

HEAT OVER TIME: GEOTHERMAL STORIES FROM MEXICO

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ABSTRACT

The Mexican geothermal stories collected here span hundreds of years. Some were found in a 1541 Spanish manuscript about the just-conquered P'urhépecha, an indigenous people in central Mexico. The rest, part of the oral tradition, were heard in 1993 and 1994 at geothermal sites in Mexico, many from the Spanish narrative.

The stories offer historical commentary and drama shaped by magic realism. They include P'urhépecha political and religious ceremonies, Mayan beliefs, Spanish conquistadors, the Mexican War of Independence, and country life after the Conquest. Ancient and modern, written and oral, the stories are the history of geothermal Mexico.

1. THE BEGINNING

There are many geothermal stories in Mexico—remembered, forgotten, oral, and written. A few are retold here. Some have characters and plots, others do not. All show how geothermal settings influence lives. All tell the story of heat over time.

The P'urhépecha stories are first, as accounts from this indigenous Mexican people started my search. The P'urhépecha still live in the State of Michoacán, bordered to the east by the State of Mexico and Mexico City (home of the Aztecs, an ancient enemy). Much of P'urhépecha culture was destroyed with the Conquest. From 1539 to 1541, a Franciscan friar, probably Jerónimo de Alcalá, interviewed the P'urhépecha. From them, he compiled the only known survey of their government, customs, and traditions taken at the time, the *Relación de las Ceremonias y Ritos y Población y Gobierno de los Indios, de la Provincia de Michoacán*.

In the *Relación*, the hot springs and volcanoes of Michoacán are woven into religious ceremonies and stories. Sites and cities were called by names used today, and I decided to visit some, including the volcanic hills of Zinapécuaro and the hot springs of Araró (Fig. 1). Both towns are mentioned in the *Relación* in the following story about the

P'urhépecha feast of "Sicuñdiro," which means "the skinning."

Sicuñdiro (The Skinning)

Narrative of P'urhépecha sources.

The Relación, (translated by S. Hodgson).

*(Probably) compiled by Friar Jerónimo de Alcalá.
Michoacán, Mexico, 1539-1541.*

"Five days before this feast, the priests arrived from the towns mentioned, with their gods, and they came to the feast, and dancers called *cesquárecha* entered the houses of the priests, and two other priests called *hauripitzipecha*, and they fasted until the day of the feast, and the day before the feast, the priests marked the chests of two slaves or criminals that they had to sacrifice the day of the feast, and the day of the feast the dancers mentioned danced with their silver shields on their backs and golden lunettes at the neck, and two chiefs came to that dance, and these represented the clouds white and yellow, red and black, costuming themselves to represent each of these clouds; having to represent the black cloud, they dressed in black, and so with the others, and these danced there with the others, and four other priests that represented other gods that were with the one called *Cuerauáperi*, and they sacrificed the slaves mentioned, and in taking the hearts, they performed their ceremonies with them, and while they were still warm, they carried them to the hot springs of the town of Araró from the town of Zinapécuaro, and they threw them in a small hot spring, and they covered them with tablets, and they threw blood in all the other hot springs that are in the town mentioned, that were dedicated to other gods that were there, and those hot springs gave off vapor, and they said that from there the clouds left to rain, and this goddess called *Cuerauáperi* was in charge of them, and that she sent them from the east, where she was, and for this reason they threw that blood in the springs mentioned. After the sacrificial deed; those two set out called *hauripitzipecha*, which means hair removers, and they ran after people, men and

