

A BRIEF HISTORY OF SONORA (February 14, 2014)

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Warning: Being but a brief overview, this essay cannot do justice to Sonora's long and colorful history, but it does provide a condensed introduction to this marvelous state. Readers with a serious interest in Sonora should consult the fine histories and geographies of the region, many of which are cited in the References section. All photographs by R.C. Brusca, unless otherwise indicated.

LAND AND BIOTIC DIVERSITY

The State of Sonora encompasses 71,595 mi² (185,430 km²) and is the second largest of Mexico's 31 states (not including the Federal District). Located west of Chihuahua (Mexico's largest state), Sonora shares its northern border almost exclusively with Arizona, and it is topographically, ecologically, and biologically diverse. It is the most common gateway state for visitors to the Sea of Cortez (Gulf of California). Its population is close to three million.

The origin of the name "Sonora" is unclear. The first record of the name is probably that of explorer Francisco Vásquez de Coronado, who passed through the region in 1540 and called part of the area the *Valle de La Sonora*. Francisco de Ibarra also traveled through the area in 1567 and referred to the *Valles of Señora*.

Four major river systems originate in Sonora, to dissect it and empty into the Sea of Cortez: the Río Colorado, Río Yaqui, Río Mayo, and massive Río Fuerte (with tributaries originating outside the state of Sonora). Several smaller rivers originate primarily within the state, including the Río Sonoyta, Río Magdalena-Asunción-Concepción, and Río Sonora, and these also empty into the Gulf of California. The headwaters of the San Pedro River also originate in Sonora, but the river flows north, crossing into Arizona as one the last remaining undammed rivers in Arizona. The eastern part of the state comprises the western slopes of the Sierra Madre Occidental range—part of the great North American Cordillera. The highest elevations (~ 2625 m; 8612 ft) are in the Sierra de los Ajos and Sierra San Luis in northeastern Sonora. In addition to the Sierra Madre range,

about 35 high, isolated ranges (often called Sky Islands) are found west of the Sierras in the northern half of the state.

Sonora encompasses a biological transition zone, with tropical ecosystems in the south, subtropical deserts in the north, and montane transitions in the Sierras. The northern limit of Mexico's Tropical Deciduous (Dry) Forest and Sinaloan Thornscrub lie in the center of the state, whereas some of the most arid desert regions of North America occur in the northwest, in the Gran Desierto de Altar. This topographic and climatological mix makes Sonora one of the most biologically diverse regions of the world. An estimated 5,000 species of vascular plants are reported from Sonora—20% of Mexico's total flora, in an area of less than 10% of the country.

In general, precipitation in Sonora decreases from higher to lower elevations, from south to north, and from east to west. In the pine-oak forests around Yécora (1550 m; 5085 ft) average annual precipitation exceeds 90 cm (35.5 inches), and in the tropical deciduous forests near Alamos (440 m; 1444 ft) it is around 65 cm (26 in). However, in the volcanic desert of the Pinacate region in northwestern Sonora, average annual precipitation is less than 25 cm (9 in) per year, and in the extremely arid Gran Desierto de Altar (near the Río Colorado) average annual precipitation is just 4-7.5 cm (1.5-3.0 in) per year. During summer months, temperatures exceeding 38°C (100°F) are common in the Gran Desierto, and the high summer air temperatures here drive up evapotranspiration (i.e., loss of water from plant leaves and soil). Historically, the highest temperature recorded for anywhere in northwestern Mexico was 56.7°C (134°F) in the Sierra Blanca of the Pinacate region (near where the El Pinacate y Gran Desierto de Altar Biosphere Reserve's visitor center is today). In spring and fall, rain is infrequent at best. Summer temperature extremes are mitigated by rains, called monsoons (or *las aguas*), characterized by strong afternoon thunderstorms. Less violent winter storms, called *equipatas*, are derived from Pacific frontal storms with ultimate origins as far north as Alaska. This biannual rainfall pattern is a key

reason that the Sonoran Desert has one of the highest biological diversities in the world.

The Pinacate area of northwest Sonora is unique for being home to North America's second largest lava flow region (the Snake River Plain basalt fields of Idaho are slightly larger) and largest active sand dune field, the latter running from just north of Puerto Peñasco (Sonora) to Yuma (Arizona). The dune field embraces the western slopes of the Sierra Pinacate, and it completely surrounds the isolated granitic Sierra del Rosario (probably the westernmost Basin-and-Range mountain in North America). This 5700 km² (2200 mi²) sand dune field is estimated to have developed during and following the last Glacial Maximum (~20,000 years ago). The dunes were built almost entirely from wind-transported Colorado River deltaic sands piled up over the centuries from prevailing Westerlies. Thus, these dunes are largely the eroded rocks of the Grand Canyon! East of the Pinacates, along Hwy 8 between the town of Sonoyta and entrance to the Pinacate Biosphere Reserve, is a field of ancient, stabilized dunes. These are much older dunes, perhaps over a million years in age, but their origin is unclear.



Pillowed pahoehoe lava, Pinacates



Sand dunes of the Gran Desierto de Altar
(Photo by Rick Westcott)

Topographically and demographically, the State of Sonora can be thought of as having two great regions, with different geologies and cultural histories (see West 1993). The eastern mountain region, called *La Serrana* (the highland) comprises the western slopes and foothills of the Sierra Madre Occidental. It was inhabited originally by Native American farmers, in the 17th and 18th centuries by Jesuit missionaries and Spanish miners and ranchers, and today it is losing population and confronting narcotrafficking as drugs move north to the U.S.-Mexico border. The Western Lowland, on the other hand, was originally only sparsely populated by Native Americans. In the late 18th century, the lowlands were exploited by Spanish and Indian gold seekers, and today characterized by recently developed government-sponsored irrigated agriculture, coastal mariculture, and tourism, which has given rise to dense farming, industrial centers, and rapid urbanization.

