I. Introduction

This report discusses the results of my TCS-funded research in northeastern Mexico in summer 2009. The reader is urged to refer to the project proposal of the same name for a background on the research. Quoting from the proposal,

[A] central question that emerges from Mesoamerican interaction with cycads over the past 6,000 years is to what extent were cycads involved in human domestication of maize? The proposed project seeks to delve into the ethnological record both current and historical to begin to answer this question. Why is this important? Maize research has focused, understandably, on the genetic heritage of the world’s foremost food crop, but it has neglected or misinterpreted the wider cultural/symbolic underpinnings of maize domestication. The role of cycads has been completely ignored until now...

The primary goal of this project is to interview the oldest and most knowledgeable people specifically about cycad uses and beliefs, among the Xi’ui, Nahuatl, and Teenek ethnic groups. All permits for research in indigenous communities will be procured by UASLP. Ethnographic interviews will be conducted in the informants’ maternal languages, and will be tape-recorded or (preferably) videotaped where allowable. Our goal is to interview a minimum of 10 people from each ethnic group, using unstructured, open-ended techniques that seek, in the course of conversation, to delve into the informants’ complete knowledge of cycads. Where possible, we will seek to supplement...
these interviews with demonstrations of food preparation, visits to local cycad populations, and discussions with community leaders and other members of the community. Interviews will be transcribed and translated in a timely fashion by researchers at the UASLP.

The proposal also included a visit to the *Dioon angustifolium* population in the Sierra de Tamaulipas, and a visit to Huayacocotla, Veracruz.

Also described was a planning phase for future, large-scale research on the human geography and ethnobotany of cycads in northeastern Mexico, which this researcher and the UASLP are keen on pursuing. To that end, preliminary mapping of cultural uses of cycads in the region, and identification of major archival sources (land grant titles, geographic relations, and so forth, relevant to the region), will be a priority. This project will thus serve as a type of feasibility study for what may become the first-ever multidisciplinary research effort in the human relationship with cycads that looks at the cultural landscape of a region over time...

Overall, while the research was extremely productive (discussed under Section IV, below), it was at considerable variance from the original proposal. In general, I was able to establish an extremely good general outline of current and historic human uses of *Dioon edule* and *Dioon angustifolium* among mestizo communities of San Luis Potosí and Tamaulipas. In addition, some valuable data on *Ceratozamia* were gathered. However, only one interview with a native speaker of indigenous languages, in these languages, was possible. As it turned out, the most productive ethnographic data were garnered from mestizos, in Spanish, in both the Pamería and Huasteca regions. Factors constraining interviews were time available, inaccessibility of communities (my rental car in the Huasteca was barely able to make it to the one traditional Tének community where I did have a successful interview, albeit in Spanish), and the main fact, that knowledge of overt maize-cycad relationships at the symbolic level is largely absent. In this respect, it appears that only very few Nahuatl and Tének speakers in the most traditional communities of the Huasteca lowlands of southeastern San Luis Potosí and Hidalgo may still
retain at least a memory of the former symbolic connections between maize and Zamia and Ceratozamia cycads. Much lengthier fieldwork, based in Aquismón and Tamazunchale, SLP (San Luis Potosí state), would be necessary to track down informants who could expand upon the beliefs reported by Janis Alcorn among the Tének (Alcorn, J. B., 1984, *Huastec Mayan ethnombotany*, University of Texas Press, Austin, TX) and Mario Vázquez-Torres among the Nahuatl (Vázquez Torres, M., 1990, *Algunos datos etnobotánicos de las Cícadas en México*, *Mem. New York Bot. Gard.* 57: 144–147).

I was extremely impressed by the quality and quantity of interdisciplinary research on cycads being carried out at the Universidad Autónoma de San Luis Potosí (UASLP). Students at both the undergraduate and masters levels are researching diverse aspects of *Dioon edule* ethnobotany and biology under the tutelage of dedicated scientists such as Dr. Fortanelli and Dr. Yañez. The Instituto de Investigación de Zonas Desérticas (IIIZD) is basically a semi-autonomous research institute focused on the botany of the entire state (not just, as the name might suggest, the western desert highlands). It contains a large and well-organized herbarium (with numerous cycad vouchers) and a library, and affiliated faculty who include some of Mexico’s premier field botanists. Every year, students and guests present their research findings in a rigorous conference where they have the opportunity to be critiqued by their mentors in a public setting. I was also fortunate enough to be able to give a presentation at this event. In addition, I gave a talk on Honduran cycads to students and faculty at the university’s interdisciplinary environmental science graduate program, which includes an exchange component between Germany and the UASLP. Overall, I would say that the hospitality, professionalism, and willingness to collaborate among UASLP faculty and students is second to none in Mexico, and given the enormous diversity of cycads in northeastern Mexico, it constitutes an ideal research partner institution for other cycad researchers.

