

Where Chocolate Begins and Research Methods End: Understanding Kuna Cacao Consumption

Jeffrey Barnes

Contrary to a recent deluge of scientific and popular publications, the island-dwelling Kuna people of Ailigandi, San Blas Panama do not consume large amounts of locally derived cacao beverages. This paper introduces new research on the actual consumption of *Theobroma cacao* among the people of Ailigandi. The chocolate tree, *Theobroma cacao*, is of great cultural importance for Kuna people, and its fruits are used within multiple contexts as an irreplaceable element of Kuna identity and cultural life. However, cacao cultivation has become dramatically more difficult because of the numerous fungal pathogens that attack the tree. Despite the constraints this has placed on local cacao production, recent studies suggest that Kuna people consume large amounts of local cacao. This research evaluates the livelihood strategies and dietetic intake of the Kuna in a cross-cultural context. Findings suggest that recent studies may have misunderstood the local reality in their depictions of the Kuna people of Ailigandi as prolific consumers of locally derived cacao. Using a methodology that incorporates a local nomenclature, I found that the actual consumption of locally grown cacao among Kuna people is negligible, notwithstanding the claims of researchers whose work is largely funded by an industrial chocolate manufacturer.

Key words: chocolate, indigenous, diet, cacao, methodology, Kuna

Introduction

Traditional food is an area of great interest to both indigenous peoples (Receveur, Boulay, and Kuhnlein 1997) and a diverse academic community focused on pharmacology (Voeks 2004), nutrition (Kuhnlein et al. 1982), sustainability, economic development, and ecological diversity of landraces (Brush 2000). Moreover, a modern natural health craze animates an international search for superfoods and indigenous landraces—featuring indigenous societies as unexploited repositories of nutrition secrets (Johns and Sthapit 2004). This is especially true in the context of chocolate, which originates from the *Theobroma cacao* tree (Bennett 2003).

Since the first encounters between Cortez and Moctezuma, aboriginal consumption of chocolate has mystified and seduced Western consumers. Meanwhile, local people's consumption of *Theobroma cacao* in various forms bears little resemblance to a Western penchant for chocolate. Indeed,

cacao is considered to be medicinal throughout the Americas and is consumed in a diversity of forms whether it is braised, ground, boiled, baked, fermented, or simply worshiped for its generally recognized potency (Coe and Coe 2010; Dillinger et al. 2000; Duke 1975, 1986; Henderson et al. 2007; Young 2007). In the case of the Kuna¹ Indians of San Blas, Panama, little in-depth research has been done regarding their multiple traditional uses of cacao. Including James Howe's (2012) most recent paper in the journal *Gastronomica*, most accounts of cacao use among the Kuna are disparate (McNiell 2006), fragmentary (Chapin 1983; Duke 1986; Howe 1986; Sherzer 1997), and generally provide a piecemeal understanding of the multiple contexts within which cacao is used on a daily basis in Kuna society (Barnes 2005).

The Kuna of San Blas Panama use cacao in ceremonial contexts related to birth, death, spiritual healing, spiritual defense, and as a strong portal to communicate with the spiritual world (Barnes 2005, 2008). Cacao is also used as a component of a number of different nutritional preparations, such as beverages and energizing snacks (Barnes 2005). However, it seems as though difficulties in local cacao agriculture have caused a marked decrease in the preparation of such beverages and snacks (Barnes 2008). In the Cartí region of San Blas, shortages of locally produced cacao have led to decreases in local consumption of cacao beverages,² while more important ceremonial uses endure (Barnes 2008).

Notwithstanding this evidence of decreasing cacao intake, a number of studies have been published claiming that

Jeffrey Barnes is a Professor of Geography and Environmental Studies at Dawson College, Montreal, Quebec. This study was supported by a Short-Term Fellowship at the Smithsonian Tropical Research Institute (Panama) under the supervision of Dr. Fernando Santos Granero. Research was facilitated by cooperation with and written permission from the General Kuna Congress and the local authorities of Ailigandi. Special thanks to Fundación Dobbo Yala, Interpreter; Domingo Diaz; and Anaclaton Morris, Community Secretary of Ailigandi. Also, special thanks go to the Spaulding Residence.

Kuna people from another area of San Blas—Ailigandi—consume anomalously high amounts of cacao beverages (Bayard et al. 2007; Hollenberg 2006; McCullough et al. 2006). These beverages are commonly said to have a unique chemical composition that originates from native varieties of whole cacao (Chevaux et al. 2001; Hollenberg 2006). The healthy cardiovascular condition of the Kuna of Ailigandi has been attributed to this elevated consumption of local flavanol-rich cacao varieties in a number of studies (Hollenberg 2006; Hollenberg et al. 2006; Hollenberg et al. 2005; Lee and Balick 2005; McCullough et al. 2006), and a media frenzy has resulted celebrating the potential health benefits of chocolate (ABC News 2011; Gertner 2004; Roberts 2007).

Ailigandi is the Kuna island-community on Panama's Caribbean coast from which many of these research claims originate. This island is situated near the Colombian border and has a transient population of approximately 2,000 people, which can be divided into 250 matrilineal households where grandmothers and elder women are most often responsible for food preparation. Between 1997 and 1999, research was initiated in this community by Kati A. Chevaux,³ Lilian Jackson,⁴ and others like Norman K. Hollenberg in order to gather regional baseline data for the nutritional content of local foods (Chevaux et al. 2001). Sampling revealed that the local diet was rich in flavanols, and "researchers zeroed in on a 'flavanol' in chocolate called epicatechin" (Howe 2012:45). Subsequent studies identified a link between consumption of locally derived flavonoid-rich cocoa and both a low incidence of hypertension (McCullough et al. 2006) and a lack of cardiovascular disease (Hollenberg 2006).