Since prehistoric times, people have relied heavily on the native plants of Sonora, especially the legumes—mesquite, palo verde, ironwood, etc. The most important native grasses for grazing purposes were the gramas (*Bouteloua* spp.), 18 species of which have been identified from northeast Sonora alone. The gramas turn green and lush after summer rains, drying to nutritious hay during the fall dry season. The fruits of the pitahaya, or organ pipe (*Stenocereus thurberi*), saguaro (*Carnegiea gigantea*) and cardón (*Pachycereus pringlei*) cacti were all important food sources, and are still collected and consumed by the Seri Indians (*Comcáac*) and others.



Sideoats grama
(*Bouteloua curtipendula*)

The hearts, or trunk and leaf bases of agaves (or what many Mexicans call *maguey*), known as *cabezas*, were gathered and slow roasted by native people to prepare a sweet and nutritious food called *mezcal*. Spaniards quickly learned to ferment and distill the *mezcal* to create the liquors we know as mescal (and its regional variants, e.g., bacanora) and tequila today. By law, tequila is always made from the blue agave, a variety of *Agave angustifolia* known as *A. angustifolia tequilana*, and only in certain designated regions of west-central Mexico. Mescal can be made from many of the 400+ known species of agave (and may also have other added ingredients), although it is typically made from regional varieties of *Agave angustifolia*. In *La Serrana* today, certain native agave plants also are used to distill *mezcal de Bacanora*, a potent artisanal mescal similar to "white lightning." [Endnote 1]

Of the native mammals, mule deer (in low elevations), white-tailed deer (largely restricted to higher elevations), rabbits, and perhaps bighorn sheep were the most commonly consumed meats in prehistoric times. Today, as in centuries past, Yaqui and Mayo Indians use small stuffed heads with antlers of white-tailed deer as headdresses for special dancers ("deer dancers") during certain religious ceremonies, suggesting the prominence and importance of deer in those cultures. Hunted less commonly were pronghorn and javelina. Predators have rarely, if ever, been hunted for meat (e.g. mountain lion, jaguar, ocelot, black bear,



An agave plant used for making mescal in Oaxaca
(not the blue agave variety)



The heart ("cabeza") of an agave, ready for roasting to make mescal

coyote, gray wolf, and foxes). In addition to large quantities of fish and shellfish (and some sea lion), the Seri also used to eat pelicans seasonally, but sea turtles were a primary source of protein overall.



An agave roasting pit, the same design used since pre-Columbian times



Burro-power drives a stone wheel that grinds roasted agave *cabezas* into pulp and liquid for subsequent fermentation



A still used to recover the alcohol from cooked agave



The famous mescal or maguey worm – usually larvae of the cossid moth *Comadia redtenbacheri* (above), but sometimes a weevil larva (*Hypopta agavis*) is used, or the larva of a skipper butterfly (*Aegiale hesperiaris*)



Leg rattles (*ténaborim*) used by Yaqui and Mayo dancers are made from cocoons of the saturniid moth *Rothschildia cincta*



Larva (caterpillar) of the saturniid moth *Rothschildia cincta* (Photo by E. Pfeiler)



The tequila bar at the Hacienda de los Santos, Alamos, Sonora, offers up ~100 varieties of the liquor. Salud!

LA SERRANA

Six major rivers drain La Serrana: Río San Miguel, Río Sonora, Río Mayo, Río Moctezuma, and the upper and lower Río Bavispe, both of which drain into the Río Yaqui, historically the largest river in Sonora (not counting the Río Colorado). Each of these is fed by snowmelt, rain, and springs in the Sierra Madre. In times past, these rivers reached the Sea of Cortez, but today they rarely flow to the ocean due to damming and irrigation diversion. The river valleys of *La Serrana* were prehistoric sites of agriculture and permanent settlement. During Spanish colonial times these valleys continued to provide most of the food for Sonora. The rugged hills and mountain ranges of *La Serrana* held silver, gold, and copper where great mineralization activity had taken place along fault-block lines. The presence of these ores has attracted miners since the 17th century.

THE WESTERN LOWLANDS

Geologically, Sonora is underlain by the ancient and massive North American craton, and its dominant rocks were formed 1.2-1.7 billion years ago. Many of the mountain ranges west of the Sierra Madre Occidental and its Sky Islands have been eroded down nearly to their roots, forming isolated rock masses called *inselbergs*, separated by wide bajadas (flood plains) and basins. Rich deposits of gold dust and nuggets, eroded from the former mountains, have left placers (nuggets and flakes accumulated by gravity through erosional and sedimentary action). The northern part of western Sonora includes the Altar Desert, part of the Lower Colorado River Valley region of the



La Serrana, the rugged western slopes of the Sierra Madre Occidental; photo taken east of Alamos (Rancho Santa Barbara) (Photo by R. Brusca)

Sonoran Desert and one of the driest areas in North America. However, the rivers draining *La Serrana*, over millennia, deposited copious amounts of groundwater in aquifers below the desert surface in the Western Lowlands. These aquifers have sustained rapid growth of population and agriculture in coastal Sonora since the 1950s. However, there is now little water reaching these aquifers, the rivers have been dammed for decades, and the aquifers are being pumped at a much faster rate than they are being recharged.

ABORIGINAL CULTURES

The major indigenous groups of Sonora that are still with us today are the Kwapa or Cucupá (in the Colorado River Basin south of the border), O'odham (in northern Sonora), the Seri (in coastal central Sonora), the Yaqui and Mayo (closely related Cahitan Peoples of the Yaqui and Mayo River Valleys), and the little-known Guarijio of southeastern Sonora. The Tarahumara people inhabit the high country of the Sierra Madre, or the "spine of the Sierras," but live primarily in Chihuahua.

Aside from the Comcaac (Seri) and Kwapa (Cucupá) peoples, most extant aboriginal cultures in Sonora belong to the Uto-Aztecan language group, which is widespread in Mexico. In southern Sonora this includes the Yaqui and Mayo languages (collectively known as Cáhita). In the eastern and central parts of Sonora it included the Ópata and Pima Bajo languages. In the northwest, it was Pima Alto and the closely related O'odham (previously known as Papago) dialects. The origin of the isolated Seri tongue, on the other hand, largely remains a mystery, although some evidence suggests a

relationship with languages from the Baja California peninsula. The now extinct "Guaymas people" (*Guaimas*) evidently were the southernmost band of Seris. The Apaches, especially the Chiricahua Apache, ranged (and raided) in the northeastern corner of Sonora; they spoke an Athapascan tongue typical of northwestern America, indicating their relatively recent arrival from the north.