Notes on safety: unlike the images of Mexico propulgated in the international media, San Luis Potosí and indeed all of interior northeastern Mexico is very safe to travel and research in. The crime rate in towns and countryside is very low; only parts of San Luis Potosí city are dangerous, as is to be expected in any large urban area. After years of researching in Honduras—where the crime rate is now among the highest in the world—it was refreshing to work and travel in an overwhelmingly peaceful region. Another factor that makes northeastern Mexico an ideal cycad
research zone is the lack of widespread animosity between indigenous and mestizo populations—the opposite of the case in Oaxaca. In the latter region, visits to most of the state have to be carefully negotiated and even then can become problematic (as happened during a trip I was on in 2008) given the extremely poor relationship between many autonomous indigenous communities and government entities. I did not find this to be the case at all in the northeast: people were highly approachable and perfectly willing to discuss cycad knowledge; I always showed my letters of support from the UASLP, but informants were universally welcoming and never suspicious of my motives.

The final safety issue concerns the roads during the rainy season. These are as deteriorated as could be expected in any mountainous region of the tropics, though I was able to (barely) navigate the Sierra Madre in a low-slung rental car. Nevertheless, researchers wishing to visit the most remote communities, and even the headquarters of the major biosphere reserves (El Cielo and Sierra Gorda, both teeming with cycads) would be well advised to travel in high-clearance, 4WD vehicles.

II. Itinerary and Principal Activities

40 TOTAL TIME
14 Days spent doing field research
3 Days spent in international transit
5 Days in conferences, formal meetings, and presentations
18 Days in office (individual research, informal meetings, etc.)


June 22

Long-distance bus to San Luis Potosi, capital of the state of the same name.
Meeting with Dr. Miguel Aguilar Robledo, Coordinador de Ciencias Sociales y Humanidades, Universidad Autónoma de San Luis Potosí. Tour of the Social Sciences and Humanities
campus; meetings with personnel; installation in office. Dr. Aguilar-Robledo, a geographer I have known for many years, is the equivalent of a college dean.

June 23

Moved into apartment

Meeting with Dr. Javier Fortanelli Martínez, Profesor Investigador, Instituto de Investigación de Zonas Desérticas, Universidad Autónoma de San Luis Potosí and the team of cycad researchers, including Drs. Erika García and Laura Yañez and their students. Dr. Yañez has led the interdisciplinary group for several years, and also utilized TCS funds; Dr. Fortanelli, ethnobotanist however, was my primary research collaborator during this visit.


June 29 – July 5

*Research trip to the Pamería zone of San Luís Potosí state, with Dr. Fortanelli and his student, Elvia Tristan, who was working on her undergraduate thesis on ethnobotany of Dioon edule (chamal) in indigenous Xi’ui communities.*

June 29: Visit to Agua Puerca (Xi’ui community, Tamasopo municipality); Tamasopo city.

Lengthy hike to chamal population with Xi’ui guide.

June 30: Visit to Gamotes (Xi’ui and mestizo community, Rayon muni.); Santa Catarina;

*Saucillo* (mostly mestizo community Santa Catarina muni.) Beginning of documentation of chamal tamale-making process.

July 1: Saucillo. Conclusion of documentation of chamal tamale-making process.

July 2: Saucillo. Ethnographic interviews.

July 3: Saucillo. Ethnographic interviews and hike to cemetery.

July 4: Visit to Santa María Acapulco (Xi’ui core village); Tamasopo city.

July 5: Return to Gamotes; visit to Río Verde region; return to San Luis Potosi city. Could not carry out research in Gamotes due to a chickenpox epidemic in the village.

July 6 -8. In office.
July 9
Gave seminar to graduate students and professors in the international multidisciplinary environmental sciences program (Programa Multidisciplinario de Posgrado en Ciencias Ambientales, Universidad Autónoma de San Luis Potosí). Talk was entitled “Geografía y conservación de las cícadas (Ceratozamia, Dioon, y Zamia) en Honduras” (Geography and conservation of cycads (Ceratozamia, Dioon, and Zamia) in Honduras).

July 10 – 12. In office.

July 13 – 17
Solo research trip to the Huasteca and Sierra Gorda regions, states of San Luis Potosi, Veracruz, Hidalgo, and Queretaro.

July 13 and 14: Ethnographic research in Tanchachín, a mestizo village in the Huasteca tropical rain forest lowland of eastern SLP. Conducted ethnographic interviews in town; went on an all-day hike with an experienced guide through the Sierra to two chamal populations and a large waterfall.
July 15: Through the Huasteca tropical lowland region of Veracruz, and through a Nahuatl zone of the Sierra Madre Oriental to Huayacocotla.
July 16: Through Hidalgo and back to the Huasteca zone of San Luis Potosi; visits to Nahuatl community of Chimalaco, Tének community of Chamal, Aquismón, and the Sotano de las Golondrinas sinkhole.
July 17: Return to San Luis Potosi city via the Sierra Gorda Biosphere Reserve in Queretaro; side trip to Tancoyol.


July 22 – 24
After the conference, facilitated a follow-up meeting with Drs. Fortanelli, Yañez, and García on possible future collaborations.


**July 27 – 28**

*Research visit to Dioon angustifolium populations in the state of Tamaulipas. Accompanied by Elvia Tristan.*

July 27. North side of the Sierra de Tamaulipas, via Jaumave; visited the village of Los Angeles and researched current chamal populations as well as the locations of caves containing chamal remains. Visited chamal population near Soto La Marina.