Flavanols, the focus of much recent scientific inquiry, have been a mainstay of Mars Incorporated's research and development program over the last decade. Following observations about the absence of hypertension among the Kuna people from Ailigandi (Hollenberg et al. 1997), Mars—one of the world's largest chocolate confectionary producers—began to increase support of research surveying the Kuna diet (Gertner 2004). Surveys revealed that local people consume significant amounts of "cocoa"—a principle ingredient of chocolate (Chevaux et al. 2001).

Originally, in Chevaux et al.'s (2001:554) volume presenting baseline data on the Kuna diet, the cocoa consumed in Ailigandi was said to be "partially or totally acquired from Colombian trading boats." At the same time, this article developed a focus on the chemical composition of the locally cultivated, flavanoid-rich cacao varieties. In subsequent publications (Bayard et al. 2007; Fisher et al. 2003; Hollenberg 2006; McCullough et al. 2006), cocoa consumption was characterized as *originating* from locally cultivated varieties of *Theobroma cacao*, which are "naturally very rich in a specific subclass of flavonoids known as flavanols ... and flavanol-based oligomers known as procyanidins." (Hollenberg 2006:S101)

These claims conflict with each other and with past findings (Barnes et al. 2011; Barnes 2005, 2008). In 2004, an ethnobotanical study was initiated, exploring the cultural uses

of cacao among the Kuna. I found that despite the marked decline in cacao availability since before the 1970s, cacao remains of great medicinal and ceremonial importance to local people⁵ (Barnes 2005). This marked lack of local cacao was also reported in a 2008 study relating ceremonial activities to availability of cacao (Barnes 2008). The reduced availability of cacao in Kuna communities is further reported in epidemiological studies that tracked the spread of more than 75 devastating cacao pathogens throughout South and Central America, including Panama in the late 1950s and 1960s (Aime and Phillips-Mora 2005; Evans 1986; Orellana 1956; Phillips-Mora, Aime, and Wilkinson 2007). Although Mars Inc. has attempted on one hand to revitalize cacao production among the Kuna through extensive agricultural interventions,⁶ research sponsored by the company continues to claim that there is an abundance of locally grown cacao.

Hollenberg claims in two different contexts that the Kuna consume "more cocoa than anyone else in the world" (Gertner 2004) and that the cocoa consumed is "all locally grown" (Bayard et al. 2007:53). James Howe (2012), a well-respected anthropologist who has worked with Kuna people for over four decades, denies these assertions outright. He builds a convincing case that makes Hollenberg's claims seem preposterous, based upon field experience in other communities and anecdotal conference with other anthropologists of the Kuna (Howe 2012). Why do findings on the Kuna people's consumption of cacao differ so substantially? This paper proposes a methodology that aims to accurately characterize the Kuna people's cacao consumption, resolving the existence of conflicting claims about the amount and form of cacao consumed in the remote Kuna community of Ailigandi.

Methods and Context

This study was designed to evaluate the frequency of whole cacao consumption and how this has changed over time in Ailigandi. In April 2009, written permission was acquired from the national and local Kuna authorities (*congresos*) to carry out research after cooperating in the development of research objectives and methods. Considering the congreso's limited awareness of recent cacao-related research and its results, authorities were anxious to garner a better idea of actual whole cacao consumption and a better understanding of the widespread published depictions of Kuna people.

A primary focus of this research was, thus, to obtain an accurate characterization of the form and frequency of cacao consumed by the people of Ailigandi. Actual consumption is compared to *household historical characterizations* (HHC)—a chronological benchmark of when traditional food consumption was elevated—as a way to identify the interval over which traditional diet may have changed. HHC is a new method forwarded by this paper that combines the well-established tradition of nutritional anthropology (Mintz and Du Bois 2002) and the current urgency associated with changing indigenous nutrition (Kuhnlein and Receveur 1996). Retrospective historical analysis is a social tool that has been

recommended in an ecological context as a method that “often provides critical information for interpreting current conditions” that would otherwise not appear in current data (Foster 2000:3).

Prior to beginning 60 randomly selected⁷ household surveys, Field Interpreter Domingo Diaz and I carried out interviews with five locally elected elders regarding the various local nomenclature used to identify consumable cacao products. Although past research provides a basic understanding of *Dulegaya*⁸ cacao nomenclature (Barnes 2008), regional linguistic variations limit their use in the production of a research tool that is sufficiently sensitive to accurately measure local food frequency. Literature addressing the challenges faced in carrying out cross-cultural research on food consumption prescribes an approach that is sensitive to culturally appropriate terminology and measurements in order to attain useful information from Food Frequency Questionnaires (Jerome 1997; Sharma and Cruickshank 2001; Teufel 1997). Past livelihood research proposes a number of creative in-situ methods for understanding local nutrition, especially within a cross-cultural context (Ghimire and Aumeeruddy-Thomas 2009; Lee, O’dea, and Mathews 1994). Unfortunately, few studies explicitly identify a method for learning how locals talk about food forms within a cross-cultural context.