Even before the Spanish began to settle northwestern Mexico, aboriginal populations had dwindled, presumably due to introduced European diseases. During the 16th Century, disastrous scourges of smallpox, typhus, measles, and other diseases swept through central Mexico soon after the Spanish Conquest and probably reached all the way to Sonora. It is known that by 1592 smallpox had, at least, reached southern Sonora, causing death and famine among the Yaqui and Mayo. During the Jesuit missionization, epidemics are thought to have killed half of the Mayo population.

Farming Cultures

The Río Sonora Culture. Most of the Indians of *La Serrana* were farmers, representing an expansion of farming techniques from central Mexico. Taken together, this farming culture of eastern Sonora is sometimes called the "Río Sonora Culture." Among these peoples were the Ópata and Pima Bajo, who practiced both dryfield (rain dependent) and small-scale irrigation farming. Spanish explorers (and recent archeological work) document the complex pueblos and farming of the Ópata, which included cultivation of maize, beans and squash. The Ópata region of northeastern Sonora, with an estimated 10,000 to 100,000 inhabitants, may have been the most densely populated area of northwestern Mexico when the Spanish arrived. The Ópata probably had strong trade routes to the Casas Grandes (Paquimé) people in what is now northwestern Chihuahua. However, by the time the Jesuits and miners arrived in *La Serrana*, populations had dwindled. In the south, the Yaqui and Mayo tribes used mainly natural floodplain farming along the Yaqui and Mayo rivers, as did many O'odham and Kwapa peoples until very recent times.

The Pima Bajo and Pima Alto Cultures. The terms "Bajo" (lower) and "Alto" (upper), probably introduced by the Jesuits, are geographical, not linguistic categories, and the people in both

regions largely spoke the same basic language. Pima Bajo extended from the middle Río Sonora (around Ures) east to the middle of the Río Yaqui, and then into and over the Sierra Madre as far as La Junta in western Chihuahua. The Pima Alto lived in the more arid northwestern Sonora and southern Arizona, especially along the Gila and Salt Rivers.

The Desert Pima (later called Papago, and now Tohono O'odham) inhabited the arid Sonoran Desert in northwestern Sonora and southern Arizona, with the most arid region inhabited by the Hia C-ed O'odham (the "Sand Papago"). Several other related tribes lived farther to the east and south, including the Soba Pima (in the lower Magdalena and Altar River Valleys), Himiris (upper Magdalena), and Sobaipuri (San Pedro, Santa Cruz and middle Gila Rivers). After the Spanish conquest, all of these peoples (including any remaining Arizona Hohokam) were considered residents of the Pimería Alta. The O'odham were hunter-gatherers who farmed scattered fields during summer rains, although near present-day Sonoyta (Sonora) they used limited canal agriculture. The Riverine Pima of Arizona had permanent villages and canal irrigation.

Of all the prehispanic cultures, one of the most interesting was that associated with curious sites called *trincheras*—terraced hillside habitations constructed on mountain slopes overlooking arable land along streams. One of the largest of these sites (and the namesake) is *Cerro de Trincheras*, located at the railroad town of Trincheras, west of Santa Ana, Sonora. *Trincheras* sites are abundant in the Magdalena, Concepción, and Cocóspera River Basins, in the Altar Valley, and from the San Miguel and Santa Cruz River Valleys as far north as Sells, on the modern Tohono O'odham reservation in Arizona, and near Redrock (between Tucson and Phoenix). The *trincheras* are generally interpreted as having been both agricultural and defensive sites, possibly places of refuge when villages and fields were attacked by enemies. The Trincheras Culture had ties with the Hohokam Culture to the north and may have been a forerunner of Piman Culture. Evidence of Trincheran visitation is also common along the Gulf of California coast of northern Sonora, and inland to the Caborca and Santa Ana areas.

Hunting-Gathering Cultures

When the Spanish arrived, two widely separated hunter-gatherer groups lived in parts of Sonora: the Seri People along the central Gulf coast (including the Guáimaras people), and several Apache-related tribes of present-day Chihuahua, New Mexico and Arizona. In contrast to the Native American farming cultures, these two groups strongly resisted both Jesuit and secular attempts to “civilize,” or acculturate them. The Seri were a collectively small group of fewer than 5,000, living in distinct bands along the coast between Guaymas and Cabo Tepoca (Puerto Lobos), inland nearly to modern-day Hermosillo, and on Tiburón and San Esteban Islands. They spoke a distinctive language, and might have originally migrated across the Gulf from the Baja California peninsula where several Yuman-related languages were spoken. Seri were primarily fishers, especially for sea turtles, and shellfish gatherers, who occasionally foraged inland where they used more than 100 different plant species for food and medicines. The Seri have probably inhabited coastal Sonora in the region of Isla Tiburón for at least 2,000 years. Today, there are fewer than 1,500 Seri’s, and they are one of the last functioning aboriginal hunter/fisher-gatherer societies remaining in North America. The Apaches were latecomers, probably not arriving from their gradual migration from Canada into Arizona, New Mexico and Chihuahua until the last decades of the 1500s.

THE MISSIONARY PERIOD (1614-1767)

For many reasons, Sonora has always been isolated within Mexico. It is the farthest state from Mexico City, historically viewed by the country’s strong central government as a “frontier region” or, worse, a dry desert wasteland. Its colonial history is not as deep or rich as that of central-southern Mexico, and its archeological past lacks remains of the great civilizations from the south (Aztecs, Mayas, Toltecs, etc.). Even today, many Sonorans feel the government of Mexico City largely ignores their presence. In fact, until the completion of the “Yécora Highway” (Mex Hwy 16) in 1992, Sonora was even largely isolated from its neighbor state of Chihuahua. For these reasons, and because of



The border fence at Naco, Arizona

the state’s location on the border with the U.S., cultural and economic ties often seem stronger between Sonora and Arizona than between Sonora and Mexico City (despite the recent construction of the despised border fence).