July 28. Visited south side of Sierra de Tamaulipas on road to Almagre; documented chamal populations and cycad knowledge. Returned to SLP city via the Chamal region and Ocampo.

July 29 and 30. Long-distance bus to Mexico City; return flight to Jackson, Mississippi

**COMMENT:** Time “in office” was spent during the week at my assigned office in the UASLP or visiting the IIZD. Time “in office” on weekends was spent working at my apartment.

**III. Expenses**

*Amount awarded: $2480.*

**Approximate breakdown:**

- Plane ticket $700
- Bus tickets $50
- Car rentals and gas $400
- Apartment $600
- Hotels $250
- Food $400
- Miscellaneous $80
COMMENT: The budget was sufficient to cover the main research needs; UASLP contributed by paying most expenses for Pamería trip, and helping with car rental fees for other trips. UASLP’s administrator also was extremely helpful in the apartment arrangement and all other logistics issues.

IV. Results and Conclusions

(Notes: no exact population locations are given. *Dioon* populations, however, are both extremely abundant and easy to locate; in many cases, particularly in the Pamería, they are at little to no threat. No names of informants are given)

A. *Dioon angustifolium* in Tamaulipas

Some of the earliest identifiably domesticated corn (maize) cones were found in rock shelters in the Sierra de Tamaulipas in the 1950s by archaeologist Richard McNeish (MacNeish, R. S, 1958, Preliminary archaeological investigations in the Sierra de Tamaulipas, Mexico, Transactions of the American Philosophical Society 48[6]); these were dated to ca. 4000 years BP (before present). Confirmed early maize cones were also found in caves near Ocampo, Tamaulipas in the Sierra Madre, as well as in the Valle de Tehuacán, Puebla (6000 BP). Maize remains the world’s most important crop and food, but its origins are still shrouded in mystery. It is now generally believed that maize was domesticated, somehow, from the seed heads of wild *Zea* ‘teosinte’ grasses in the Balsas basin of western Mexico some 8000 to 9000 years ago. Nevertheless, the only 100% reliable way of confirming the presence of maize in any prehistoric time period is through finding remains in caves, and only four cave regions in Mexico are known that contain preserved cobs. Of these four, I have discovered, three also contain *Dioon* remains in the same strata as the corn, as well as prior to it (the cave that doesn’t contain *Dioon* is Guila Naquit, in Oaxaca, where there are no *Dioon* populations nearby). Thus there is considerable evidence for the early complementarity of maize and cycads - the same situation we find today in northeastern Mexico and northeastern Honduras, as well to a lesser extent in other parts of Mexico such as Oaxaca. The main purpose of this field research was attempt to shed light on the origins, depth, and continuance of these connections, keeping in mind my basic assumption that cycad consumption predated maize consumption, and that the culture surrounding the
harvesting and food preparation of the former influenced the cultural acceptance of the latter, if not the actual process of domestication itself.

One possibility, probably impossible to prove but certainly compelling, is that maize ears themselves were favored inasmuch as they resembled cycad ears—i.e., that cycad-similar ears were selected for in regions that contained wild cycad populations. This would explain the unprecedented increase in size of maize ears over the millennia: an intentional mimicry of the already-sacred *Dioon* cones. This would also explain the sacred connections embedded in the language ("teocintle", i.e., "sacred ear of corn") ascribed not only to the genetic *Zea* ancestors and *Tripsacum* relatives, but also to the "inspirational" ancestors, cycads. A more conservative hypothesis is that early maize, which was not processed into tamales for many thousands of years after its domestication, gained acceptance in areas where cycads were already eaten because of its obvious resemblance to cycads. The latter may be the case in northeastern Mexico, which is not considered to be a possible candidate region for the origins of maize domestication.

The case of the Sierra de Tamaulipas—an isolated range east of the Sierra Madre Oriental—is intriguing in that hunter-gatherers 4,000 years ago stayed in rock shelters for a few months of the year specifically to gather *Dioon* in large quantities. *Dioon* was by far the dominant food in the shelters for millennia, yet the significance of this has been completely overlooked in the literature. The seasonal cycad-gathering camps indicate an overwhelming emphasis on *Dioon* in the diet, at a time when maize was of little importance.

Kent Flannery, an anthropologist familiar with the region, had already conveyed to me that a cycad population was near the principal rock shelter (Cueva del Perro) in the northern Sierra, and I was interested in finding out how prevalent *Dioon angustifolium* still was in the region, as well as whether it was still consumed. The archaeological record shows that *Dioon* was still consumed by indigenous "Pasitas" inhabitants into the 1700s. However, despite missionization efforts, these inhabitants died out or were assimilated long before Spanish or mestizo habitation of the Sierra (outsiders populated the flatlands of southern and central Tamaulipas from the 1600s, but the mountain reaches were not settled until much later).
As it turns out, the three rock shelters that contained *Dioon* remains are only accessible via 4WD vehicle and multi-day hikes. The Sierra, though not very high, is quite rugged; guides do exist who know the region, but at least a week would be needed to descend to the canyon floors above which the shelters are located. Nevertheless, during our brief visit we were able to confirm the persistence of at least 20 *Dioon* populations throughout the Sierra, in no place as abundant as in the Pamería or southeastern León, but nevertheless of significant extent. However, none of the approximately dozen informants had ever heard of the possibility of consuming *Dioon* for food. All were familiar with the damage it does to livestock, and there were occasional mentions of the use of its leaves for ornament.