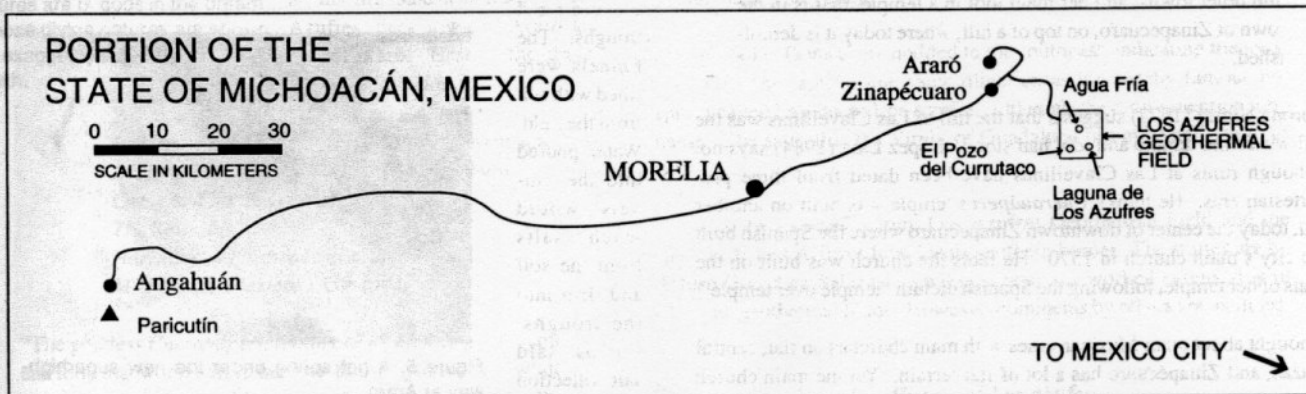


Figure 1. Geothermal sites in the State of Michoacán noted in the text.

women, and they cut their hair with some hives from the earth, and these were all painted red with cinnabar. and some thin cloths on their heads, and they took those hairs they had cut, and they put them in the blood of those they had sacrificed and they threw them in the fire. and after the following day they danced dressed in skins of the sacrificed slaves, and they were drunk five days, and for the month of *charaputzapi*, they carried offerings for those sacrificed..." (the *Relación*).

According to Lopez Lara (1984), the five dancers at the feast wore colors representing the five clouds. The dancer who was the Blue Cloud at the center of the sky portrayed *Cuerauáperi*, mother of all earthly gods and one of the most important gods of the P'urhépecha. She made the clouds at Zinapécuaro, "the place of health". and kept them in the hot springs of Araró, from there sending them out over the earth.

Araró means "the perforation site." Here during the feast, great warriors would receive lip rings, nose rings, and earrings. Blood let from inserting them was thrown in the hot springs (Corona Nuñez, 1977).

2. AT ZINAPÉCUARO

I first went to Zinapécuaro, perhaps looking for *Cuerauáperi*. On the outskirts of town. I noticed a sign advertising hot springs at a resort of therapeutic and recreational renown, *Lo Reino Atzimba*--the Queen Atzimba.

Stopping nearby, I asked a family about geothermal stories. They directed me to María Guadalupe Avalos, life-long resident and editor of the Lopez Lara work just mentioned (Fig. 2). Señorita Avalos spoke about Queen Atzimba, calling her Princess Atzimba, and this is what she said.



Figure 2. María Guadalupe Avalos, narrator.

Princess *Atzimba*
Narrative of María Guadalupe Avalos.
Zinapécuaro, Michoacán, Mexico,
May 1994.

"Princess Atzimba was the sister of a P'urhtpecha king named *Zuangua*. His palace is on a hill called Las Clavellinas that is by the resort of *Lo Reino Atzimba*."

This hill brings us back to Cueraudperi, for the *Relocidn* states:

"...She (Cueraudperi) had her priests in the town of Araró and other towns, and her main idol in a temple, that is in the town of Zinapécuaro, on top of a hill, where today it is demolished..."

Corona Nuñez (1977) suggests that the hill of Las Clavellinas was the hill where her temple and idol had stood. Lopez Lara (1984) says no, although ruins at Las Clavellinas have been dated from three pre-cortesian eras. He thinks *Cuerauáperi*'s temple was built on another hill, today the center of downtown Zinapécuaro where the Spanish built the city's main church in 1570. He feels the church was built on the ruins of her temple, following the Spanish dictum "temple over temple".