Spanish settlement of Sonora did not occur for nearly a century after Francisco Vázquez de Coronado made one of the first explorations through the area searching for the fabled Seven Cities of Cíbola. Early in the 17th Century, the Jesuit Order began to establish missions in the northwest. By the 1640s Spanish lay settlers, mainly miners from central Mexico, had crossed the Sierra Madre Occidental into Sonora. Both forms of settlement were originally restricted to *La Serrana*, along the river valleys.



The border fence at Sonoyta, Arizona

The Jesuits dominated mission activity in Sonora for more than 150 years, from their initial entry (via Sinaloa) among the Mayo and Yaqui (1614-1617) until the order was expelled from the Spanish colonies in 1767. Padre Eusebio Francisco Kino arrived in Mexico from Spain in 1681. He tried to missionize Baja California without success, and then moved on to Sonora. His northernmost settlement was San Xavier del

Bac, near Tucson (Arizona). Today, one can view the skeletal remains of Padre Kino at the handsome domed crypt in the town of Magdalena de Kino, Sonora, near the church of Santa María Magdalena. Although there is evidence that Kino himself might have established a chapel at this site (perhaps in the 1690s), the existing church dates to 1830s and has been reworked several times.

Aside from his missionary work, Kino's other great contributions stemmed from his exploratory and cartography skills. He re-discovered that Baja California was indeed a peninsula, and not an island (Francisco Ulloa had discovered this in 1539, Melchior Díaz proved it again in 1540, and Juan de Oñate again in 1604, but their writings went largely unnoticed). His maps of northwestern Mexico and southwestern United States (the Pimería Alta region) were the most accurate made to date, and they can still be used with good precision, although there had been several earlier maps showing Baja California as a peninsula (e.g., the



The grave of Padre Enrique Ruhen, the only priest ever to be in (brief) residence at Misión Marcelo de Sonoyta, Kino's westernmost mission, in Sonora. None of the original mission structures remain at the site—only Ruhen's grave.



Statue of Padre Kino in the city of Magdalena de Kino, Sonora



Church at the site of Kino's mission in San Ignacio, north of Magdalena, Sonora



The Jesuit mission of San Francisco Xavier, west of Loreto, high in the Sierra La Giganta (Baja California Sur). Founded in 1699, in an area then inhabited by Guaycura Indians, it was the first mission in Baja California to have glass windows. Construction was completed in 1758 under the direction of Padre Miguel del Barco.



All that remains of the Jesuit mission at Santa Rosalía, Baja California Sur



An original mission olive tree, 300 year-old, still living at San Francisco Xavier mission



The beautiful Jesuit mission at Ures, along the Rio Sonora, built between 1636 and 1644



The spartan Jesuit mission at Mulegé, Baja California Sur, built in 1707



Mission Nuestra Señora de Loreto, the first mission built in the Californias; founded by Padre Juan María de Salvatierra in 1697 and completed in 1752

French Guillaume de l'Isle's *L'Amerique Septentrionale*, Paris, 1700; the Italian di Arnoldi map, *America*). Kino's expeditions to the Lower Colorado River and the Sierra Pinacate relied on the springs at Quitobaquito (now part of Organ Pipe Cactus National Monument), as well as other, smaller springs and *tinajas* that his Indian guides led him to. He made four expeditions into the Pinacates: October 1698, March and April 1701, and November 1706. [Endnote 2]



Memorial housing Padre Kino bones, in the zócalo of Magdalena de Kino, Sonora



The skeletal remains of Eusebio Kino, in the zócalo of Magdalena de Kino, Sonora

By the end of the 17th Century, the Jesuits had founded 38 primary missions and 59 *visitas* in Sonora. According to Spanish law, a mission was to be dissolved 10 years after its founding, based on the supposition that by then the natives should be sufficiently versed in Christianity that they could be left on their own. However, the Jesuits had a habit of developing ranching and farming missions that were so economically successful that they tended to forego the 10-year rule. When they were finally expelled from the New World in 1767 (by royal edict), at the promulgation of jealous lay officials who coveted the land and cheap Indian labor,

many of their missions were taken over by the Franciscans. The Jesuit enterprise of Sonora was one of the most successful endeavors of the order in the New World, on par with that of Paraguay, which was established at about the same time (recall the book "The Mission," and the movie of the same name filmed at Iguazu Falls where the countries of Brazil, Argentina and Paraguay meet).



Bust of Padre Kino in the zócalo of Magdalena de Kino, Sonora

Probably the most enduring cultural changes that the missions made on Indian life were in agriculture, through the introduction of Old World crops (especially wheat), farm tools and techniques, and domesticated animals. During the planting and harvest periods, all men in the mission settlement were required to work the church lands 3 days/week, and their own plots 3 days/week—Sundays and feast days were reserved for compulsory church attendance. It was the introduction by the Jesuits of wheat that led to the invention of northwestern Mexico's famous flour tortillas. In Sonora to this day, thin flour tortillas (and beans and chilies) are the norm of rural diets; elsewhere in Mexico, native maize (corn) is the dietary staple. The later-arriving Franciscans were a more devotional-based sect and, not surprisingly, brought with them to Sonora the growing influence of Our Lady of Guadalupe. [Endnote 3]

SPANISH SETTLEMENT: MINES AND RANCHES

Spanish settlers began colonizing Sonora about the same time the Jesuits were founding missions. By the end of the 17th Century, ranching and silver mining had become firmly established in Sonora, eventually rivaling (but not eclipsing) the silver towns of Taxco and Zacatecas in central Mexico. The silver deposits were mostly superficial (to 150-200m depth), but below them lay copper, and after the silver ore had been mined American companies moved in during the 1800s to begin mining copper ore. Some of the original copper mines are still producing, and Sonora is the top-ranking state in Mexico for mineral extraction.



A portion of Kino's famous 1701 map of the Pimaria Alta Region, showing Baja California as a peninsula rather than an island (based on his 9 expeditions between 1698 and 1701).

