Sandfood and Sand Papago: A Wild Kind of Mutualism

IT was May 17, 1854, in the sea of sand called the Gran Desierto, and temperatures were already reaching above one hundred degrees. Colonel Andrew Belcher Gray wondered why he had decided to stray from the line he had been surveying. He was hired to chart a route parallel to the new United States/Mexico border upon which the Texas Western Railroad could set tracks across the deserts to San Diego. Gray occasionally let his crew visit nearby pueblos or mining prospects, but this was as far as they had deviated from the straight and narrow. This day, there had been no mines nor towns, only sand sables, talc-like silt beds, and lava flows that looked as though they were still crazily creeping down from Pinacate Peak. His men were ill-humored and hungry; their horses, tired and dusty.

All this because of Gray's vain desire to become the first Anglo since Lt. R. W. H. Hardy in 1826 to describe the desert coast on the Sonoran side of the Gulf. As unproductive as this tangential jaunt had been, the desire seemed obsessive. Hardy at least had had some luck. He had charted new harbors and stumbled upon wild Seri Indians on Tiburón Island who believed him to be a great doctor. This had allowed Hardy to gain the intimate view of their primitive life that had later made his journals famous. Gray's own attempts to learn more of the "savage existence" of desert Indians had so far been futile. His old Papago guide, "Termite," who was "as thin a specimen of humanity as you would want to see," understood little English, said hardly a word all day as they had traveled, and rebuffed all inquiries. The worthlessness of the land was even more depressing to

Gray. He wrote that "towards the Gulf of California, the country presents more the appearance of a barren waste than any district I have ever seen."

Then, before dusk, Termite led them into the dunes overlooking Adair Bay and the open gulf with the sun setting over Baja California:

> Immediately upon entering these sand hills...I observed the Indian dismount from his horse and commence digging with his hands. At first I could not perceive his object, but shortly discovered that he had pulled out of the sand a vegetable-looking substance, which was shaped somewhat like a mushroom. He showed great eagerness to obtain more, and made a sign that it was good to eat.

The vegetable-like substance? It was what the O'odham have long known as *hia tadk,* 'dune root,' a vascular plant which botanists now know as *Pholisma sonorae* or simply "sandfood." Within an hour or so of discovering it for science, Gray had some in his belly:

> We encamped for the night in the sandhills, and the chief instead of supping with us as usual, made a fire, and roasted his roots or plants on the hot coals (which took about 20 minutes), and commenced eating them. None of the party seemed inclined to taste, but out of courtesy, I moved over to the chief's fire, and he handed me one. At first I ate but a little, and slowly, but in a few minutes, so luscious was it that I forgot my own mess and ate heartily of it; next morning each of the party followed suit and afterwards there was scarcely enough to satisfy us. The taste, though peculiar, was not unlike the sweet potato, but more delicate.

Gray sent specimens and a letter back to the famous botanist John Torrey, who hailed the discovery at meetings of a natural history society on the East coast. It was not then recognized that 170 years earlier, Juan Mateo Manje had encountered "poor people who lived by eating roots of wild sweet potatoes" on the same coast. Those natives, the *Hia C-ed O'odham* or 'Sand People,' had of course "discovered" the plant and its value long before that. When Termite took Gray's party to a Sand Papago fishing camp the next day, these wary Indians all ran away and would not meet the whites until the old Sonoita Papago chief gave them considerable assurances. Returning to where they had been processing their harvests of fish, shrimp, and wild grass seeds, the Sand Papago gave Gray the glimpse of aboriginal life in the desert that he had been craving:

> In this naked spot, I found a band of Indians (Papagos) almost in a state of nudity living on fish and crabs caught in the salt creeks and lagoons on the Gulf; and a

> sort of root, which was ate after roasting upon hot coals; or dried in the sun, and ground on a metate (curved stone) with mezquite beans, forming "Pinole."...
>
> Not withstanding it appears to be the most desolate and forlorn-looking spot for eighty miles around the head of the Gulf...Nature seems even here, where no rain had fallen for eight months, to have provided for the sustenance of man one of the most nutritious and palatable vegetables.

Yet there was a problem with this vegetable that Gray failed to advertise. Forty years later, his sidekick Pete Brady recalled the Sand Papago encounter with mixed emotion. Brady was somewhat aroused by the beauty of the thinly clad maidens present. Then they smiled at him:

> Most astonishing of all, their teeth were all decayed and were level to the gums. Even the young Indians of twelve or fourteen years of age were in the same fix....[Present in the sand root was] a great deal of a certain kind of acid...that destroyed the enamel on their teeth and it was this that caused the Indians to present such a frightful appearance.

We are not sure if the Sand People were toothless because of some undescribed acid in this plant or because of all the crunching and gnashing of sand and shell that came along with many of their foods. Fear of tooth decay has not kept others from dreaming of eating this luscious foodstuff, no matter how far it may be tucked away in the hottest, driest areas of Arizona, California, and Sonora. Its renown has grown through the decades since Gray and Brady brought it out for the rest of the world to see. In the 1930s, USDA and BIA bureaucrats even funded a feasibility study to see if sandfood could be cultivated, culled, and canned in order to buffer Papago Indian reservation residents from the food scarcity that comes with the droughts that hit their homeland.

