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Historical Timing of Volcanic Eruptions and Its Comparison with Incidents in the Book of Ether

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Chapter 3
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We can establish a basic chronological framework for the events narrated in the Book of Ether by connecting two of those events—the great destructions associated with the reigns of Shiblom and Heth—with volcanic eruptions for which a timeframe can be established. Though there are other possibilities for the natural disasters described here, volcanic activity is a likely fit.

Shiblom Event

There is particularly one event in the Book of Ether, during the reign of Shiblom, that has all of the telltale markings of a volcanic eruption and its after effects:

> Ether 11:7
>
> And they hearkened not unto the voice of the Lord, because of their wicked combinations; wherefore, there began to be wars and contentions in all the land, and also many famines and pestilences, insomuch that there was a great destruction, such an one as never had been known upon the face of the earth; and all this came to pass in the days of Shiblom.

The volcanic and seismic event that occurred in 3 Nephi is also described as a "great destruction," although this term is not used exclusively in the Book of Mormon to describe a volcanic eruption (3 Nephi 8:23). Moroni$_2$, in his abridgement of the Book of Ether, utilizes language nearly identical to what was engraved by his father, Mormon, to describe the 3 Nephi great storm/volcano event, which "such an one as never had been known in all the land" (3 Nephi 8:5).

Volcanic eruptions and subsequent ashfalls impact local climate, ecology, agriculture, and human health and livelihood. Ash blocks solar radiation from reaching the lower atmosphere, and, as a result, modification in precipitation, temperature, cloudiness, and air pressure occurs, which creates localized cooling and warming. Mesoamerican colonial documents indicate a connection between major eruptions and occurrences of drought and subsequent famine (Gill 2000, 199, 235–36). It has recently been recognized, for instance, that local ground-level emissions from volcanic eruptions can cause localized droughts because the reactions of local emissions, SO_2, and other volcanic gases in the local atmosphere can suppress rainfall by inhibiting raindrop formation (USGS, 2001). In addition, eruptions and ashfall directly destroy vegetation and crops, buildings, agricultural land, as well as humans and animals.

On a local level, Sorenson (2013) noted that the 1902 eruption of the Santa Maria volcano in Guatemala killed all of the birds for hundreds of miles around, with the result that "flies, mosquitos, and rats [multiplied] to such an extent" and caused illnesses "that life for human beings became nearly unbearable" (Dull 2001). Moziño (1869) reported a similar effect on wild birds after one of the smaller eruptive events of the 1793 eruption of the San Martín volcano, located in the Olmec area. In that instance, the birds were stunned and immobilized to such an extent that they could be collected by hand.

Dull also noted that:

> Although post-eruption starvation and disease have caused only 4 percent of the volcano-related deaths worldwide since 1900, this percentage swells dramatically to 49 percent for the pre-industrial period from 1600 to 1899. . . .
>
> Thus, malnutrition, starvation, and pestilence following the TBJ eruption (*260 AD Tierra Blanca Joven eruption of the Ilopango caldera in central El Salvador*) might have been partly responsible for progressive demographic collapse throughout the abandonment zone. (37)

Sorenson (2013), citing other authors, notes the contamination of water supplies caused by ashfall, essentially stopping agricultural production. Moziño also reported that during the 1793 San Martín eruption, fish were killed and the Tuxtla River was clogged with mud and sand. Drinking the murky water caused "many grave cases of dysentery and persistent coughing." Thus, volcanic eruptions directly correlate to famines, pestilence, and the "great destruction" mentioned during the reign of Shiblom.

In the Olmec area, during Olmec times, there have been three active volcanoes, with the following eruption timeframes documented by radiometric sampling (see table 1 and figure 8). The San Martín volcano, which is centrally located in the Olmec heartland, erupted in 750 BC +/– 55. The Pico de Orizaba volcano, located on the northern margins of the Olmec heartland, erupted in 780 BC +/– 60. On the southern boundary of the Olmec heartland, the El Chichón volcano had a series of at least three eruptions dating potentially from 777 BC to 645 BC.