Indeed, nowhere in the entire state of Tamaulipas, even in the areas that had been settled for longer than a century, did we find anyone who had ever heard of *Dioon* being eaten for food. This is exactly the opposite of the case for *Dioon edule* in the states to the south, and is also at variance with the widespread practice of eating *Dioon angustifolium* tortillas made from the dried and ground sarcotestas in the Sierra de San Carlos of Nuevo León (and possibly neighboring extreme western Tamaulipas). Furthermore, as we tracked down several *Dioon* populations outside the Sierra, following the cycad literature, we found that the species has been largely eliminated from the flatlands, following decades of cattle pasture "improvement," but that it still densely populates numerous nooks and crannies, usually the rockiest places, in the vast Sierra Madre, and is even found in extremely sandy soils near the Gulf of Mexico in hills outside Soto la Marina.

Given that we observed that both indigenous people and mestizos know how to prepare a wide range of foods and drinks from 'chamal' (the widespread name for both *Dioon* species) across the states to the southward, is seems a reasonable hypothesis that the complex and necessarily exact process of toxin removal—via washing with ash—did not get directly transmitted from the Indians to the later inhabitants of Tamaulipas, as it obviously did in SLP, Queretaro, and elsewhere. That is to say, Indians in Tamaulipas were wiped out or died out rather than assimilated. In every case where European- and African-American peoples know how to process cycads, I have found that they overlapped in both time and space with indigenous peoples, whether or not an identifiable process of "mestizaje" (mixing) occurred. Where this did not happen, in a meaningful way, no cultural transmission occurred. In short, the knowledge of how
to remove cycad toxins is so specific and detailed that it is near to impossible to discover it by happenstance or experimentation. Thus we usually see in the primary cycad-eating regions of the New World, where it is still heavily consumed—Pacific coastal Colombia, Dominican Republic, northeastern Honduras, and San Luis Potosi and Queretaro—exact knowledge of how to do so among mestizos (European-Americans), African-Americans, and Indians in the same region. In the Dominican Republic, though the Indians were wiped out, they passed on this knowledge to escaped African slaves who later transmitted it through many generations down to the present. In Colombia, Honduras, and Mexico, all three cultural groups still make heavy use of cycad foods. The mode of transmission of recipes is oral, via participant-observation, among women. The obvious mode is from mother to daughter, but women also commonly pass down their knowledge to daughters-in-law and to other relatives and in-laws, almost always female. But in Tamaulipas, the chain must have been broken. In neighboring Nuevo León, the link was also broken, but a relict knowledge of grinding sarcotestas remained; this, however, does not require any special knowledge, for the sarcotestas are simply dried, not detoxified. They apparently contain little or no toxins; we ate sarcotestas without obvious effect in the Pameria, following the suggestion of a local Xi’ui guide.

It is interesting to note that the name ‘Chamal’ is found in the toponymy of the Sierra Madre of southern Tamaulipas, and plays as a prominent part of the history. There is a Sierra de Chamal and a Chamal Viejo, originally a huge Spanish land grant with this name that later gave its name to the Chamal Colony, a settlement of farmers from the US in the 1800s that lasted until the Mexican Revolution. We visited the modern-day community, but there were no known chamal populations in the valleys, only in the high sierras, including in the adjacent El Cielo Biosphere Reserve.

**B. Uses and knowledge of *Dioon edule* in the Pamería zone of SLP (Xi’ui and mestizos)**

I spent the better part of a week in the arid mountains that form the western approach to the Sierra Madre Oriental, between the high central plateau, a desert dominated by mesquite, agaves, and cacti, and the eastern Huastecan rain forests (which are the northernmost rain forests in mainland North America). “Pamería” means "land of the Pame”, the former name of the Xi’ui (X’uiyky), an ethnic group now numbering only a few thousand, whose central place is
Santa María Acapulco, where traditional clothes are still worn and the native language still widely spoken. We visited several communities with varying degrees of retention of Xi’ui culture and identity: in the case of Saucillo, where we stayed for several days, we heard the comment that “we are not Indians, but it is said [by the government] that we are”; in that village, only one person, an elderly woman, self-identified as “Pame.” Regardless of one’s view of acculturation, the clearly mestizo inhabitants possessed extensive knowledge and traditions of chamal; but there were no overt symbolic associations and indeed virtually no non-material associations of chamal. It is hard to know whether the Xi’ui speakers themselves retain any non-material associations; interviews in Agua Puerca did not reveal anything.