In this case, prior to carrying out household surveys, much emphasis was placed upon understanding how cacao beverage nomenclature changes on the basis of the origin and form of ingredients—a detail that is not obvious without specific efforts. Indeed:

Many indigenous peoples do not separate plant species into those that are food and those that are medicine because the same item can be one, the other, or both at the same time, depending on the stage of plant development, the method of preparation, and the state of health or pathology of the individual. (Kuhnlein et al. 1996:421)

Cacao, or as it is known to the Kuna, “*Siagwa*,” is a generic name that can be used in reference to cacao in one of many forms—seeds within the fruit, dried seeds, or in some cases industrially produced powder (Barnes 2008). Once the researcher and field interpreter gained a clear idea of the local nomenclature related to cacao consumables from five in-depth interviews, household surveys were then carried out with ease and with a focus on understanding the frequency and nature of local cacao consumption throughout recent history. Each food frequency interview lasted between 30 minutes and one hour and included the following:

1. a short discussion/confirmation of nomenclature used to identify traditional foods and the origin of their ingredients;
2. a series of questions related to the current household frequency of cacao consumption, with specific reference to pre-established nomenclature;
3. a discussion of current cacao consumption at the broader community level; and

4. a request to recall the most recent historical point when, at the community level, it would have been possible for most people to consume four to five servings of whole cacao beverages on a daily basis.

This last point aimed to determine whether the consumption of whole cacao has undergone considerable changes in recent history or if commonly recognized changes (Barnes 2008) occurred long ago. Nutritional anthropology proposes ways to effectively characterize a diet that is under pressure (directional or non-directional) while using robust methods such as in-depth household interviews, visual aids (Receveur, Boulay, and Kuhnlein 1997), and even the “store-turnover method” (Lee, O’dea, and Mathews 1994). However, these are insufficient for understanding how diet has changed from some point in the past. As a default, research often focuses on the present, leaving the past as an ambiguous archetype.

The HHC method engages local heads of household as randomly selected community historians, charged with the responsibility of recalling a point when the consumption of a traditional food was great at the community level. The inherent variability in personal dietary recollection of the past is an important consideration that does not preclude the value of this analysis. In fact, some authors (Bakkum et al. 1987; Byers et al. 1987) explore the accuracy of retrospective dietary reporting and conclude that it is generally preferable to ask retrospective questions rather than relying on testimonials about current diet as an analogue for the past (Byers et al. 1987). In this way, the HHC approach is a novel but familiar way to elicit historical baseline data for nutrition at a community level where there seems to have been a shift away from traditional foods. The principal difference is that respondents in the present study were asked to approximate a date when community consumption of whole cacao could have been high (four to five cups per day per individual). The demographic selected for this part of the analysis is composed of respondents who were 60 years of age or older. This is an important consideration, because most heads of household were actually under the age of 60, and many of those respondents did not feel comfortable speaking to historical periods that they had not witnessed. For this reason, only 19 (of 60) respondents were represented in the average HHC.

Research was carried out in April, May, June, and July of 2009 immediately after what is normally the most productive time of year for local cacao harvesting. Timing is an important consideration when sampling consumption of traditional foods. Ideally, one would sample in order to capture the annual low point and the “peak of traditional food consumption” (Receveur, Boulay, and Kuhnlein 1997:2180), which is often determined according to seasonal availability. This would be a superior method when attempting to characterize the average annual dietary composition. However, in the case of the present study, sampling followed a peak in cacao availability. Therefore, while food frequency sampling does not permit full generalizations about average annual consumption, we can be sure that annual averages are most certainly lower than the findings herein.

Table 1. Names and Composition of the Famous Kuna Cacao Beverages

Specific Beverage Names	Ingredients/Origin	Generic Name	Chevaux et al. Beverage Names
1 Siagwanis/Kaynis Siagwaba	Whole cacao, sugar (granulated or cane)	Gobed	Cocoa beverage
2 Cocoa Gobed	Cocoa powder, sugar	Gobed	Cocoa beverage
3 Siagwa Olligwa	Whole cacao, corn, sugar	Olligwa	Cocoa/corn beverage
4 Cocoa Olligwa	Cocoa powder, corn, sugar	Olligwa	Cocoa/corn beverage
5 Madun Siagwaba	Banana, whole cacao	Madun/Ochi	Cocoa/banana beverage
6 Madun Cocoaba	Banana, cocoa powder	Madun/Ochi	Cocoa/banana beverage

Once data gathering was complete and the data was analyzed, preliminary results were presented to local and national congresses as a gesture of transparency—and a measure to ensure accuracy. These presentations were also an opportunity for local people to express ideas regarding the validity of findings and eventual use of the results.

Results

I found that past research tends to oversimplify the nuanced differences among the various forms of Kuna cacao beverages. Indeed, beverages containing locally grown (whole) cacao were quite rarely consumed at the time of sampling, and have been since the late 1950s, whereas the consumption of beverages confectioned from industrially produced de-fatted cocoa powder was highly common. A *t*-test based on the sample ($n=19$ elders ≥ 60 years) concludes that it is highly unlikely that beverages containing whole cacao were consumed commonly (in the order of four to five cups per day) in the year 1998, as suggested in Hollenberg et al. (2006) and derived from Chevaux et al. (2001). Based on HHC estimations of when whole cacao consumption was common (four to five cups per day per individual), it is likely (sig .05) that the actual most recent time of great cacao consumption lies between 1951 and 1963.⁹ Research findings can be divided into three thematic categories: local cacao nomenclature, the origin of cacao consumables, and the actual frequency of cacao consumption.