I thought about other Mexican cities with main churches on flat, central plazas, and Zinapécuaro has a lot of flat terrain. Yet the main church does sit on a singular rise about two blocks higher than major streets around it. Why weren't the flatter areas used, unless the main temple for Cueraudperi had stood on the hill?

To approach the church, you walk for about two blocks up a straight narrow street ending in two tiers of steps (Fig. 3). The walkway rises up to the church in a carefully graded way, paved with stones perhaps especially well placed. Her old temple entranceway...?



Figure 3. The approach to the main church in Zinapécuaro.

3. ON TO ARARÓ

Leaving Zinapécuaro, I went north about six kilometers to Araró and the field of hot springs, the place where *Cuerauáperi* kept the clouds. Just outside of town I stopped to take a photo. People nearby asked for a ride to the house of friends in Araró. I agreed, and on the way questioned them about the hot springs. They said they knew nothing of them, but their friends did.

In this way, I met Carlos Ferrer at his house, a young man about 15 years old who guided us through modern Araró and out to the hot springs mentioned in the *Relocidn*. As we approached the field, I saw plots of corn planted to the edges of the thermal area. Carlos explained, in Spanish I could barely understand and which I later learned was a P'urhépecha-Spanish dialect, that the thermal vapors help the corn to grow and sometimes the hot springs are used for cooking the ears.

Passing the corn, we came to the field of hot springs, heralded by two resorts-Balneario Los Hervideros and Balneario Hingo. We parked and entered the field. It is a large flat expanse, a few square kilometers in size, covered with brown meadow grass and about 17 hot springs, at Carlos' estimate. He said there once was a geyser, called "El Géiser", that shot straight up. Here an apparition had appeared, the "Señor de Araró." An especially large hot spring resembling a collapsed cave is named "La Cueva del Diablo," or "Devil's Cave."

In the field I saw several small sites for collecting salt (Fig. 4). At each, a wooden funnel about 1½ meters high and 1½ meters in diameter was erected over a few



Figure 4. Hot spring in the foreground, salt collection mound at photo center, highway construction in the background, at Araró

covered troughs. The funnels were filled with soil from the field. Water poured into the funnels would leach salts from the soil and drip into the troughs. Carlos said salt collection goes way back, that his grandfather had done it.



Figure 5. A hot spring under the new superhighway at Araró.

Much of the field looked natural, perhaps not too different from the days of Cueraudperi. Then I noticed highway construction crews working at a far edge. Carlos said that Mexico is building a new superhighway **across** the state of Michoacán, connecting Mexico City with Guadalajara. The highway **will** cross Araró's field of hot springs. It would have covered some hot **springs** except for special efforts made to **save** them.

We went to take a look. Each preserved hot spring is under a **large** arched area of the highway supported by a row of **columns** (Fig. 5). Between the columns are passageways three to four meters wide. Some passageways have holes in the floor about a meter in diameter—hot springs completely surrounded by **concrete**, bubbling and steaming away.

4. FROM ARARÓ TO LOS AZUFRES

The P'urhépecha believed strongly in omens and dreams, which warned them of the Conquest at least four years before the Spanish arrived. I believe the pine forests, volcanoes, and thermal areas of Los Azufres Geothermal Field are included in a dream recounted in the *Relación*. Drawings and text from the *Relación* support the idea, but not conclusively.

In the dream, a P'urhépecha woman is flown on the back of an eagle over steep mountain slopes covered with pine trees. The topography and vegetation of the slopes, illustrated in Plate XLII (Fig. 6), are identical—albeit in rough-sketch format—to topography and vegetation at Los Azufres today.