Some of the salient features of *Dioon edule* in the Pamería:

1. It is an abundant species, with cone-bearing individuals numbering in the millions. Chamal occurs in dense stands throughout *Quercus* woods (encinares) and thorn scrub (monte caliente) in a nearly unbroken 150+ -kilometer swath of mountains from extreme northeastern Queretaro northwestward through central San Luis Potosí; numerous isolated populations are found elsewhere in the Sierra Madre. Chamal, though not nearly as tall as tiusinte (*Dioon mejiae*) in Honduras, and with cones a fraction of the size of the latter, is unquestionably a far more abundant plant.

2. Chamal is closely associated both ecologically and culturally with *Brahea dulcis*, an understory palm harvested for thatch and other purposes. For example, one of the major sources of income in Saucillo is the harvesting of palm leaves for sale in towns. Formerly, Xi’ui from Santa María Acapulco came to Saucillo to barter chamal seeds for palm fronds. Among the inhabitants of Saucillo, a common remedy for enchamalamiento – cycad intoxication – is the ingestion of some decoction of palm, or the soil from around the palm.

3. *Enchamalamiento* is widely known; it is believed that the raw chamal “goes to the joints” of cattle. They can almost never walk again and eventually have to be put down, but the meat is unharmed. No true remedy is known, and it is widely cited as a scourge across the range of the species. Intriguingly, a management strategy is widely employed to protect the cattle from the chamal. It is claimed that the most toxic part of chamal are the new leaves, which also emerge when virtually no other greenery is available for
cattle to eat. Thus, from late April into July, cattle are penned up, and only allowed to roam free again when there is abundant fresh growth. This constitutes a major traditional management strategy that has not hitherto been documented. It is important to note here that in a recent return trip to Honduras (April 2010) I continued ethnographical research on *Dioon mejiae*, but found absolutely no association between *tiusinte* and poisoning of cattle. The cattle ranching culture there, comprising families who have runched for four centuries, has absolutely no awareness of cycad toxicity. There is only a vague idea that you might get a little sick if you eat cycad food products that aren’t well prepared. No one has EVER heard of cattle intoxication. My conclusion is that *Dioon mejiae* is not nearly as toxic as *Dioon edule*.

4. In the Pamería, unlike in the flatlands of Veracruz and Tamaulipas where chamal has been largely eradicated from pastures, chamal is said to thrive no matter how much it is burned and chopped back. People seem to be largely resigned to its presence, and in any case they are not wholly dependent on cattle, either. Indeed, in Saucillo, the main source of income is clearly working in the United States—much of the village at any one time is in North Carolina. Additionally, chamal is eaten throughout the year, stored up to three years, and – uniquely – often sent to family members in the United States in the form of tamales. These can reach Texas the next day, and North Carolina in three; this is the first evidence I have of international (if informal) commerce in cycad food products. In this case, chamal is cherished as it provide emigrants a “taste of home.”

5. Chamal and maize are closely associated in the Pamería, and one widespread folk belief that speaks to a deeper connection is that in years when there is a good maize crop, there is not much chamal, and vice versa. In addition, in Gamotes, Elvia Tristan was later told (by acculturated Xi’ui) that in the old days, chamal was known as “maíz del monte” (wild maize) or “maíz gordo” (“fat” corn). It should be noted that the origin of the word “chamal” is unknown, and thus the connection between cycads-as-chamal and cycads-as-teocinte (tiusinte), i.e. cycad-as-maize-ancestor, is a bit unclear. Fortunately, I have been able to clarify this a bit—see below

6. As throughout the world with cycads, chamal is the famine crop par excellence, and as recently as 1951 helped thousands of people survive a major drought. Unlike with *Dioon* in Oaxaca and elsewhere in Mexico, in the Pamería the consumption of chamal is still centrally important, though apparently not necessary as a famine food for most
inhabitants. The only other place in Mexico where Dioon is as important is among the Chinantec of Oaxaca, with Dioon spinulosum. In the Pamería, families may eat cycad tamales or gorditas as often as once a month, and there is no seasonality. They are stored up to three years.

7. The process of chamal food preparation is identical to that followed in northeastern Honduras for tiusinte, though the resulting products have distinct forms. This is striking in that these two regions are the only ones that I know of in the New World where ash-washing is employed to remove toxins, rather than the common and widespread leaching and sun-drying that produces the starch derivative. The production of cycad starch is the main process documented from the rest of Mexico and from any Zamia; it is also widespread across the world. In the case of northeastern Honduras, tiusinte foods are also prepared from starch made by leaching and sun-drying, whereas in northeastern Mexico, only ash-washing is known for Dioon. Given the abundance of evidence for Mexican settlement of Honduras, it is now clear that the “cycad culture” from northeastern Mexico was imported to Honduras, and "grafted" onto preexisting Central American beliefs. This could have happened pre- or post Conquest. The only uncomfortable question is, how did “chamal” become “teocinte” in Honduras (keeping in mind that “teocinte” everywhere else in Mesoamerica but these two regions refers to Zea and Tripsacum grasses)?

8. Continuing the comparison between the two regions, the variety of cycad foods produced in the Pamería is less than that in Honduras simply because only the process of wet meal preparation made via ash-washing is practiced in SLP. Nevertheless, the variety of ingredients combined with tamales, tortillas, gorditas, and atole (drink) are greater in the Pamería than in Honduras. In the latter region, cycad foods are often filled with various stuffings, including garbanzos. This is never the case in Honduras.