Cacao Nomenclature

Dietetic research by Miriam Jackson¹⁰ designed to characterize the nutritional content of typical Kuna foods focused on seven different foods. Three of these were treated generically as “cocoa beverages” (Chevaux et al. 2001). Local consumption of cocoa beverages can actually be segmented into at least six different preparations,¹¹ rather than the three outlined in Chevaux et al. (2001). Indeed, while Chevaux et al. seemed only to describe those that are composed of cocoa powder, their deep consideration of local cacao varieties’ chemical composition alluded to some logical link between the beverages described and local cacao varieties.

Described in Table 1 is the nuanced nomenclature actually used to identify cacao beverages—comparing it to Chevaux et al.’s (2001) depiction. The *Dulegaya* names of local beverages tend to differ on the basis of the form and origin of their ingredients. What was described by Chevaux et al. (2001:577) as a sweetened “cocoa beverage” can be referred to in at least three different ways based upon the origin of its ingredients - cacao and sugar. If this beverage is made from whole, and or locally cultivated cacao beans, it can be referred to as *Siagwanis* (sweetened with sugar) or *Kaynis Siagwaba* (sweetened with cane sugar), whereas if industrially processed cocoa powder (*Cocoa Ubiled*) is used, it becomes an entirely different beverage that is called *Cocoa Gobed* (see Table 1). Another cocoa beverage described in Chevaux et al. (2001) as “banana beverage” can be made with cocoa powder or with whole cacao beans, and while it is generically called *Madun* or *Ochi*, locals make specific reference to the preparation containing whole cacao beans and banana by calling it *Madun Siagwaba*. In the case of the “cocoa/corn beverage,” locals refer to it in two different ways that also reveal the form of cacao used in its preparation—generically as *Olligwa*, and specifically as *Siagwa Olligwa*, when whole cacao beans are used in its confection.

Origin of Cacao Consumables

This research reveals that while some distinctly named beverages call for local whole cacao, many do not. Recent depictions of Kuna cacao consumption claim that “Island-dwelling Kuna consume more than five cups of flavanol-rich cocoa per day” (Hollenberg 2006:S99) in the form of traditional beverages that are prepared using local whole cacao (Bayard et al. 2007). Indeed, *when* beverages—such as *Siagwanis*, *Madun Siagwaba*, or *Siagwa Olligwa*—are made, the beans usually originate from local agricultural production. Among the 60 heads of household surveyed, 45 claimed to acquire whole cacao locally, *when needed* for specific beverages, whereas 15 others either never used whole cacao beans for beverages ($n=9$) or acquired them from Panama City ($n=6$). When industrial cocoa powder is used in beverages—such as *Cocoa Gobed*, *Cocoa Olligwa*, or *Madun Cocoaba*—it originates entirely from Colombian

Table 2. Frequency of Whole Cacao Consumption at Household Level

Whole Cacao Beverage		Average Frequency of Household Preparation <i>n</i> =60 Respondents (Separated by Ingredient) ¹	
Number	Name	Whole Cacao (Generally)	Whole Local Cacao (Specifically)
1	Siagwanis/Kaynis	1 cup/35days	1 cup/37 days
3	Siagwa Olligwa	1 cup/23 days	1 cup/23 days
5	Madun Siagwaba	1 cup/23 days	1 cup/25 days
Totals in frequency per week		0.81 cups per week or 1 cup per 1.2 weeks	0.77 cups per week or 1 cup per 1.3 weeks

¹ Respondents were asked to quantify the consumption frequency of discrete beverages in terms that were most comfortable to them. Their responses were thereafter converted into weekly values.

markets, as suggested in Chevaux et al. (2001) and Barnes (2005, 2008). This sensitivity to the origin of ingredients found in distinct cacao beverages allowed researchers to more accurately characterize the frequency of whole cacao consumption.

Frequency of Whole Cacao Consumption

The frequency of whole cacao consumption among the Kuna of Ailigandi has been a pivotal element of the Mars company’s claims about the influence of flavanol consumption on human health. With the help of Mars laboratories, Hollenberg (2006:S101) claims that the Kuna consume at least five cups of local cacao on a daily basis and that “the cocoa ingested by the Kuna is naturally very rich in” flavonoids in comparison to “commercially available” varieties (Gertner 2004). Contrary to Hollenberg’s claims, beverages containing local and whole cacao are rarely consumed compared to those containing industrially produced cocoa powder.

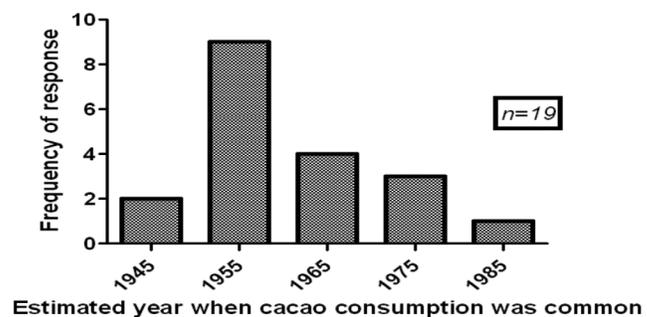
When heads of household in Ailigandi were asked if they had prepared/consumed a *Siagwa* (whole cacao bean) beverage within the last 24 hours, only two out of 60 respondents had done so. Upon asking this question, it was immediately evident to almost all respondents (58 of 60) that the researchers were referring to beverages containing whole cacao beans and not cocoa powder.¹² This distinction between beverages and their ingredients facilitated a discussion of the frequency with which locally produced and whole cacao is actually consumed.