Figure 6. Portion of Plate XLII at the beginning of Chapter XIX, the *Relación*. The comet at the top is one of two that warned the P'urhépecha of the Conquest. I believe the mountain covered with pine trees on the right depicts the topography and vegetation of the Los Azufres area. The figures are of gods in the dream, whose divine natures are shown by exaggerating the features and teeth.

They pass over a mountain with a hot spring whose description matches that of a famous hot spring, Laguna de Los Azufres, found in the slopes on today's southern edge of Los Azufres Geothermal Field. The *Relación* describes the hot spring as surrounded by sulphur-bearing rock. The laguna is surrounded by such rock, which was mined for sulphur in the 1800s.

The eagle flies the woman to a meeting of the **gods** on a mountain called Xanoato-hucatzio, where she is warned of the Conquest. Her route was the same I used to continue my journey: south from Araró to the Los Azufres area. Xanoato-hucatzio, however, is not on the map so I cannot say I passed it. The only person I found who knew of it, a man who had lived in Los Azufres all his life, said it is north of Los Azufres, back towards Araró and Zinapécuaro. Here is the dream from the *Relación*.

Excerpt from Chapter XIX, "Of the Omens and Dreams This People Had Before the Spanish Came to This Province."

The Relación

*Narrative of P'urhépecha sources.
Michoacán, Mexico, 1539-1541.*

"The goddess *Cueraudperi*, mother of all earthly gods, came and **look** that woman from her own house...guided her awhile towards the road from Mexico...and turned her towards the road to Araró...And that woman went by the road, and on the road she met an eagle that was white, and it had a large cape

in front, and the eagle began to whistle, and to arch its feathers, and with some large eyes that they said to be the god *Curicaueri*, and the eagle greeted her, and told her that she **was** welcomed, and she also greeted him, and told him: 'Sir, you come just in time.' The eagle told her, 'Climb up here, on top of my wings, and don't be afraid of falling.' And just **as** the woman climbed **up**, the eagle **rose** up with her, and began to whistle, and carried her to a mountain, where there is a hot spring, and sulphur in the rock, and carried her by that mountain flying with her, and now dawn was breaking, when he carried her to the foot of a very high mountain, that is near there, called Xanoato-hucatzio, and carried her high, and that woman saw that all the gods of the province were seated..." (the *Relación*).

At a somber, solemn meeting, the gods **warn** the woman that invaders are coming, that "everything will be gone far other men will be throughout the land..." They say she must **warn** everyone, including King *Zuangua*, that the fates of the P'urhépecha people and the gods depend on the actions of the king.

But King *Zuangua* ignored all the warnings and the Conquest came. It began to the southeast, where soon the Aztecs were under attack. The Aztecs appealed twice to the P'urhépecha for help against the Spanish and were refused both times. First they petitioned King *Zuangua*, who soon (in 1520) was to die of smallpox. The second time they asked his heir, to no avail. By 1521, the Aztecs had been conquered and the Spanish were moving into P'urhépecha lands (Bravo Ugarte, 1963).



Figure 7. Celia Escalante Arreola, narrator.

5. NOW AT LOS AZUFRES

Today about 473 years later, just **on** the northern edge of Los Azufres Geothermal Field, Doña Celia Escalante Arreola runs a small hot **spring** resort where her family has lived a long time, including her great grandparents (Fig. 7). When we talked on the front porch, she told me a very short story of an Aztec queen, *Xóchitl*, which means "flower." The Los Azufres area was a boundary between the P'urhépecha and the Aztecs, and her account reflects the cultural interface. This is what she said.

Queen Xóchitl

*Narrative of Celia Escalante Arreola
Michoacán, Mexico, May 1994.*

"When I was a child, Queen *Xóchitl* would bathe here in the thermal waters. She did this because the waters were beautiful and kept you young."

As she spoke, Doña Celia nodded to the southeast, indicating the location of the hot spring—the same direction as the nearby famous hot spring called Laguna de Los Azufres, although she didn't mention it by name. She said that the Virgin of Guadalupe has appeared there, as well.