One of the most productive mining centers of Mexico was the area around Alamos in southeastern Sonora, where silver was mined the Mexican Revolution (1910-1920) caused the permanent closure of most operations. Because of its riches, Alamos became a regional for more



Sketch of Eusebio Kino, by Frances O'Brien. Several interpretations of what Kino might have looked like have been prepared, including a bust in the zócalo in Magdalena de Kino



Shrine to the Virgin of Guadalupe, just south of Hermosillo, Sonora

than 200 years, until the disruption of commercial center. In 1776, nearly two-thirds of the silver produced in northwestern Mexico came from the Alamos mines. Today Alamos is one of the most charming, largely restored colonial towns in northern Mexico.



The colonial town of Alamos, Sonora



The main zócalo and church at Alamos, Sonora

With the mines came merchants, and the Sierra Madre Occidental foothills town of Hidalgo de Parral (in southern Chihuahua) came to be the merchant center for the region, being strategically positioned between the mining areas of Sonora and central Mexico. Most of the silver ore was packed out to Parral where it was assayed and then shipped to Durango or Mexico City. The Jesuits of the missions supplied food to the miners in return for silver, which was used to purchase church furnishings and luxury items such as cloth and tobacco.

INDIAN WARS

During the 18th and 19th centuries, Indian raids on mines, missions and ranches were frequently made by Apache, Jocome, Jano, and Suma Peoples from the north, and Seri from the west. The Apaches began raiding in the 1680s and continued for 200 years, until the last of the bands, led by renowned chief Geronimo, was finally defeated by combined Mexican and U.S. troops in the 1880s. Even the Yaqui, who were powerfully missionized throughout most of their history, rose up against the Spanish briefly (1740-1742). The nomadic Apaches probably

attacked simply because it was an easy way to acquire food, horses and slaves. Apaches became excellent horsemen, raiding the Spanish settlements for their mounts and, it is said, always choosing the best animals for riding.

Destruction by these tribes (mainly Apache) became so rampant in the mid-18th century that Spanish officials issued regulations that all houses in Sonora were to be constructed of adobe walls with flat roofs covered with sod or dirt to avoid destruction during Indian attacks. Their weapons were bow and arrow, and occasionally the lance. Eventually, the Spanish built a series of presidios, or forts, at strategic places. One of the main activities of the presidios was escorting mule trains carrying goods from Parral over the Sierra Madre into Sonora, and returning with silver bullion. The last of the northern presidios was established at Tucson in 1775, from which arose the present city of Tucson, originally on the banks of the Santa Cruz River. General small-scale warfare with the Apaches continued in Sonora and Chihuahua for most of the 19th century. In the mountains of Sonora (the Sierra Madre Occidental), isolated occurrences of Apache resistance actually continued until the 1920s.

The failure of the Spanish, and later the Mexican military to make peace with the Apache may have been due, in part, from differences of sociopolitical thought between Europeans and Indians. European ideas of hierarchy and subordination did not exist among the Apache, each band having temporary leaders who were not necessarily recognized by the other bands. Thus, a truce made with one group likely did not apply to members of other bands. Farther east, the states of Texas, Coahuila, Nuevo León, and Tamaulipas confronted Comanche raids. Comanche were High Plains bison hunters of Shoshone stock that are said to have been the best riders among all the nomadic tribes of western North America. Some historians have suggested that the position of the present U.S.-Mexico border may have been largely determined by the presence of nomadic Indian bands that stopped and forced back Spanish settlement in southern Arizona and Texas.

THE SONORAN GOLD RUSH

In the last half of the 1700s, long before the California gold rush, Spanish Sonorans (and some Indians, mainly Yaqui and Mayo) began

panning gold from placer deposits in the Sierra Madre. As the mainly pre-Cambrian rock weathered down, gold in the form of nuggets and flakes eroded from quartz veins and washed down across the alluvial fans of the mountain bajadas to form placer deposits. Most placers in southwestern U.S./northwestern Mexico were formed (trapped) between a layer of caliche (hardened calcium carbonate deposits) and the underlying bedrock. Nuggets could be obtained by "dry placering" -- tossing the broken earth, sand and gravel into the air and permitting wind to remove all but the heavier gold nuggets. "Wet placering" with running water recovered even the finer gold dust. The most productive areas were in the Altar Desert of northwestern Sonora, and there the first authentic gold rush in North America took place from 1775 to 1825. Unlike lode or ore mining, working placer deposits could be a one-person operation, or at most a small group association. It required simple tools and nuggets of pure gold needed no further refinement. Deposits were small, however, so placer camps were ephemeral, at best lasting only a few years. Gradually the gold miners pushed farther and farther north, into Arizona and eventually west to California. When news of the discovery of large gold deposits in the foothills of California's Sierra Nevada Mountains reached Mexico in 1848, some 5,000 fortune hunters from Sonora migrated to the new gold fields. Among the many marks they left is the namesake town of Sonora, in California's Mother Lode country. [ENDNOTE 4]

"NEW SONORA"

For most of its early years, Sonora was dominated culturally and economically by its eastern mountainous *La Serrana* region. During the last half of the 20th Century, however, the arid Western Lowlands region experienced rapid economic growth, especially in irrigated agriculture along the river tracks and floodplains. This shift left the older mountainous region a cultural backwater, characterized by quaint colonial era villages, like Alamos, Ures, Sahuaripa, Ariveche, Arizpe, Tecoripa, Suaqui Grande, Banámichi, Sinoquipe, and Cananea. Thus, the present-day state of Sonora reveals its dual geographical personality—eastern, colonial, "Old Sonora," and the modern western "New Sonora." First to develop there were the towns of Guaymas, the main seaport of the state, and Hermosillo, which became Sonora's capital in 1879. The first wagon road between Hermosillo

and Tucson was established by 1860. The first rail line to Hermosillo opened in 1882. Grains went from Guaymas (by boat) and Hermosillo (overland) to the U.S., and machinery for the Sonoran mines was shipped to Guaymas from San Francisco.