The rarity of whole cacao consumption became clear when respondents were asked to evaluate community and household consumption. This was achieved by asking for a generic assessment of community whole cacao consumption, a recollection of when specific whole cacao beverages were last prepared, and an approximation of the general frequency of household-level preparation (household consumption frequency outlined in Table 2). Table 2

demonstrates that the average frequency of whole cacao consumption¹³ is approximately once every eight days at the household level. That frequency drops to approximately once every nine days when the data is adjusted to represent the consumption of only locally harvested cacao. These frequencies are derived from an average of continuous household estimations that varied between once a week, once a year, and never.

All respondents felt as though the consumption of whole cacao is currently rare in the community of Ailigandi. More than a month had passed since most (*n*=37) households had consumed a *Siagwa* beverage, while for 27 households it had been over a year. Furthermore, elder heads of household estimated that (on average) the regular consumption of *Siagwa* beverages has been uncommon since 1957 (see Figure 1 for frequency distribution). Accordingly, 14 of the younger respondents (between 20-35 years) did not feel comfortable commenting on a time period, because they had never witnessed a time when regular *Siagwa* consumption was common. Respondents often talked about how cocoa powder has virtually replaced the use of local *Siagwa* in beverages,¹⁴

Figure 1. Histogram of Household Historical Characterizations of Whole Cacao Consumption in Ailigandi



Discussion

Figure 2. Ailigandi community member and default owner of 600 cacao trees left by Mars Inc. Agricultural Projects. Here, he is demonstrating (in his right hand) the size of a gourd that was used to distribute nearly 1,000 seeds to local individuals interested in cultivating Mars Inc.'s varieties of *Theobroma cacao*. In his left hand are cacao beans: what is left of the first harvest of Mars' varieties.



suggesting that this is principally due to local difficulties in the cultivation of *Theobroma cacao*. According to locals, it is for this reason that Mars Inc. initiated agricultural cacao-revitalization initiatives in 2000 throughout many communities in San Blas—among others, in Ailigandi.

Local employees of the Ailigandi health center confirm that this agricultural help was indeed a reward to the community for having participated in Mars' research initiatives (personal communication, 2009). Local people graciously accepted the technical assistance sent by Mars and the introduced *Theobroma cacao* varieties that were distributed by Mars' agricultural technicians in the local town hall or congreso (see Figure 2). Although this agricultural initiative has enjoyed mixed success (Barnes et al. 2011), two people from Ailigandi currently boast a plot with over 600 of Mars' trees—which had rendered their first production in February of 2009, prior to this field research. For the Kuna, cacao is an important component of beverages and countless ceremonial processes. Thus, despite agricultural difficulties, people talk about maintaining a number of spiritually important varieties, required by traditional specialists who know how to use the plant's powers. The people of Ailigandi are generally grateful for Mars Inc. interventions, which have taught locals how to control some of the diseases that disable cacao production throughout the tropics.

This research has taken a nuanced approach to understanding the form and frequency of cacao consumption in Ailigandi. Special attention has been paid to the complex nomenclature associated with cacao consumables, while the novel HHC approach to community cacao consumption has juxtaposed current diet and the average estimation of past diet in a way that allows local people to retrospectively characterize dietary change. Incorporating cacao nomenclature in the analysis has provided a sound basis for a critical perspective on past research that seems to have exaggerated the extent of the Kuna people's actual consumption of locally produced flavonoid-rich cacao. The HHC of dietary change further emphasizes this exaggeration. Overall, findings confirm a need for meticulous methods when using food frequency questionnaires in a cross-cultural context.

The HHC method produced a window into the past that has been used in different forms in historical ecology, ecological anthropology, and dietetics. For this analysis, a stratified random sample of heads of household produced what might be considered a representative sample of community history. Despite the variability of responses and small sample size, we are able to determine an approximate range within which a change in cacao availability may have occurred—sometime between 1951 and 1963. This is superior to the de facto presumptions that proceed without baseline data. Furthermore, this data—marking dietary change—coincides with national agricultural observations of difficulty in the cultivation of cacao throughout Panama (Orellana 1956).

In James Howe's (2012) categorical critique of Hollenberg's claims about Kuna cacao consumption, he refers his own ethnographic fieldnotes dating back to the 1970s. He finds that not only did the Kuna consume a diversity of beverages at that time but also that cacao-containing beverages seemed to represent a minority of those consumed in the given community. Although Howe's fieldnotes are not derived from Ailigandi, but rather another distant island community, these notes remain relevant in that residents identify with the same cultural group and would have had similar access to resources (and hence beverages).

Evaluating indigenous nutrition can be an invaluable contribution to community history, especially in the context of rapid globalization and cultural change. Research focused on indigenous food systems stands to support an informed and consensual approach to such changes. The findings of this study demonstrate a possible methodological advance for research involving the evaluation of food frequency, especially as it relates to the nuanced use of traditional foods in a cross-cultural context. Whether or not researchers speak the same language as research subjects, complex and important linguistic nuances stand to be missed if they are not given preliminary attention.