9. Following the identical preparation process, the two most highly-desired characteristics of the finished tamale (the best-loved of the cycad foods, as is the case in Honduras) are rubberiness and ruddiness, the same as for tamales de tiusinte. The form of the tamal de chamal, however, is radically different: it has more or less the shape and size of a potato (the tamal de tiusinte is hotdog-shaped). Form, however, is highly variable and does not reflect the crucial qualities that result from proper detoxification. Color (ruddiness) and consistency (rubberiness) clearly do reflect successful detoxification.
10. Lime (cal) is rarely used—as in Honduras—but is sometimes mixed in if the ash is too strong. Lime is of course the ingredient in most modern maize wet meal, though ash can be used for them as well.

11. One supposedly full-proof way of knowing that the seed chunks boiling in water “tienen punto” (i.e., are detoxified and thus ready for draining and grinding) is to put maize kernels in the water and wait until the membranes of the kernels peel away. This would seem to be a very close association between maize and chamal, in that gauging the point at which cycad chunks are detoxified is the most important and difficult step in the entire process.

12. Chamal leaves are used to a certain extent in religious and civil ceremonies, but nowhere appear to play as central a role as Ceratozamia teocintle leaves do in neighboring Hidalgo, among the Nahuatl. In addition, whereas cycad leaves are used commonly across Mesoamerica for Holy Week (Semana Santa, particularly on Good Friday), in the Pamería they are most closely associated with Day of the Dead (November 1-2) ceremonies, as they are in parts of northeastern Honduras. The cemetery in Saucillo, for example, is ringed with chamal, the leaves of which are used in decorations to honor the dead on November 2. Otherwise, chamal leaves are used occasionally for funeral masses and for weddings. A recent tradition in Saucillo has been the gifting of chamal plants to families of graduates at the closing ceremony of the primary school year; these are intended for planting in home gardens.

C. Uses and knowledge of *Dioon edule* in the Huasteca of SLP (mestizo)

I interviewed both men and women in Tanchachín, a mestizo community in the tropical lowlands heavily dependent on sugarcane harvesting. Though chamal has been little documented or studied in the Huasteca, it grows in small to mid-size populations within tropical rain forest in rocky areas within the sierras, long, high limestone ridges that separate the fertile valleys of the region. The chamal populations that I saw and was told about have been heavily affected by agriculture and cattle. As it turns out, Tanchachín was settled in the early 20th century by immigrants from the impoverished Sierra Gorda region of Queretaro, particularly the town of Zoyapilca. Immigrants from the dry highlands settled the Huasteca rain forest frontier looking for jobs and fertile lands, and brought their culture of chamal-eating with them, where it
prevails to this day. Techniques and beliefs were by all appearances identical to those I found in
the Pamería. Intriguingly, the famine food of the indigenous Tének (Huastec Maya) of the
Huasteca was *Brosimum alicastrum*, a non-toxic tree of the tropical Gulf lowlands closely
associated with the Maya and believed by some to have been the main food prior to the
introduction of maize cultivation. Mestizos in Tanchachín averred that local Tének neither knew
nor cared about chamal, and relied on Musaceae and other foods instead.

One practice that had also been mentioned to another researcher in the Pamería was also
related to me as having occurred in the Sierra Gorda: the harvesting of the chamal stem for
starch, if hunger was present but not enough cones were available.

The term for the male cone is *jilote* (which also refers to the young maize cone) and the female,
edible cone is the *bola* (ball). These terms are found across the region.

Because the uses and knowledge of chamal in the Huasteca among mestizos derived from the
Sierra Gorda, I altered my plans to visit that region (see E, below).

**D. Uses and knowledge of *Dioon edule* in the Huasteca of SLP (Tének)**

After locating two Chamal toponyms within the Tének heartland of the Huasteca, I became quite
curious, given that chamal is not a plant recorded by Janis Alcorn in her exhaustive ethnobotany
of this group. It was possible to visit one of these locations, which turned out to be a small
village inhabited by bilingual Tének who had consumed “Tzamal” up until the early 1980s. There
is one or more population in rocky areas within the rain forest within an hour’s walk of the
village; no population of *Dioon edule* has hitherto been recorded, at least in the literature, from
this zone. While I did not visit the population, I was told that the only food that used to be
prepared was tamales, using the ash-washing technique; toxic qualities were known; the leaf
wrap was from the Musaceae. It was also used for decoration on November 2; recently, one had
been planted in the schoolyard to reflect the fact that the community was named after the
species.
This discovery was the most surprising of the trip, and leant credence to the idea that the origins of the cycad-maize connection in northeastern Mexico lie with the Tének, who at the time of Spanish arrival possessed a complex. This is discussed in more detail below.