The outer harbor at Guaymas, Sonora

Guaymas is one of the best natural harbors in all of Mexico. During the 19th Century large Mexican, U.S., and English mercantile firms were established there, and a regularly scheduled steamship line to San Francisco developed.

Hermosillo, in 1700, was no more than a small settlement (called Pitic) housing a few Spaniards and Pima Bajo Indians. It came to serve as a presidio against the rebellious Seri Indians, but eventually grew to become the city of Hermosillo (named in honor of a Mexican hero of the War of Independence).

After the final subjugation of the nomadic Indians in the 1880s, U.S. companies began to invest heavily in Mexico's mining industry. Foreigners and their Mexican partners reopened many of the abandoned silver, gold and copper mines (called *antiguas*), using modern techniques to exploit the deeper, poorer lode ores. Important copper mining towns such as Cananea grew up along the southern end of the great Arizona copper belt. For a while, Cananea, with 20,000 inhabitants, was the largest city in the state. The revival of Sonoran mining was short-lived; it was arrested by the outbreak of the Mexican Revolution in 1910. Today, only the rich copper mines of Cananea and Nacozari de García still remain functional.

Agriculture in the Western Lowlands

Irrigated commercial farming on the coastal river floodplains and deltas of Sonora and Sinaloa began slowly in the 1890s, but it came to be the most significant factor in the “modernization” of northwestern Mexico. The fertility of floodplain and deltaic soils was well known to both indigenous peoples and Spanish settlers.

Throughout much of the latter 19th Century and early 20th Century, farming settlements in the Río Yaqui region were ravaged by fighting between rebellious Yaqui and the Mexican military. Eventually the government declared a campaign of extermination on the Yaqui, including taking many of them as indentured servants to work plantations in the far-away Yucatán and Oaxaca regions. Many escaped government persecution by fleeing to Arizona, where some families still live on the Pasqua-Yaqui Reservation at Tucson.

The first farmlands to be developed were along the Río Yaqui and Río Mayo in southern Sonora. Then came the Río Colorado and, finally, in the mid-20th Century, the Río Sonora and Río Magdalena-Asunción-Concepción. All were developed through government economic planning processes with no apparent regard whatsoever to water or land conservation issues. For the past half-century, the coastal plains of Sonora and Sinaloa have been Mexico’s most important agricultural (and more recently, shrimp farming) lands. Major land crops include wheat, corn, rice, soy, sugar cane and vegetables, much of which finds its way to Arizona and California.

In 1926, Mexico passed the National Water Law, which committed the federal government to develop large-scale irrigation projects throughout the country. To administer the law, the government formed the Comisión Nacional de Irrigación, the main duties of which were to undertake construction of large-scale dams and canals, and to colonize the newly formed irrigation districts. In 1946, the Comisión was replaced by the Secretaría de Recursos Hidráulicos, which had cabinet-level status and thus increased access to federal funds. This initiated a period of rapid dam construction and expansion of irrigated lands. Along the larger rivers, annual summer floods were controlled by the construction of large dams and reservoirs in the 1940s and 1950s.

By the 1960s, the first signs of increasing soil salinity were appearing in the Yaqui and Mayo deltas. Excessive application of water to the land was viewed as the cause, so deep drainage ditches were built to carry excess irrigation runoff to the Sea of Cortez. Extraction of water from aquifers in the Río Sonora delta (the “Costa de Hermosillo” District) has far exceeded natural replenishment, leading to a rapid fall in the water table. Growth in the population of the Hermosillo area (more than a half-million residents today) has exacerbated this water problem. Intrusion of salt water from the Sea of Cortez into the aquifers, caused by the falling water table, made much of the groundwater along the coast too saline for agricultural use. In response to these problems, the government, in 1989, limited the number of permitted wells to 498, which halved the annual amount of ground water pumped, from 800 million to 400 million cubic meters per year. It was hoped that this would shift agriculture away from water-intensive crops like wheat and cotton, toward crops requiring less irrigation. However, over-exploitation of fossil water is now taking place in the Caborca area, where hundreds of wells supply water for wheat, cotton, olive groves and vineyards. [Endnote 5] Hermosillo faces serious water shortages and is now planning an extensive (and expensive) canal project to bring water from the Río Yaqui to the city (over strong objections from the Yaqui community).

Despite the agricultural production of Sonora and other irrigated districts of Mexico, the country still cannot feed itself and is unlikely to be able to do so in the near future because of its rapidly growing population. Today Mexico imports large quantities of wheat and wheat flour, maize, oilseeds, soybeans, and sorghum from the U.S.

Fishing

About the same time that government-sponsored irrigation districts were being established in western Sonora, commercial fishing was evolving along the Sea of Cortez coast. The first Mexican shrimp boats were operating out of Guaymas in the 1920s. In the 1930s the Japanese, with permission of the Mexican government, began exploiting shrimp stocks off Guaymas. John Steinbeck and Ed Ricketts observed the Japanese operations

during their 1940 Sea of Cortez expedition, describing the destructive fishing methods in their classic book, *The Sea of Cortez. A Leisurely Journey of Travel and Research*. The Mexican government eventually banned the Japanese fleets from the Gulf, but their success led to the establishment of the three major fishing centers of Sonora: Guaymas, Puerto Peñasco, and Yavaros.

Due to its high productivity and subtropical location, the Gulf of California teems with many species of finfish, crustaceans, and molluscs. Over 6000 species of animals have been reported from this sea, and many still remain undescribed. The numerous marsh- and mangrove-bordered lagoons and estuaries that line the Gulf coast of Sonora and Sinaloa serve as nurseries for juveniles of many important shellfish and finfish. The majority of the fisheries catch today is shrimp, squid and sardines. Nearly three-fourths of the shrimp catch is exported to the U.S., and today the shrimp harvest (including farmed shrimp) from the Sea of Cortez makes up about 60% of Mexico's total fishery by dollar value. Industrial ("high seas") shrimpers use one of the most destructive fishing methods known—dragging large trawls across the sea floor, ripping up the top few inches of the sea bed, capturing (and killing) virtually every animal the nets encounter. Limited data suggest that the entire benthic ecosystem of the shallow Gulf has been dramatically altered because of this continual disturbance, year after year, since the 1920s. The principal change appears to be greatly reduced species diversity, loss of rare species, and hypoxia (severe oxygen depletion) due to the rain of decomposing by-catch dumped off the shrimp boats day after day. However, no thorough scientific study of this long-term disturbance has been undertaken. The sardine catch (comprising mainly *Sardinops sagax* and *Opisthonema libertate*, and the recently reestablished northern anchovy *Engraulis mordax*) is six times the shrimp catch by tonnage, but of relatively less value. Sonora accounts for 60% of Mexico's sardine take. Most of it is processed for poultry feed and fishmeal fertilizer. It is likely that every commercial species in the Sea of Cortez is unsustainably fished today.