Figure 8. Location of Pico de Orizaba, San Martín, and El Chichón volcanoes in the Olmec heartland. (www.latinamericanstudies.org 2015, modified by author)

Table 1. Historical Eruptions of El Chichón, Pico de Orizaba, and San Martín Volcanoes

El Chichón

255 BC +/– 60

340 BC +/– 250

520 BC +/– 50

695 BC +/– 55

700 BC +/– 200 *

722 BC +/– 50 **

1095 BC +/– 105

1175 BC +/– 70

1340 BC +/– 150 *

1357 BC +/– 50 **

1725 BC +/– 80

2030 BC +/– 100 *

(Espíndola 2000, * Smithsonian 2015, **Nooren et al. 2015)

Pico de Orizaba

780 BC +/– 60 **

1500 BC +/– 70 **

2110 BC +/– 120 **

2300 BC +/– 75

2500 BC +/– 70 **

2780 BC +/– 75

(Smithsonian 2015, ** Del La Cruz-Reyna et al. 2002)

San Martín

150 BC +/– 300

750 BC +/– 55 *

1320 BC +/– 250 **

2130 BC +/– 50 *

(Smithsonian 2015, * Espíndola et al. 2010, **Nelson et al. 1992)

Based on this data, with all three of the major volcanoes in and surrounding the Olmec heartland erupting at the same time, correlating to the Book of Ether, the reign of Shiblom, as mentioned in the Book of Either, fits

somewhere in the 750 BC to 720 BC time frame, perhaps earlier or later. Evidence from pollen cores in a small lake in the Tuxtla Mountains indicates that the lake essentially dried up starting in this same time frame (Goman et al. 1993), further corroborating this timeframe with the reign of Shiblom.

Many volcanic eruptions consist of multiple eruption events that take place over months or years, so the effects are not necessarily of short duration, thus fitting well with the description given for the Shiblom event, which suggests the effects of the "great destruction" occurred over a long period.

By thus placing the end of the reign of Shiblom at approximately 715 BC, using the volcanic correlation which happened earlier in his reign, together with the calculated regnal period calendar (discussed later), one arrives at the date of Ether's death at 440 BC, which corresponds fairly well with the demise of the Jaredites/Olmecs somewhere around 400–450 BC.

This framework also places the start of Lib_1's reign at approximately 1065 BC. The Olmec city of La Venta (discussed in more detail later) is a nice match for the "great city" constructed by Lib_1. An initial layer of occupation at La Venta dates to 1200 BC, but La Venta did not reach its apogee until after 900 BC. After 500 years of preeminence, La Venta was all but abandoned by the beginning of the fourth century BC (Diehl 2004).

Heth Event

The Book of Ether describes another dearth on the land, which occurred when Heth was the ruler, involving a significant ecosystem disruption:

> Ether 9:29–35
>
> 29. But the people believed not the words of the prophets, but they cast them out; and some of them they cast into pits and left them to perish. And it came to pass that they ~~did~~ [done] all these things according to the commandment of the king, Heth.
>
> 30. And it came to pass that there began to be a great dearth upon the land, and the inhabitants began to be destroyed exceeding~~ly~~ fast because of the dearth, for there was no rain upon the face of the earth.
>
> 31. And there came forth poisonous serpents also upon the face of the land, and did poison many people. And it came to pass that their flocks began to flee before the poisonous serpents, towards the land southward, which was called by the Nephites Zarahemla.
>
> 32. And it came to pass that there were many of them which did perish by the way; nevertheless, there were some which fled into the land southward.
>
> 33. And it came to pass that the Lord did cause the serpents that they should pursue them no more, but that they should hedge up the way that the people could not pass, that whoso should attempt to pass might fall by the poisonous serpents.
>
> 34. And it came to pass that the people did follow the course of the beasts, and did devour the carcasses of them which fell by the way, until they had devoured them all. Now when the people saw that they must perish they began to repent of their iniquities and cry unto the Lord.
>
> 35. And it came to pass that when they had humbled themselves sufficiently before the Lord ~~he~~ [the Lord] did send rain upon the face of the earth; and the people began to revive again, and there began to be fruit in the north countries, and in all the countries round about. And the Lord did show forth his power unto them in preserving them from famine.

This event during the reign of Heth can be summarized chronologically as follows:

1. There is a great dearth upon the land.
2. Inhabitants are destroyed exceedingly fast because of the dearth; there was no rain on the face of the earth.
3. Poisonous serpents came forth and poisoned many people.
4. Flocks flee “before” the poisonous serpents toward the land southward.
5. Some of the animals perished along the way; some made it into the land southward.
6. Serpents stopped pursuit and hedged up a way so people could not pass without falling to the poisonous serpents.
7. People followed the path of the animals, eating all of the ones that had fallen.
8. Rain came back to the earth.
9. Sometime later the serpents were destroyed, so people could pass to the land southward.