When researching cacao among the Kuna, it is common to ask locals in Dulegaya, "*Siagwa be nikka?*" which translates roughly as "Do you have cacao?" Local people

tend to answer this question in any number of ways depending on a contextual interpretation of the generic word for cacao—*Siagwa*—from a simple yes or no, to an enthusiastic demonstration of their hidden stash or the appearance of a purchased plastic bag of Colombian cocoa powder. This variety of answers confirms that the initial question is simply too vague. It is necessary to ask a more specific question in order to gain a better understanding of how much local cacao is being consumed. In this context, it is clear that concerted efforts to incorporate customary nomenclature are important prior to any survey of local diet.

A lack of methodological rigor can confound findings and compromise the applied potential of research, in addition to undermining the accurate documentation of invaluable customary knowledges. There is a major methodological difference between the research described in this paper and the work of Chevaux et al. (2001). This research is designed to demonstrate the differences between the forms and frequency of cacao consumption among the Kuna people of Ailigandi. These features are lacking in the research of Chevaux et al. (2001), which failed to clearly elaborate the differences between cacao beverages, especially as they relate to the use of flavonoid-rich cacaos.

Norman K. Hollenberg (2006) has produced the common knowledge that Kuna people consume flavonoid-rich cacao and that the related health benefits may be achieved by chocolate lovers through the consumption of flavonoid-rich chocolate and supplements (Bayard et al. 2007; Chevaux et al. 2001; Hollenberg et al. 1997; McCullough et al. 2006). This creation of knowledge supports a niche market for heart-healthy chocolate such as Mars, Dove, and CocoaVia products and their patented cacao-based supplements (ABC News 2011).

The tenuous claims made by Hollenberg are understood by Howe (2012:50) not as a methodological matter but as a simple case of “wishful thinking, inattention to context, and tremendous pressure for positive results.” Indeed, the results of the present study stand in such stark contrast to Hollenberg’s findings that one wonders if his research methods were even designed to work in the first place. Funding from one of the biggest chocolate producers should have been minimally acknowledged as a conflict of interest in respectable journals such as *Hypertension*, *Nutrition*, or *Cardiovascular Pharmacology*.

If the Kuna people of Ailigandi do not consume large amounts of natural cacao, then why are they so healthy? Furthermore, why would Mars’ agricultural projects have allegedly introduced other varieties (see Figure 2) into what is being portrayed as the panacea of healthy *Theobroma cacao*? Although a comprehensive scientific answer to these questions is beyond the scope of this paper, one elder suggests that regardless of what miracle drug scientists can synthesize from cacao, “they will never know how to sing to cacao, or [how] to send it deep into the eighth spiritual level. Doing that takes practice” (Sabbín Dummad, personal communication, 2009).

When the results of this study were presented to the elders representing Kuna communities at a national level, they laughed ironically. One man said, “This is true. We barely drink *Siagwa* beverages anymore, and this weakens us. *Siagwa* was the source of our strength. Kuna people used to be strong in the time of our forefathers.” Another leader interjected, “Yes, they are talking about how *Siagwa* makes us strong, but we already know this. No matter how deep they dig, they won’t even scrape the surface—they’ll never see the eighth level. That is where the power of *Siagwa* resides.”

Notes

¹National initiatives for phonetic and spelling standardization have led to an official change in the spelling of “Kuna” to “Guna,” whereas early ethnographic works spelled the group’s name “Cuna” (Orán and Wagua, 2011).

²Cacao beverages are those discrete customary beverages consumed by Kuna people that contain whole cacao or derivatives thereof.

³Affiliation: Analytical and Applied Sciences, Mars, Incorporated, Hackettstown, N.J.

⁴Affiliation: Panamanian Ministry of Health, Panama City, Panama

⁵This period was extrapolated from a series of formal interviews in 2007 where respondents were asked to estimate how long it has been since the cultivation of locally-grown cacao failed in their respective communities. These interviews were carried out with members of three communities in the Cartí region of San Blas ($n=30$) who were elected by local leaders as *knowers of cacao*. These findings correspond closely to epidemiological data (Aime and Phillips-Mora, 2005) tracking the mid-century arrival of devastating cacao pathogens in Central America.

⁶This was organized through a Kuna NGO – Fundación Dobbo Yala (FDY)—and ACIDI/VOCA, an international development organization based out of Washington, D.C. that fosters community projects and partnership with agribusiness. Just before the year 2000, they and Mars Inc. launched a first phytosanitary project intended to improve the Kuna’s dismal cacao production through education and the provision of seedlings and plant nurseries.

⁷Random interval selection from local household census list

⁸Kuna language

⁹Calculated using Wilcoxon Signed Rank Test with Prism5

¹⁰Published as Chevaux et al. (2001) (See Note 3.)

¹¹Whole cacao is also prepared in some other ways; however, their generally recognized rarity precludes these mediums from a meaningful frequency analysis. (i.e., cacao-coconut beverage and mashed ripe banana and cacao nib snack).

¹²Confirming the accuracy and value of preliminary interviews focused on nomenclature. In the two cases where a term was not immediately understood, time was taken to explain the intended meaning.

¹³Based on three regularly consumed beverages and a combination of their frequencies

¹⁴Although the local consumption of defatted cocoa powder is quite significant and in the order of that described by Chevaux et al. (2001), elaboration upon its frequency and form is beyond the scope of this paper.