Shrimp boat, working out of Puerto Peñasco, 2013

CONSERVATION IN SONORA

Sonora has over 7,000 sq mi (>18,130 sq km) of protected wildlife areas. Federally-protected natural areas in Mexico are of six types: biosphere reserves, national parks, areas for the protection of flora and fauna, protected natural resource areas, natural monuments, and shrines. Sonora has about 10 federally protected areas, around 20 state-protected sites, and a number of private natural reserves. Among these is the *El Pinacate and Gran Desierto de Altar Biosphere Reserve* (both a Mexican and a UNESCO Biosphere Reserve, and a UNESCO World Heritage Site, and also one of Mexico's designated "13 natural marvels"), located between Puerto Peñasco and the U.S. border in the Altar Desert. The reserve comprises rich Sonoran Desert habitat, massive dune fields, and hundreds of dormant volcanic craters. Bordering the western edge of the Pinacate reserve is the 3,609 sq mi (9,348 sq km) *Alto Golfo de California y Delta de Río Colorado Biosphere Reserve*, at the head of the Gulf of California. This, and the Pinacate reserve, were created in 1993. The *Sierra de Ajos-Bavispe Natural Resource Area* is in the central interior of Sonora. The 156 sq mi (405 sq km) *Reserve for the Protection of Flora and Fauna, Sierra de Alamos-Rio Cuchujaqui* is in the far southern foothills of the Sierra Madre Occidental in Sonora. In addition to these, and others, all of the islands of the Sea of Cortez comprise the *Protected Natural Resources of the Flora and Fauna of the Islands of the Gulf of California*. Additionally, the entirety of Bahía Adair, between the towns of Puerto Peñasco and El Golfo de Santa Clara, is a Ramsar Designated Wetland. The Convention on Wetlands of International Importance, known as the Ramsar Convention, is an international

treaty that defines actions and areas of cooperation for conservation of sustainable wetlands.

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ENDNOTES

Endnote 1. According to one popular myth, the Aztecs discovered the beverage *pulque* (later distilled into mescal/tequila by the Spanish) when a bolt of lightning struck an agave field. The bolt instantaneously cooked the heart of one of the plants, and caused it to quickly ferment. The Aztecs noticed the aromatic nectar exuding from the cooked plant, and deemed it to be a miraculous gift from the gods (which they named *pulque*). Subsequently, during colonial times, it was distilled into *vino mezcal* ("mezcal wine"), the most popular version of which came to be tequila. (In Mexico, it is usually spelled *mezcal*; in the U.S. it is usually spelled *mescal*.) There are today around 30 tequila distilleries in Mexico, producing hundreds of brands of tequila in six categories (fixed by federal law): (1) 100% agave tequilas are required by law to be made from 100% fermented juices from the blue agave, with no additives, not even sugar. (2) *Mixto* tequilas must be at least 51% fermented juices from the blue agave plant, but additives may be used, such as fermented cane sugar juices. (3) *Blanco* tequila is tequila in its youngest and purest form, just as produced by the distillation process, without the effects of any barrel aging. Blancos can be 100% agave, or *mixto*. (4) Gold (*joven abocado*) tequilas are usually *mixtos*, unaged blanco tequila to which additive colors (usually caramel) and flavors are mixed after the distillation process. (5) *Reposado* tequilas are, literally, "rested." By law, a *reposado* must be aged in wood for at least 60 days, but most are actually aged closer to a year. They are aged in large wooden tanks, or sometimes in small oak barrels. (6) *Añejo* tequilas are "aged" or "old." By law, *añejos* must be aged for at least 12 months in government-sealed barrels that are no larger than 600 liters. Often, the barrels used are old 190-liter whisky barrels from Kentucky. The longer the aging process (in wood), the darker the tequila becomes.

Many mescal makers put a "worm" in the bottle, said to enhance the flavor (also said to be a marketing ploy). The "worm" is actually an insect larva, typically either of a cossid moth (*Comadia redtenbacheri*), a skipper butterfly (*Aegiale hesperiaris*), or a weevil (*Hypopta agavis*). All are found associated with living agaves, but only the weevil causes any real damage to the plants. In Oaxaca, these larvae are often added to chile (and other secret

ingredients) to concoct a tasty powder that one sprinkles on a citrus slice to accompany a glass of mescal. Locals insist the insect larva enhances the flavor and enjoyment of the drink, and perhaps even gives the drinker temporary special powers of love and intellect.

Endnote 2. On Kino's first Pinacate expedition, he saw the mountains of Baja California and judged that there could be no seaway separating them from the mainland. On his second and third expeditions, he saw the head of the Gulf of California, the actual land connection between Baja and the mainland, confirming the peninsular nature of the former; on these trips he also reached the Sea of Cortez, on the coast of Sonora. On his fourth expedition, he took "official witnesses" to the top of Sierra Pinacate, to prove to them the peninsular nature of Baja California. Kino was 61 years of age on this fourth expedition to the Pinacates.