E. Uses and knowledge of *Dioon edule* in the Sierra Gorda of Querétaro

Use of chamal among mestizos in northern Querétaro is perhaps the best developed and most widespread in northeastern Mexico—or anywhere, for that matter. The 18th-century mission church in Tancoyol is notable for what are apparently extensive representations of chamal cones and leaves on its façade. Tancoyol was one of a series of mission churches along the southern fringe of the Sierra, focused on “civilizing” the “wild” Xi’ui, who lived in the rugged mountains stretching northward (a southern extension of the Pamería; Santa María Acapulco was another such mission church). The principal student of the Xi’ui, anthropologist Heidi Chemín-Bassler, (Chemín Bassler, H., 2000, *Recetario pame de San Luís Potosí y Querétaro*, CONACULTA, Culturas Populares, MX; Chemín Bassler, H., 1984, *Los pames septentrionales de San Luís Potosí*, Instituto Nacional Indigenista, MX) also pointed out the importance of chamal to the Xi’ui, in both SLP and Queretaro, as authors have done. But what is notable is that the completely mestizo inhabitants of Tancoyol, Zoyapilca, and other neighboring communities have carried on the chamal tradition.

F. Note on uses and knowledge of *Dioon edule* among Nahuatl and mestizos in Hidalgo and in Veracruz

The following sections draw from my field research in Hidalgo in 2008, Veracruz in 2009, and the recent important thesis of Aurelia Vite (Vite, A., 2010, Etnobotánica de cícadas en Hidalgo y algunos aspectos demográficos de Ceratozamia fuscoviridis D. Moore, Universidad Autónoma del Estado de Hidalgo, Pachuca de Soto, MX). The isolated population of *Dioon edule* in Jacala, Hidalgo is known as chamal, but is not eaten.

In central Veracruz, near Xalapa, the plant is known as “tiotamal” which means “sacred wrap” which is presumably related to “teocintle”, sacred ear of corn. I have not yet been able to establish whether the plant is still consumed in tamales; the historical evidence is equivocal.
G. Knowledge and uses of Ceratozamia in the region

In the Pamería, Ceratozamia can be abundant enough to be considered something that has to be weeded out of a coffee farm or other plantation. The widespread name is "chamalillo", which has been recorded before. The Xi’ui name bijio’a is first recorded here, and refers to the widespread Ceratozamia mexicana.

The name “teocintle” applied to Ceratozamia is a Nahuatl phenomenon, and is found in Hidalgo possibly in SLP, and southward through the Sierra Madre in Puebla, and possibly in other Nahuatl regions of the country. Huayacocotla, Veracruz had a “teocentli” that was obviously Ceratozamia referred to in the 1500s; populations of species in this genus are scattered but quite common throughout the region, and the name has remained essentially the same. Even today, there are still memories of the consumption of Ceratozamia cones as food, particularly among the most traditional Nahuatl communities of northeastern Hidalgo, in this state's slice of the Huasteca region; traditional inhabitants in Molango, which Vite studied intensively, also have mentioned this. There are even hints of the symbolic connection between cycads and maize, though much more work remains to be done (see H, below, for a similar situation in the Huasteca of SLP).

H. Knowledge and uses of Zamia in the region

According to Alcorn, zamias in the Huasteca are known as Thipaak, among other things, among the Ténék, and seen as progenitors and guardians of maize; I did not conduct any interviews that elucidated this, however. Among Nahuatl, they are known as teocintle (according to vouchers in the IIZD herbarium, UASLP), and among mestizos as "amigos del maíz" or friends of maize. In all cases, the zamias and ceratozamias of the Huasteca are related directly to maize as guardians, protectors, and ancestors.
I. What does all this mean?

*Zamia* and *Ceratozamia* cycads are known in aggregate as “teocintle” and derivatives along the eastern, tropical rain forest side of the Sierra Madre Occidental, stretching from southern SLP to Puebla. In the western, dry tropical side of the range, *Dioon* and *Ceratozamia* are related to each other as *chamal* and *chamalillo* (in Queretaro, one species of *Ceratozamia* is even called “chamal”), and one *Ceratozamia* is known as both *teocintle* and *chamalillo*. Yet the term “teocintle” became uniquely applied to *Dioon mejiae* in Honduras by Nahuatl-speaking colonists, probably at some time between 1000 AD and 1600 AD. As it turns out, only in one place—the valleys on the southern of the Sierra Gorda de Querétaro—have Nahuatl speakers overlapped with both Xi’ui and Tének in both space and time. In that region, different strains of knowledge about cycads were likely woven together into a common set of concepts and practices, and emigrants to Honduras were thus able to carry a unified idea of cycads into a new land where *Dioon mejiae* was obviously a member of this same cognitive group—even if the name applied would more accurately have been “chamal.”

Major pieces of the puzzle are still missing, and warrant further investigation. Chief among them is the ash-washing phenomenon: was it also practiced in central Veracruz, around Xalapa? And how was or is *Zamia* and *Ceratozamia* processed to make food or other products in the Huasteca?