The next two stories feature **Los** Azufres Geothermal Field and the Laguna de Los Azufres found at its southern border. The stories are by Arturo González Salazar, a geologist who has worked extensively in Mexican geothermal fields. However, comments by **others** are included, as well.

The History of Los Azufres

*Narrative of Arturo González Salazar.
Morelia, Michoacán, Mexico, November 1993, May 1994*

*Additional narrative, as noted. of Celina Silva.
Agua Fria, Michoacán, Mexico, May 1994.*



Figure 8. L.to R., Susan Hodgson with narrators Celina Silva and Arturo González Salazar, in Agua Fria.

"In 1968, I arrived in the high pine forests of eastern Michoacán," said Arturo González Salazar (Figs. 8 and 14). "I explored the geology of a place now called Los Azufres Geothermal Field, in the Parque Nacional de Los Azufres. The Comisión Federal de Electricidad (CFE) sponsored my work and I lived by the famed Laguna de Los

Azufres, today on the field's southern edge (Fig. 10). This hot spring area, known through centuries for steamy vapors and curative waters, is just south of a volcano called Las Humaredas (so-named by mistaking its vapors for smoke) and the main field camp of the CFE

"When I came to Los Azufres, almost no one was there. I climbed the slopes of Las Humaredas. Near the top in a flat grassy area, I found designs of rocks laid out on the ground and rocks piled in a triangle (Fig. 9).

"Small funerary rock piles and triangular rock mounds lay by the Laguna de Los Azufres, as well, and I asked about them. The country people said the rocks were from the past, part of P'urhépecha religious ceremonies when a young girl entered puberty.



Figure 9. Rock designs found at Las Humaredas.

"From the time of the P'urhépecha, there are stories of women seeking fertility in the waters of Los Azufres, and of people bathing to alleviate rheumatism and arthritis. When I came, I saw many using the waters for cures. These were poor rural people who had arrived on burros, bringing along their own food and blankets.

"For the P'urhépecha, the Laguna de Los Azufres was a sanctuary and a center of religious life. Priests held ceremonies in the early morning when vapors from the hot waters were intense. We can imagine them colorfully dressed, standing in the hot coiling vapors and worshipping the sun.

"The laguna served other purposes. P'urhépecha society was very hierarchical. The country people told of large, periodic P'urhépecha migrations to the laguna where leaders would undertake formal rites matched to their political status, mixing religion and power. Ceremonies were held at nearby Cerro Las Humaredas, as well.



Figure 10. The Laguna de Los Azufres. People are bathing in the waters.

"All this ended with the Span-

ish. Cortez entered Mexico in 1517. Quickly the Spaniards moved to alter native religious expression. At first this did not stop people from worshipping secretly in small groups, continuing to speak with their gods, and then it did. One day, I found a Spanish coin at Los Azufres from those times.

"The end for Mexico of almost 300 years of Spanish rule began on September 15, 1810, with Miguel Hidalgo's famous 'el grito de Dolores' in the State of Guanajuato. His proclamation is considered the Declaration of Independence for Mexico. The revolution soon spread south into Michoacán, which quickly became a center of the conspiracy and a home for many revolutionary leaders.

"Because the revolutionaries had no gunpowder, they made their own. They mined sulphur, the main ingredient, at Los Azufres from the rocks surrounding the Laguna de Los Azufres, perhaps increasing the size of this hot spring in the process. Today, if you walk around the laguna, you pass several old mine shafts filled with water. The revolutionaries had to drain this water through a channel they carved in the rocks.

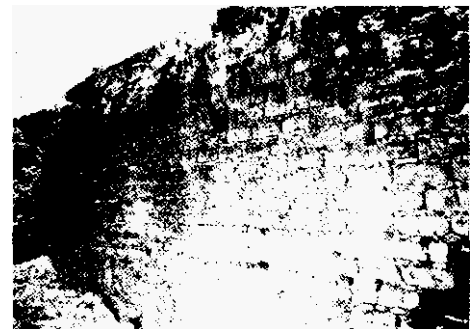


Figure 11. Fragment of the factory wall.