Endnote 3. The Virgin of Guadalupe has been known by many names (the Dark Virgin, the Virgin of Tepeyac, *La Criolla*, etc.), and the hold that devotion to Our Lady of Guadalupe has on the Mexican people is legendary and profound. In fact, she has come to be venerated throughout Latin America and is sometimes referred to as the Empress of the Americas. This devotion is based on the story of the Virgin Mary's appearance to the newly converted Aztec (Nahuatl) Indian, Juan Diego Cuauhtlatotzin, in December 1531, in the village of Tepeyac, near Mexico City. The apparition occurred early in the conquest of Mexico, just ten years after the Aztec capital of Tenochtitlán fell to the conquistador Cortés. Not only did the Virgin appear, but she left her beautiful image on Juan Diego's cloak, in which Diego carried "miraculous roses" (unknown in the New World at that time) from Tepeyac Hill to Bishop Zumarraga, with a request from the Virgin that a new church be built on the hilltop site. The cloak is now on display at the Basilica of Our Lady of Guadalupe in Mexico City. Zumarraga was a compassionate man who built the first hospital, library and university in the Americas. He was also the "protector of the Indians," entrusted by Emperor Charles V to enforce his decree of 1530 that Indians could not be made slaves. By mass of that year, and adobe structure was built atop Tepeyac Hill in honor of the Blessed Mother, Our Lady of Guadalupe. It was dedicated on December 26, 1531, the feast of St. Stephen the Martyr. This was 76 years

before the first permanent English colony was established in the New World (in Jamestown, 1607)

The first published account of the apparition came more than 100 years later, in 1648, by the Oratorian priest, Miguel Sánchez. Sánchez's account was responsible for the popularization and spread of the devotion among the *criollos* of Mexico City – that is, among those people of European stock who had been born in the New World. Though the only difference between *criollos* and Spaniards from Europe (from the Iberian Peninsula) was their place of birth, the *criollos* saw themselves as marginalized. Disdained by the Spaniards of New Spain (the Spanish colonies of the New World), excluded from the topmost positions of local government, and suppressed by what they regarded as second-class citizenship, they reacted by developing a strong sense of group and regional identity. Thus, Sanchez's book was not only a devotional treatise but a complex celebration of *criolloismo* that used the vision of the Virgin of Guadalupe as proof of special divine favor toward the *criollos* – the Virgin Mary had revealed herself to the *criollos*, even if through the agency of a lowly Nahuatl Indian. The devotion soon spread throughout New Spain. It reached Europe through the efforts of Pedro de Gálvez, a former *visitador* in New Spain and a member of the Council of the Indies, who in 1662 subsidized publication of Mateo de la Cruz's version of the apparition story.

The first political use of the Virgin of Guadalupe as a national symbol was during the Mexican Revolution of 1810 (Mexico's war of independence), when the Virgin appeared on the banners of the military general Miguel Hidalgo, while his troops proclaimed long life to her and death to the Spaniards. Thus, the long-standing rivalry between the Virgin of Guadalupe (*La Criolla*) and the Virgin of Remedios (*La Conquistadora*) became clearly marked along nationalistic and political lines. It is not surprising, therefore, that, after independence was attained, the Virgin of Guadalupe emerged as the preeminent national religious symbol of Mexico. As the famous writer-philosopher Octavio Paz once observed, "The Mexican people, after more than two centuries of experiments and defeats, have faith only in the Virgin of Guadalupe and the National Lottery." The narration of the Virgin of Guadalupe is sometimes called the "fifth gospel." It has been

one of the most important evangelizers in the history of the Americas.

Two hundred years after Juan Diego's vision, in the 18th Century, the road to fame for aspiring composers in Italy had come to be the writing of operas. For their Latin American, New World counterparts, however, the most prestigious genre was *Maitines* (or *Matins*), a Roman Catholic service traditionally performed in the early hours of the morning. The *Matins* provided a range of opportunities to display compositional skill, as it juxtaposed a wide variety of textures and style, commonly paralleling that of an Old World opera but with monophonic *Psalms* in chant, intoned *Lecciones* that could preach or weave a story, and sets of *Responsories* that elegantly combined voices with instruments. In 1742, the Italian composer Ignacio de Jerusalem was recruited to Mexico City to help strengthen the music resources of New Spain's growing empire. In 1750 he was appointed to the top post of Chapel Master at the Cathedral. In 1764, in Mexico City, he presented his masterpiece, "*matins* for the Virgin of Guadalupe." Jerusalem's *matins* have rarely been recorded, but several versions of this stunning composition do exist; my favorite is "*Matins* for the Virgin of Guadalupe, 1764," by Chanticleer (Teldec 3984-21829-2).

The name "Guadalupe" may derive from the Aztec word *tlēcuatlecupe*, which means "one who crushes the head of the serpent." When pronounced correctly, the name sounds like "Guadalupe," and this is how the Spaniards interpreted it. There is, in Spain, a town (with a prominent Marian shrine) by the name of Guadalupe, in the province of Cáceres. The feast day of Our Lady of Guadalupe is December 12. The feast day for Juan Diego, who was declared a saint in 2002 by Pope John Paul II, is December 9.

Endnote 4. So remote was Sonora from the rest of Mexico and the United States (and the world, really), and so caught up in the gold rush and other immediate affairs, that Mexico's War of Independence (early 1800s) and Revolutionary War (early 1900s) were little more than background noise. However, the famous revolutionary, Francisco "Pancho" Villa, often entered Sonora from his main hangouts in Durango and Chihuahua, and the Sonoran border town of Agua Prieta was the site of a major defeat for Villa's troops in 1916. In addition, several key revolutionary leaders and,

later, national presidents emerged from Sonora, including Álvaro Obregón (who defeated Pancho Villa's army) and Guaymas-born Plutarco Elías Calles (who founded the PRI political party, which ruled Mexico for nearly 70 years). Like so many Mexicans of fame, Pancho Villa's legacy is controversial; he is both revered as a hero of the revolution (launched in 1910) and remembered as a notorious border bandit and killer! The statue of Villa in downtown Tucson was a gift to Arizona by the Mexican government in 1981.

Endnote 5. The vineyards provide table grapes and also supply several wineries in northwest Mexico, including the Domeq winery, which produces good brandies and wines, including the famous "Padre Kino Vino Tinto"—at about \$3/liter, an agreeable red table wine. As of 2014, around 2000 acres of vineyards were under cultivation just north of Hermosillo.

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