Concerning the origins of the cycad-maize connection, the Tének stories about Thipaak, now embodied as a *Zamia* or *Ceratozamia*, the boy who brought maize to the people and thus eliminated their dependence on *Brosimum alicastrum* (cast as the evil grandmother) form the most elaborate symbolic tabloid we have, but was their idea of cycads as sacred derived from the Nahuatl (who arrived in the region later), or vice versa? It should be kept in mind that in the rest of the Maya world, cycads have no symbolic relationships to maize. Or was the entire idea of cycads as sacred ancestors of maize something derived from the warlike tribes of the dry sierras, i.e. the Xi’ui and their extinct relatives, who were clearly dependent on chamal as a food source? In any case, at least we know that chamal, if not other cycads has been consumed heavily in northeastern Mexico for 4000 years; it was consumed 6000 years ago in the Valle de Tehuacan, but the practice is now extinct. In northeastern Mexico, we have a unique
opportunity to continue to study an unbroken human connection with cycads, with a rich archaeological as well as historical record to draw from.

V. Follow-up

A. The meeting between Drs. Fortanelli, Yañez, García and me on July 24th concluded with a plan for me to visit with a representative of a German funding agency in Cologne in August (I was there on unrelated business); the German agency had already been funding programs, research, and exchanges associated with the internationalization of the UASLP. Unfortunately, this meeting never came about, and there has been no further communication on this front.

B. Dr. Fortanelli included me among the authors of a paper delivered at an ethnobotany conference in Bariloche, Argentina in late 2009.

C. I contributed suggestions to a draft of a research article ms. Dr. Fortanelli and colleagues planned to submit to a journal.

D. Dr. María Teresa Pulido, a professor at the Universidad Autónoma de Hidalgo with whom I had collaborated in cycad research in 2008, has included Dr. Fortanelli and me in an interdisciplinary proposal to the CONACyT (Mexico’s equivalent to the National Science Foundation) for a multi-year research project on population biology and ethnobotany of cycads of the Sierra Madre Occidental. Acceptance or denial of the proposal will take place in late 2010.

E. This final report and accompanying article for The Cycad Newsletter fulfills the conditions of the grant.
People and Cycads in northeastern Mexico

Mark Bonta, 5-27-2010

NOTE: Names of local informants have been excluded to conform with guidelines on protection of the human subject.

The male cone or “jilote” of Dioon edule (chamal).

Researchers from the Universidad Autónoma de San Luis Potosí examine the "bola" or female chamal cone. From left to right, Elvia Tristan (student), Dr. Javier Fortanelli (ethnobotanist), and a Xi’ui (Pame) guide from the village of Agua Puerca.
The Pamería (western side of the Sierra Madre Occidental, San Luis Potosí). Chamal is one of the dominant understory plants in these dry mountains.

Chamal in fallow milpa (cornfield) in the Pamería.
Chamal wet meal preparation: after removing the outer layers, the seeds are cut into chunks.

The seed chunks are left overnight in ash water.
The seeds are also boiled in ash water

The seeds are washed and rinsed several times, until it is judged that they are free of toxins.
The detoxified seeds are ground into a coarse, wet meal

The wet meal (nixtamal) is shaped into potato-like tamales, sandwiched between leaves
The boiled, steamed tamales that result are rubbery in consistency and ruddy in color.

Finished tamales de chamal, with accompanying sauce.
Chamal seeds dried in the sclerotesta for consumption at a later date.

Gorditas de chamal (stuffable tortillas)
Atole de chamal

Remnant chamal in a cattle pasture in the Huasteca
The Cascada de Tamul near Tanchachin: one of Mexico's largest and tallest waterfalls.

Charred chamal trunks and new leaves among limestone rocks in a cornfield near Tanchachin.
Rugged peaks of the Huasteca.

Ceratozamia in a Tének community of the Huasteca.
Limestone peaks in the Sierra Madres of northeastern Hidalgo; Ceratozamia is quite common here.

The northern side of the Sierra de Tamaulipas. The canyon containing rock shelters with 4000-year-old Dioon angustifolium seeds is hidden from view.
*Dioon angustifolium* in sandy, coastal hill region a few kilometers from the Gulf of Mexico.

A chamal population grows along the topside of limestones in the souther part of the Sierra de Tamaulipas.
A typical Nahuatl community in the Sierra Madre Occidental of northern Veracruz. *Ceratozamia* – teocintle – is common in this region.

Sierra del Chamal, from the village of Chamal Viejo, Tamaulipas
The Sierra Gorda, Queretaro. Chamal is quite common in these mountains, and is heavily consumed.

Tancoyol mission church, Sierra Gorda. Established 1744.
Details of the restored church façade. Of all the ornate facades in the colonial mission churches of the Sierra, only this one was principally fashioned by indigenous craftsmen. It is also the only one to incorporate what are most likely cycad leaves and stylized male and female cones.

Close-up of possible stylized chamal. The name “Tancoyol” is translated as "place of Acrocomia palms," thus the iconography is claimed to represent these palms. However, the valley is extremely dry and no “coyol” can be seen; in any case, the name is also translatable as "place of
mosquitoes.” It would seem to make more sense that the indigenous Xi’ui artisans would have represented on the façade one of their principal foods in the Sierras from which they had been removed, rather than a palm that is at most uncommon in the valleys, and in any case does not form cones.

A poster on the Sierra Gorda Biosphere Reserve in the regional museum in Jalpan, Queretaro: chamal and barrel cacti in the high desert.