What is your employment status?	11. Do you use herbal or traditional healing practices for any women health issues?
3. How would you describe your current household income?	12. Are you given a pap smear and breast exam when visiting the doctor?
4. How many people reside in your household?	13. How many pap smears/well visits have you had in the past two years?
5. Ethnic/Cultural background	14. Have you ever had an abnormal pap smear?
6. Do you currently have healthcare?	15. Have you ever had an abnormal breast exam?
7. Do you have a doctor or healthcare provider?	16. Do you know how to self examine your breast for lumps?
8. Rate the difficulty of accessing your nearest healthcare center	17. Have you received the vaccine for HPV (Human Papillomavirus)?
9. Has anyone in your family been diagnosed with cervical cancer, breast cancer, ovarian cancer, fibroid tumors, ovarian cysts, and/or breast cysts?	18. If yes to question 17, how much information were you given about the vaccine?

Results Continued

- The majority of participants were classified as middle class or high income in Atlanta
- 40% more people in the Atlanta area had health care compared to Salvador
- 20% more participants receive a pap smear and breast exam when visiting the doctor in Atlanta
- 40% more participants had abnormal breast and pap smear exams in Salvador than Atlanta
- Only 10% of participants in Salvador displayed personal history of gynecologic issues
- The human papillomavirus was not distributed to any participant in

Discussion and Conclusion

Breast, ovarian, and cervical cancer, fibroid tumors, breast cysts, and ovarian cysts are common diseases and issues a large percent of women suffer worldwide. Several factors can lead to acquiring these diseases such as stress, diet, inheritance, and health care access. The availability of health care in high-income countries can enhance and aid in the detection and distribution of services fundamental to the health of women compared to low-income countries. Although survey results show incidences of disease such as breast cancer being more prominent in high-income countries and apparent in the Atlanta area according to participants' family history, the access to health care is more readily available. Accordingly, the low level of incidences in low-income countries compared to high-income countries can be a result of detection levels. The lack of health care access and difficulty to reach the nearest healthcare center also contributed to the low numbers of visits to health care providers to receive pap smears and breast exams. Based on the lack of knowledge of the HPV infection and vaccine, low income countries such as Brazil should consider making the vaccine more readily available to prevent the spread of the virus and the increase in cervical cancer rates.

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Wasp Populations at Monteverde, Costa Rica Potential Shift in Light and Dark Morphs

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Organization of Tropical Studies[1] and Department of Biology, Spelman College[2]

ABSTRACT

The wasp species *Mischocyttarusmastigophorus* possesses both light and dark morphs. It has been hypothesized that these two morphs are adaptations either to help the animal thermoregulate body temperature across elevation or as a mimicry of the more aggressive wasps genus *Agelaia* for defense against predators. The coloration distribution was tested across elevations to test the hypothesis of the thermoregulation mechanism. Our results show that there was no difference between coloration across elevation, but that there was a greater abundance of dark morph colonies across all elevations. No relationship was found between mimicked organism coloration and coloration of the *M. mastigophorous*,so it is unlikely that the coloration deviation of *M. mastigophorous*is due to a mimicry mechanism. The large number of dark morph colonies suggests that thermoregulation may be the cause of the dimorphism. This could be because of decreasing daytime temperatures in the Monteverde region, thus giving the dark morph *M. mastigophorous*an advantage in absorbing solar heat energy.

INTRODUCTION

One example of species that exhibits multiple morphologies is the paper wasp, *Mischocyttarusmastigophorus*. This species is found in the cloud forest of Monteverde, Costa Rica at elevations ranging from 1,000 meters to 1,600 meters above sea level (Y. Molina pers. comm.) (Figure 1). *M. mastigophorus* is a eusocial species (Figure 2). Wasps are ectotherms and an *M. mastigophorus* wasp's optimal body temperature is above the ambient temperatures found at Monteverde (Ellers& Boggs 2004). For this reason, the wasps will sunbathe during the daytime to increase their body temperature. Darker coloration in the wasps allows them to absorb and conserve more heat energy than does lighter coloration, and darker wasps have been observed to be more active in colder environments than are lighter colored wasps (Y. Molina pers. comm.). Another way that some species adapt to colder environments is by having a larger body size. By decreasing their body surface area to volume ratio, they are able to decrease the amount of body heat they lose to the environment. As O'Donnell and Joyce (1999) note in their

sp[illegible]*ia* are more a[illegible]

Monteverde, Costa Rica. Monteverde, Costa Rica is a cloud forest with a tropical climate.