"Once the sulphur-rich rock was mined, it was brought to a gunpowder factory built within the confines of what is today CFE's main field camp at Los Azufres (Fig. 11). The factory was placed over a stream, the Arroyo de Agua Fda, so there would be water in case of attack. At the base of a fragment of factory wall still standing, a hole was finished with a beautiful stone archway where the creek flowed through

"The rocks with sulphur were pulverized at the factory beneath large grinding wheels. Today one of the wheels is displayed on a rise overlooking the field camp (Fig. 12). The gunpowder factory was one of the first in Mexico and the origin of the first gunpowder used in the revolution. When the war was over and no more gunpowder needed, the factory was abandoned."

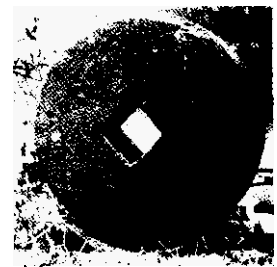


Figure 12. Grinding wheel used to pulverize rock.

Here, Celina Silva told Arturo González Salazar and myself that the sulphur miners used large pots called *casos* to process the sulphur into large pieces, called *marquetas*. Some miners were injured or killed by fumes of hydrogen sulfide. The factory had a special area where explosives were kept.

Celina Silva grew up at Los Azufres, and both she and Doña Celia said it was once part of the Hacienda Agua Fda and the home of Melchor Ocampo, a prominent Mexican political figure in the mid-1800s. Celina said that the father of El Cura Miguel Hidalgo y Costilla, mentioned earlier for his participation in the revolution, had lived at Los Azufres. I asked the CFE if old land records could confirm this, but it said that

unfortunately, nothing in the files could. I was disappointed. for this could be the way revolutionaries had learned of sulphur at the Laguna de Los Azufres.

Arturo González Salazar continued, "When I came to Los Azufres, just a few sections of factory wall remained. A man living nearby told me about the ghosts. He said that in the vapors of Los Azufres he had seen the ghosts dressed in costumes from the days of the Conquest and from the time of the gunpowder factory. He and others never went out at night for fear of meeting them.

"I was sent to Los Azufres because Luis de Anda, in the newly formed CFE, had placed the area on a list in the 1940s of geothermal sites to be developed for electrical generation. Thus, I saw the famous thermal features and forested hillsides almost untouched by man.

"Today Los Azufres is a national park and beautiful, but at the same time some things have passed away and changes have come. Some are from geothermal development of course, though Los Azufres Field is a good geothermal project, with minimal natural impact.

"Even so, I didn't go back for a long time, and I didn't want to return. I, too, feared ghosts in the vapors, the sight of Los Azufres as it used to be."

The next story, also by Arturo González Salazar, is a geothermal legend. It takes place at El Pozo del Currutaco, a hot spring a few kilometers from the Laguna de Los Azufres (Fig. 13), and is titled "El Cumtaco."

El Currutaco

"A 'currutaco' is an old-fashioned pejorative in Spanish meaning a man with exaggerated elegance, a dandy. A hot spring in Los Azufres Geothermal Field is called El Pozo del Currutaco, and this is how it got its name.

"At the turn of the century, a currutaco came to a small community not so far from the hot spring where he fell in love with a woman who had another suitor.



Figure 13. El Pozo del Currutaco

"The currutaco was very elegant and perhaps even handsome. The woman loved him for this, and forsook the first suitor who was humble and poor.

"One day, an outing was arranged into the countryside at the hot spring. The party included the currutaco, the woman, and her humble suitor.

"At a propitious moment, the humble suitor pushed the currutaco into the hot spring. The water was so hot, the currutaco couldn't get out and he died.