In the Jaredite/Olmec homeland, there are five types of poisonous snakes: coral snakes, fer-de-lances (pit vipers), cantils, eyelash vipers, and regionally located pit vipers. There are two varieties of coral snakes, the variable coral snake and the elegant coral snake. The five types of regional pit vipers are the jumping pit viper, the Olmecan pit viper, the hog-nosed pit viper, Dunn’s hog-nosed pit viper, and Rowley’s palm pit viper.

Coral snakes prefer wooded areas, marshes, or places with loose soil. Coral snakes remain in their dens for the majority of the day and are rarely spotted by humans during the day. Unlike many other snakes, the coral snake is timid and will try to flee a situation rather than stand its ground. If the animal feels harassed, however, it may strike without warning.

The Mexican cantil lives in a vast range of habitats, including seasonally dry forest, tropical deciduous forest, tropical scrub forest, and savanna. These cantils prefer habitat bordering rivers or streams, but they may also be found in grasslands and cultivated lands. They are generally shy by nature, and if threatened, their first instinct is to rely on camouflage to evade danger. If the camouflage proves insufficient, they will use a threat display to ward off potential predators. The tightly coiled animal will raise the last several inches of its tail—this portion of the tail is often bright yellow or green in juveniles and a faded yellow or green in adults. The animal will then quickly flick its tail creating a loud whipping sound against its coils or surroundings. They generally will only display these behaviors when given no other choice.

The eyelash viper prefers lower altitudes and humid, tropical areas with dense foliage, generally not far from a permanent water source. It lives in trees and is not known to be an aggressive snake but will not hesitate to strike if harassed.

The fer-de-lance (aka terciopelo) likes moist environments and lives in most life zones at low or middle elevations (up to 600 meters), excluding those with strong seasonal dry periods. These snakes have been described as excitable and unpredictable when disturbed. They can, and often will, move very quickly, usually opting to flee from danger rather than attack, but they are capable of suddenly reversing direction to vigorously defend themselves.

The jumping pit viper lives in moist forests, including tropical moist and wet rainforest, deciduous forest and lower cloud forest, as well as secondary forest. Their common name alludes to the supposed ability these snakes have to launch themselves at an attacker during a strike, thereby bridging a distance that is equal to or greater than the length of their bodies. They are slow moving and nonaggressive. When provoked, however, all species will put on a rather dramatic open-mouthed threat display. These snakes can be active during both the day and night.

The Olmecan pit viper lives principally in the Tuxtla Mountains. Its preferred habitat includes upper rainforest and cloud forest, including degraded forest and associated pastureland. It is not known to be quick moving or aggressive.

The hog-nosed pit viper and Dunn's hog-nosed pit viper occupy lowland rainforest and lower mountain wet forest. They have also been found in secondary forest. They are not known for being quick moving or aggressive.

Rowley's palm pit viper inhabits intermediate elevations in cloud forest and moist ravines in pine-oak forest. It is found in primary forests and coffee plantations. They are also not known to be quick moving or aggressive.

In trying to identify the most likely specie(s) of the "poisonous serpents" referred to in the Book of Ether, we can compare the habitations of the snakes listed above with the description of the Jaredite lands. The Jaredite lands at this time, for instance, were not in the higher mountains but were in lower mountain slope elevations or more low-lying flatlands, likely ruling out pit vipers. The description of the snakes given in Ether indicates that they were fast moving and were apparently somewhat aggressive. Thus the most likely candidate species is the fer-de-lance (see figure 9). Since the fer-de-lance is principally adapted to moist habitat, the species would also be likely to migrate en masse to a more suitable habitat in the case of a drought.

Figure 9. Fer-de-lance. (pariasprings.typepad.com, 2014)

The episode of snake migration described in Ether is not in the least far-fetched. Snakes often migrate en masse on a seasonal basis and are known to migrate in search of water during a drought. In 2007, a large migration of venomous brown snakes invaded the city and suburbs of Sydney, Darwin, and other areas of Australia that had been hit by the worst drought in 100 years. The snakes were seeking water and were much more aggressive than normal, biting many people, though normally brown snakes are known for being aggressive.