The foundress produces offspring that eventually become the workers who run the colony (Y. Molina pers. comm.). As the colony grows in size, aggression between workers increases until eventually the most aggressive worker wasps revolt. At this point the colony splits apart to form new colonies, and the cycle repeats itself (O'Donnell & Joyce 1999).

OBJECTIVE

Determine whether the variation in size and color of *M. mastigophorus* across elevation, and establish whether the variation in morph is dependent upon thermoregulation in addition to mimicry.

METHODS AND MATERIALS

[illegible] meters, 1500 meters, and 1000 meters above sea level, respectively.

Procedure: Wasps were captured using two different methods: meat baiting (Figure 5) and nest collection (Figure 6). After wasps were captured they were classified as either light or dark morphs. Next, measurements were taken of the [illegible] at each of the three sites.

With a total of 8 ounces of raw tuna fish and raw chicken were placed 3 meters apart from one another

buildings was searched for nests. Wasp nests were collected in order to identify color, measure wasp colony size, and wasp body size.

RESULTS

There are more dark colonies than light or mixed coloniesof *M. mastigophorus* (Figure 7), and more dark foundress nests than light foundress nests (Figure 8). There were also equal numbers of dark and light colonies at later stages in the development of the wasp colony (Figure 9). There were more dark colonies than light colonies at both high and low elevations (Figure 9). The dark morph mean thorax length was 35.65mm (SD=14.03mm, n=15), and the light morph mean thorax length was 35.74mm (SD=9.06mm, n=17). There is no statistically significant difference between the thorax leng[illegible]

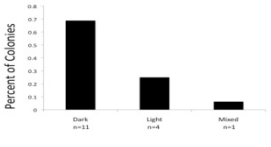

Figure 7: Percent of colonies *M. mastigophorus* by colony color morph across both high and low elevations of Monteverde where n is the sample size.

Figure 8: Colony color morph by colony stage of *M. mastigophorus* across both elevations. Foundress colonies are colonies with one wasp. Later stage colonies are colonies with more than one wasp. Each set of values below the colony stage is abundance of that colony stage compared to total abundance of *M. mastigophorus* colonies.

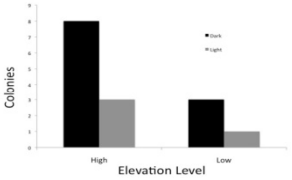

Figure 9: Colony color by elevation of *M. mastigophorus* across high and low elevations in Monteverde. High elevation colonies are 1500-1550m above sea level and low elevation colonies are 1000m above sea level.

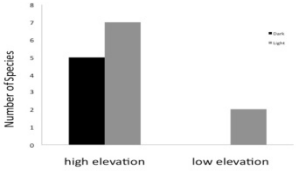

Figure 10: Hymenoptera (ants, bees, wasps) color across both high and low elevations in Monteverde. High elevation is 1500m to 1550m above sea level and low elevation is 1000m above sea level.

CONCLUSION

Our data supports the thermoregulation hypothesis and reject the mimicry hypothesis. For the mimicry hypothesis to be true, we would have expected to observe multiple *Agelaiaxanthopus* at the meat tray. However, a very limited number of *Agelaia*visited the food. There is no difference in color morph frequency of colonies across high and low elevation yet there is an overall higher prevalence of dark morph colonies across all elevations. There are more dark foundress nests than light foundress nests. This high occurrence of dark morphs is contrary to O'Donnell and Joyce's (1999) findings, because over a decade ago the researchers found that light morphs were more abundant than dark morphs, and that the portion of dark morph colonies increased with elevation. We believe that the increase of dark *M. mastigophorus* is most likely because these wasps use thermoregulation to control their body temperatures. Although we did not observe any differences between temperatures in our study across elevation, climatologist Alan Pounds has described a decrease in daytime temperatures at Monteverde over the past years (Pounds *et al.* 1999). *M. mastigophorus* could possibly be using their mechanism of thermoregulation to adapt to the dropping daytime temperatures in the region. *M. mastigophorus* as a whole species seems to have evolved to a darker coloration in order to better absorb energy in the f[illegible]e compared [illegible]rax of t[illegible]wasps we found [illegible] although the [illegible]erage of the areas [illegible]as s[illegible]a[illegible] the distributi[illegible]atterns were [illegible]e different.

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