"Thus through crime, the humble suitor changed his fate and married the woman he loved. Ever since the hot spring has been called El Pozo del Currutaco.

"Today the waters of El Pozo del Currutaco are still famous and hot. People come from all around. Leaning over the hot-spring walls, they dig out clay for beauty masks while trying to avoid the scalding bubbles, an ironic poetic justice for the handsome currutaco."

6. CHIAPAS

The final story by Arturo González Salazar follows. It is from the State of Chiapas. Though modern, it may be the oldest of all, an evocative paradox of nature, mankind, and geothermal resources, and a volcano named Chichonal.

My Days at Chichonal

"About 20 years ago in the Mexican State of Chiapas, a governor phoned the Comisión Federal de Electricidad (CFE). He said he had flown over a mountain on fire, smoke billowing from its sides. The governor asked the CFE to come to Chiapas and explore the mountain, a volcano called Chichonal, for he feared something serious could happen.

"The CFE sent a geochemist, Rafael Molina Berbey (now deceased), a geologist (myself), and a technician, Blas González Mender. After a long journey, we finally arrived in the town of Pichucalco in Chiapas. From there, we drove with great difficulty to a little town called Volcanes, a site very isolated in the heart of tropical jungle. It was a dangerous trip and we crossed several wide rivers by jeep,

"When we arrived the authorities in the town, a small farming commune (whose members were Mayan, of a tribe called the Zoque), let us stay in the school. We spread out our belongings, and that evening talked to people when they came in from the fields. We explained why we had come and asked them to take us to the volcano Chichonal, now not so far away. We could see the "smoke" of fumaroles from the town.

"To our great surprise, nobody would go. This was very unusual for in general the people we met were helpful. Finally, we convinced a small group to guide us up the slopes of the volcano. The leader was a man named Cansino, who agreed on condition that we would walk ahead.

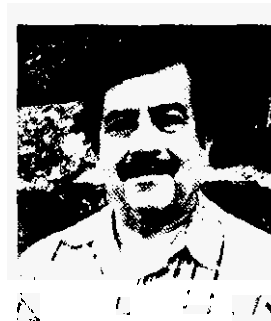


Figure 14. Arturo González Salazar, narrator.

"The next day, we penetrated an untouched jungle of rich, tropical vegetation. There were no roads or trails and we went first. Our hesitant guides stayed a distance behind, nervous and fearful. From time to time, passing carefully through dense foliage and stands of huge leaves, Cansino and I spoke. Gradually I realized that he feared visiting the volcano because he had heard its loud noises. He had watched birds flying near fumaroles fall dead from the sky, and feared he too would die,

"I found it no mystery what had killed the innocent birds--the hydrogen sulfide gases breathed in from the fumarole vapors. Hours later we came to the fumaroles but stayed briefly, for the hydrogen sulfide fumes were intense.

"Then we returned to Volcanes. Here, Cansino convinced others that the situation was not perilous, that they should help establish our camp at the top of the volcano. With great organization they did so, bringing us food and water each day.

"With time more people began to *help*, while we explored one of the most remarkable geothermal zones I have ever known. The temperatures were **very** high, there were immense areas of fumaroles, and more enchanting, perhaps because it was unvisited by any human being, the zone **was** a verdant and natural sanctuary for animals I had known in books, but had **never** seen.

"On the days I stayed there I saw many deer, tapirs, peccaries, **snakes** of many kinds, and birds of all colors and sizes. Many times I felt like Christopher Columbus in the New World, finding a paradise full of thriving plants and animals. It was something extraordinary.

"In the nighttime, I meditated. I knew breaking into this sanctuary would have mortal consequences, because teaching the people to enter here without fear would increase man's predation. I have always regretted this, but it was our job to explore the volcano.

"Nonetheless, I listened with hope to Cansino, their leader, who said that hunters would not be permitted to kill in this place, although the taboo was gone. For our guides, seeing us move calmly through the vapors, had lost their **fear**.