References Cited

- ABC News
2011 Cocoa and the Kuna Indians of Panama. URL:<<http://abcnews.go.com/Health/video/cocoa-kuna-indians-panama-native-americans-chocolate-production-13402637>> (December 10 2011).
- Aime, Catherine M., and Wilbert Phillips-Mora
2005 The Causal Agents of Witches' Broom and Frosty Pod Rot of Cacao (Chocolate, *Theobroma cacao*) Form a New Lineage of Marasmiaceae. *Mycologia* 97(5):1012-1022.
- Bakkum, Alies, Bennie Bloemberg, Wija A. van Staveren, Monique Verschuren, and Clive E. West
1987 The Relative Validity of a Retrospective Estimate of Food Consumption Based on a Current Dietary History and a Food Frequency List. *Nutrition and Cancer* 11(1):44-53.
- Barnes, Jeffrey Ivan
2005 The Cultural Importance of Cacao among the Kuna of San Blas, Panama. Montreal, Canada: McGill University and the Smithsonian Tropical Research Institute.
2008 Cacao: A Cultural Keystone Species among the Kuna of Three Communities in San Blas, Panama. MA thesis, Carleton University.
- Barnes, Jeffrey Ivan, John E. Wall, Patricia Ballamingie, and Dominago Diaz
2011 Missed Understandings: Cultural and Communication Disconnects in Indigenous Livelihood Revitalization and Conservation. *Society and Natural Resources*. 24(9):972-83.
- Bayard, Vincente, Farmina Chamarro, Jorge Motta, and Norman K. Hollenberg
2007 Does Flavanol Intake Influence Mortality from Nitric Oxide-Dependent Processes? Ischemic Heart Disease, Stroke, Diabetes Mellitus, and Cancer in Panama. *International Journal of Medical Sciences* 4(1):53-58.
- Bennett, Alan B.
2003 Out of the Amazon: *Theobroma cacao* Enters the Genomic Era. *Trends in Plant Science* 8(12):561-563.
- Brush, Stephen B.
2000 Genes in the Field: On Farm Conservation of Crop Diversity—The Issues of in Situ Conservation of Crop Genetic Resources. Ottawa, Canada: International Plant Genetic Resources Institute and International Development Research Centre.
- Byers, Tim, James Marshall, Evelyn Anthony, Roger Fielder, and Maria Zielezny
1987 The Reliability of Dietary History from the Distant Past. *American Journal of Epidemiology* 125(6):999-1011.
- Chapin, Norman Macpherson
1983 Curing among the San Blas Kuna of Panama. Ph.D. dissertation, University of Arizona.
- Chevaux, Katie A., Lilian Jackson, Maria Elena Villar, Jeff A. Mundt, Joel F. Comisso, Gary A. Adamson, Marjorie M. McCullough, Harold H. Schmitz, and Norman K. Hollenberg
2001 Proximate, Mineral, and Procyanidin Content of Certain Foods and Beverages Consumed by the Kuna Amerinds of Panama. *Journal of Food Composition and Analysis* 14(6):553-563.
- Coe, Sophie D., and Michael D. Coe
2010 The True History of Chocolate. 2nd ed. London, United Kingdom: Thames and Hudson.
- Dillinger, Teresa L., Patricia Barriga, Sylvia Escárcega, Martha Jimenez, Diana Salazar Lowe, and Louis E. Grivetti
2000 Food of the Gods: Cure for Humanity? A Cultural History of the Medicinal and Ritual Use of Chocolate. *American Society for Nutritional Sciences* 130(Supplement):2057S-2072S.
- Duke, James A.
1975 Ethnobotanical Observations on the Cuna Indians. *Economic Botany* 29(3):278-293.
1986 Isthmian Ethnobotanical Dictionary. 3rd ed. Jodhpur, India: Scientific Publishers.
- Evans, Harry C.
1986 A reassessment of Moniliophthora (Monilia) pod rot of cocoa. *Cocoa Growers' Bulletin* 37:34–43.
- Fisher, Naomi D. L., Meghan Hughes, Marie Gerhard-Herman, and Norman K. Hollenberg
2003 Flavanol-Rich Cocoa Induces Nitric-Oxide-Dependent Vasodilation in Healthy Humans. *Journal of Hypertension* 21(12):2281-2286.
- Foster, David R.
2000 Conservation Lessons and Challenges from Ecological History. *Forest History Today* Fall:2-11.
- Gertner, Jon
2004 Eat Chocolate, Live Longer? *New York Times Magazine*, October 10 Accessed at: http://www.nytimes.com/2004/10/10/magazine/10CHOCOLAT E.html?pagewanted=all&_r=0 Date Accessed: January 12, 2005.
- Ghimire, Suresh K., and Yildiz Aumeeruddy-Thomas
2009 Ethnobotanical Classification and Plant Nomenclature System of High Altitude Agro-Pastoralists in Dolpo, Nepal. *Botanica Orientalis* 6: 56-68.
- Henderson, John S., Rosemary A. Joyce, Gretchen R. Hall, Jeffrey W. Hurst, and Patrick E. McGovern
2007 Chemical and Archaeological Evidence for the Earliest Cacao Beverages. *Proceedings of the National Academy of Sciences* 104(48):18937-18940.
- Hollenberg, Norman K.
2006 Vascular Action of Cocoa Flavanols in Humans: The Roots of the Story. *Journal of Cardiovascular Pharmacology* 47(Supplement 2):S99-S102.
- Hollenberg, Norman K., Marji L. McCullough, John F. Hammerstone, Claudio Ferri, Thomas Lüscher
2006. Commentary and Discussion on the Opening Session Epidemiology, Cardiovascular Aspects, and Analysis of Cocoa Flavanols. *Cardiovascular Pharmacology* 47 (Supplement 2):S119-S121.
- Hollenberg, Norman K., Gregorio Martinez, Marji McCullough, Terri Meinking, Diane Passan, Mack Preston, Alicia Rivera, David Taplin, and Maureen Vicaria-Clement
1997 Aging, Acculturation, Salt Intake, and Hypertension in the Kuna of Panama. *Hypertension* 29(1 Pt 2):171-176.
- Hollenberg, Norman K., Erin Mohres, Terri Meinking, Mac Preston, Benny Crespo, Alicia Rivera, Lilian Jackson, Gregorio Martinez, and Won Mee Loken
2005 Stress and Blood Pressure in Kuna Amerinds. *The Journal of Clinical Hypertension* 7(12):714-720.