It has been suggested that the snakes discussed in Ether migrated to follow a food source, namely the flocks (Tvedtnes 1997); however, this does not appear to be consistent with the description that the fleeing animals that died were not eaten by the snakes but were instead left for the inhabitants to collect and eat. It appears that the snakes were looking for water, and perhaps when they encountered water and moist habitat (perhaps a river?), they stopped.

The description in Ether of the snakes maintaining high population densities blocking or “hedging” passage of a particular area for a period of time might be explained by the lack or reduction of snake predators in conjunction with ample food supply. Volcanic eruptions, for instance, have been known to significantly remove local birds, which would have allowed the venomous snake population to grow unhindered by snake-eating bird predators. Without the birds, there also would have been reduced competition for the rodent or lizard food supply, allowing growth in snake populations.

This situation of ample food supply and lack of predation currently exists off the shore of Brazil, almost 93 miles away from downtown São Paulo, on an island called Ilha de Queimada Grande. The island is untouched by human development because of the snakes. Researchers estimate that there are between one and five snakes per square meter of the island. The snakes live on the many migratory birds (enough to keep the snake density remarkably high) that use the island as a resting point. There are also no natural predators of the snakes on the island.

The snakes on Queimada Grande are a unique species of pit viper, the golden lance head. The golden lance heads that occupy the island grow to well over half a meter in length, and they possess a powerful fast-acting poison that melts the flesh around their bites. Golden lance heads are so dangerous that, with the exception of some scientific outfits, the Brazilian Navy has expressly forbidden anyone from landing on the island.

Locals in the coastal towns near Queimada Grande recount grisly tales of death on the island. In one story, a fisherman unwittingly wanders onto the island to pick bananas. Naturally, he is bitten. He manages to return to his boat, where he promptly succumbs to the snake's venom. He is found some time later on the boat deck in a great pool of blood. Another story is of the final lighthouse operator on this island and his family. One night, a handful of snakes enter through a window and attack the man, his wife, and their three children. In a desperate attempt to escape, they flee toward their boat, but they are bitten by snakes on overhead branches.

There are many species of birds in the Jaredite/Olmec homeland area that prey on snakes and rodents, including:

- Gray-headed kite
- Plumbeous kite
- Crane hawk
- White hawk
- Great black hawk
- Roadside hawk
- Barred forest falcon
- Collared forest falcon
- Laughing falcon
- Ornate hawk eagle
- Black-and-white hawk eagle
- Sharp-shinned hawk
- Bicolored hawk
- Common black hawk
- Broad-winged hawk
- Swallow-tailed hawk
- Great horned owl
- Northern pygmy owl
- Central American pygmy owl
- Mottled owl
- Striped owl
- Northern harrier

- Great blue heron
- Little blue heron
- Black-crown night heron
- Osprey
- Wood stork
- Cattle egret
- Limpkin
- Least bittern
- Yellow crowned night heron

Elimination or decimation of these birds would remove serious snake predators and competition for snake prey. There are also perhaps a hundred other species of birds in the Jaredite region, which do not prey on snakes, but they do prey on rodents or lizards, similar to the fer-de-lance. Elimination or depletion of these species would also allow population explosions of snakes for which rodents and lizards are a food source.

Notably, the account in Ether indicates that some time later, the serpents were “destroyed,” but it does not say whether the destruction was caused by humans or natural events; perhaps it occurred naturally through the reestablishment of competing predator populations.

The description of the level of domestication of Jaredite flocks is consistent with the semi-domesticated nature of many Mesoamerican animals, since the Jaredite flocks successfully migrated without the guidance of owners or caretakers.

Although the Book of Ether does not enumerate any occurrences directly descriptive of volcanic activity during the Heth period, the volcanic activity concurrent with the “dearth” may have been one of the causalities and may also help to explain the poisonous serpent phenomenon.

Based on the only other volcanic event besides the Shiblom event involving all three surrounding volcanoes (Pico de Orizaba, San Martín, and El Chichón) erupting during the same time period, the indications are that the Heth event took place approximately during some period between 2070 and 2130 BC, which, by using calculated regnal periods (discussed later), would place the departure of the Jaredites at approximately 2600 BC.