"After **45** days we were done. Working in heat **over** 40° Celsius and **in** constant rains and cyclones from the Caribbean Sea, we had sampled **vapor**, measured the temperature of land, and mapped the area. The hydrogen sulfide was **so** concentrated that we often had headaches. But clearly great geothermal promise existed.

"In my report, I wrote that we had felt tremors from **5** to **6** earthquakes each day, and perhaps the volcano of Chichonal was **awakening**. Thus with several kilos less of weight, without our boots and with dirty clothing, our mission was ended and we returned home.

"Years later in **1982**, the volcano Chichonal erupted, spewing volcanic ash that changed the climate of the world and destroyed nearby areas, including the sanctuary with the flora and fauna I had so admired. With time, they **have** told me that almost all my friends and guides of Chichonal died in the **catastrophe**, which in the end brought destruction, death, and sorrow to the Zoque tribe.

"As a final note, perhaps it **is** worthwhile here to remember the geologist Salvador Soto Pineda, who died in one of the eruptions while trying to save a community. It was when the volcano was in its full eruptive cycle. Some people living in a little town nearby did not wish to evacuate their homes. Salvador Soto Pineda went to convince them to leave for the danger of death that existed. He and others **arrived** by helicopter in a humanitarian effort. Once in the town, all were surprised by an eruption and buried forever under tons of volcanic ash. For this I consider Salvador Soto Pineda a hero of **volcanology**."

7. IN CONCLUSION

Thus, geothermal forces destroy lives and geothermal sites enhance them. **Gods** and mankind commune here. Ailments **are** alleviated, beauty perfected, crop growth quickened, food cooked, sulphur and salt mined, resorts visited, and energy made. Geothermal stories record it all.

But our affinity to geothermal features is deeper. A quote from Benito Bravo helps illustrate our connection (Fig. 15). Benito lives in the largely P'urhépecha town of Angahuán, which is near Paricutin,



Figure 15. Benito Bravo, narrator.

the volcano that rose in the middle of a corn field in southwestern Michoacán in 1943. Angahuán was untouched by lava flows covering the areas nearby. I asked what **people** in Angahuán think about Paricutin, and Benito said, "It is important because we saw it when it was **born** and when it died."

Birth and death. Like us, geothermal phenomena begin and end, moving through cycles of their own. We draw towards them, lured by change, beauty, and an unusual cast of the familiar--water, rock, and heat. We search them for answers to mysteries in our lives, like birth and death. We have done this

through time, and geothermal stories are the archives of our quest.

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REFERENCES

- Alcalá, Fray Jerónimo de (most probably). (1541), (1977). *Relación de las Ceremonias y Ritos y Población y Gobierno de los Indios, de la Provincia de Michoacán*. Reproduction of the Ms. c. IV. 5, de El Escorial, Spain. Balsal Editores, S.A., Morelia, Michoach. 277 pp.
- Bravo Ugarte, Jose. (1963). *Historia Sucinta de Michoacán, Tomo II, Provincia Mayor e Intendencia*. Ed. Jus. S.A. Mexico.
- Corona Nuñez, Jose. (1977). Preliminary Study. In: *Relocidn de las Ceremonias y Ritos y Población y Gobierno de los Indios, de la Provincia de Michoacán*. Balsal Editores, S.A., Morelia, Michoach. pp. v-xx.
- Lopez Lara, Ramón. (1984). *Zinapécuaro, Tres Épocas de Uno Parroquia*. Tercera Edition. Editado por Fimax Publicistas. Morelia, Michoach. 312 pp.
- Refugio Cabrera V., Ma. del and Pérez González, Benjamin. (1991). *El Estado P'urhépecha y sus Fronteras en el Siglo XVI*. Carrasquilla Editores, S.A. de C.V., Morelia, Michoacán. 79 pp.