- Howe, James
 1986 *The Kuna Gathering: Contemporary Village Politics in Panamá*. Austin: University of Texas Press.
 2012 Chocolate and Cardiovascular Health: The Kuna Case Reconsidered. *Gastronomica* 12(1):43-52.
- Jerome, Norge W.
 1997 Culture-Specific Strategies for Capturing Local Dietary Intake Pattern. *American Journal of Clinical Nutrition* 65(Supplement 4):1166S-1167S.
- Johns, Timothy, and Bhuwon R. Sthapit
 2004 Biocultural Diversity in the Sustainability of Developing Country Food Systems. *Food and Nutrition Bulletin* 25(2):143-155.
- Kuhnlein, Harriet V. and Olivier Receveur.
 1996. Dietary Change and Traditional Food Systems of Indigenous Peoples. *Annual Review of Nutrition* 16:417-442.
- Kuhnlein, Harriet A., Alvin C. Chan, Neville J. Thompson, and Shuryo Nakai
 1982 Ooligan Grease: A Nutritious Fat Used by Native People of Coastal British Columbia. *Journal of Ethnobiology* 2(2):154-161.
- Lee, Amanda J., Kerin O’dea, and John D. Mathews
 1994 Apparent Dietary Intake in Remote Aboriginal Communities. *Australian Journal of Public Health* 8(2):190-197.
- Lee, Roberta, and Michael Balick
 2005 Rx: Chocolate. *The Journal of Science and Healing* 1(2):136-139.
- McCullough, Marjorie L., Katie Chevaux, Lilian Jackson, Mack Preston, and Gregorio Martinez
 2006 Hypertension, the Kuna, and the Epidemiology of Flavanols. *Journal of Cardiovascular Pharmacology* 47(Supplement 2):S103-S109.
- McNiel, Cameron, ed.
 2006 *Chocolate in Mesoamerica: A Cultural History of Cacao*. Gainesville: University Press of Florida.
- Mintz, Sidney W., and Christine M. Du Bois
 2002 The Anthropology of Food and Eating. *Annual Review of Anthropology* 31 :99-119.
- Orán, Reuter, and Aiban Wagua
 2011 *Diccionario Guna Castellano*. URL:<<http://www.congresogeneralkuna.com/diccionario%20guna.pdf>> Accessed December 15 2011).
- Orellana, R. G.
 1956 La Moniliosis Y Otras Enfermedades Del Cacao En El Este De Panamá. *Boletín Fitosanitario de la FAO* 4:168-169.
- Phillips-Mora, W., M. C. Aime, and M. J. Wilkinson
 2007 Biodiversity and Biogeography of the Cacao (*Theobroma cacao*) Pathogen Monilophthora Roreri in Tropical America. *Plant Pathology* 56(6):911-922.
- Receveur, Olivier, Marjolaine Boulay, and Harriet V. Kuhnlein
 1997 Decreasing Traditional Food Use Affects Diet Quality for Adult Dene/Métis in 16 Communities of the Canadian Northwest Territories. *The Journal of Nutrition* 127(11):2179-2186.
- Roberts, Michelle
 2007 Cocoa Nutrient for ‘Lethal Ills’: BBC News. URL:<<http://news.bbc.co.uk/2/hi/health/6430777.stm>> Accessed December 10 2011.
- Sherzer, Joel
 1997 *Kuna Ways of Speaking: An Ethnographic Perspective*. Austin: University of Texas Press.
- Sharma, Sangita; Kennedy J. Cruickshank
 2001 Cultural differences in assessing dietary intake and providing relevant dietary information to British African-Caribbean populations. *Journal of Human Nutrition and Dietetics* 14 (6):449-456.
- Teufel, Nicolette I.
 1997 Development of culturally competent food-frequency questionnaire. *Am J Clin Nutr* 65 (suppl):1173S-8S.
- Voeks, Robert A.
 2004 Disturbance Pharmacopoeias: Medicine and Myth from the Humid Tropics. *Annals of the Association of American Geographers* 94(4):868-888.
- Young, Allen M.
 2007 *The Chocolate Tree: A Natural History of Cacao*. Gainesville: University Press of Florida.