The trouble is, sandfood defies domestication. Over the years, USDA technicians and university scientists have all failed miserably in their attempts to germinate its seeds. You see, the root of the dunes is not a root at all. It is a parasite on the roots of desert shrubs. The edible portion of this plant is actually a subterranean flower stalk which reaches up from its attachment on the shrub roots, in order to let its flowers open on the surface of the sands. Scientists speculate, but have not proven, that sandfood seeds will germinate only if they are on or near the roots of certain host plants. How then do the seeds which mature on the burning surface of summertime dunes ever get dispersed through a sea of sand to the proper harbor? And why is the vegetable which Gray found to be "very abundant

in the hills" now considered a good candidate for endangered species lists? It is doubtful that it was eaten into oblivion, for soon after Gray's visit, the Gran Desierto was largely deserted by its human gatherers. More troublesome yet, where did those Sand Papago go?

If you were a Sand Papago who knew your gathering grounds well, you could go to certain sand swales two moons after winter solstice and dig. Not just anywhere. Dig at the edge of selected sand-loving shrubs. Dunes buckwheat. White bursage, maybe. Or look for the two kinds of mat-forming bushes with quiltlike leaves. There is no common name by which they are known today, although botanists call them *Tiquilia*. Find a circular marking in the sand around these plants, sculpted by branches dipping and sweeping with the wind. Dig down, down until you hit the cooler moist sand, then dig another meter.

There, on shrub roots no thicker than a baby's little finger, look. Looking hard, you might sight a pale mass of undifferentiated cells, wartlike, waiting. Wait yourself.

Come back a moon later, when the sand is warmer. As the days lengthen, so lengthens this mass of cells, shaped like a spear, pushing up through tons of sand toward light. Not much longer, and a wooly gray cushion the size of a small fried egg will burst the surface of the now-hot sand.

Yet it still hides from the untrained eye, for drifting sand lingers in the gray fuzz, camouflaging it. This coating of silica grains reflects light back to the sky, reducing the plant's heat load. It is hidden amidst the dazzle of wildflowers that pop up with the winter rains. Devil's lantern primrose. Gran Desierto sunflower. White-stem blazing star. Desert lily. Sacred datura. Sandfood's subtle lavender flowers, only millimeters wide, are seldom seen beneath the leggier dune flora.

Only when the wildflower show fades in the spring, and water becomes scarce or scummy in mountain *tinajas* or pisstanks nearby, does sandfood loom larger in the gatherer's eye. Now dig at dawn, because by noon in May, the sand surface reaches above one hundred forty degrees. Dig where the last flowers wane on the puckered seedhead, while some seeds mature, hidden in the wooly mat. Widen a hole around the two to ten mushroomlike tops that converge down into the loose sand, but try not to break the yard-long, wrist-thick succulent stalks. At this stage, sandfood may weigh more than thirty times its host plant's weight. It is ready to eat.

Breaking the stalk off close to the shrub roots in the excavation you've made, you jar the seedhead with enough force to cause several hundred seeds to fall into

the hole. A few find themselves pressed up against the shrub's roots. You have inadvertently dispersed them to places from which they can germinate. They have landed in a harbor, rather than being lost in a sea of sand. While gathering food, you have participated in a wild kind of mutualism.

Outsiders often try to freeze desert Indians. Freeze them in time and space, restrict them in our minds so that we feel secure that we know who they are. Freeze one moment of how they lived and looked. Hang on to this snapshot, and forget that the movie rolls on.

One time at the Hopi mesas, a pigeonhole in which I had unconsciously placed a friend collapsed before my eyes. I was talking to his wife about native foods. She had been telling me when to gather the wild potatoes from the sand dunes below the mesas. "Those *tumna* are good, good with venison." I inquired, "Do you eat much venison?" imagining Hopis hunting deer in canyons nearby. Her husband, who was carving a katsina at a workbench nearby, replied, "I had some yesterday and it sure was good. That's why I feel tired today. I just flew in from the Explorer's Club luncheon on the East coast, where we had venison, caribou, kangaroo, and even shark meat. It was a real feast."

With the Sand Papago, visitors have always called them "poor." Poor people in a barren land. From Manje's first visit to them in 1694, outsiders have tried to pin them down. Manje pinned them naked to a place "full of rocks and all kinds of brush and cacti—an arid sterile land with no water for pasture....We gave them a supply of food since they were poor and hungry, living on roots, locust and fish." Early observers viewed them as desperate enough to eat even snakes, lizards, and toads.

Poor. No gold to give to the conquistadors. No agriculture that an outsider could recognize as such. No permanent housing or fixed residences. No cuisine except that prepared from herpetological oddities and plant parasites.

To lock them up further, Anglo folklore claims that there are no Sand Papago left. They were wiped out by an epidemic around the time that Gray visited the Pinacate. They were rounded up by a Mexican posse and all were shot for having robbed Camino del Diablo travelers. They left the sand, never to return. Or only one hermit lived into this century, and Lumholtz was the last to see his traces. Or they all took to living on the Papago Indian reservation, and studying at BIA boarding schools, where they have become part of the American Indian melting pot. They gave up sandfood for Coca-Cola, which not only rotted their teeth, but killed them as well.

The last few years, however, Sand Papago families have been gathering together with one another. They have known all along that they were not extinct. Nor do they have exactly the same traditions as the 12,000-plus Desert Papago (Tohono O'odham) native to the villages where the present-day Papago Indian reservations are located. However, some Sand Papago have married Desert Papago and now live in these villages. More often than not, they still live beyond the margins of both these reservations and their former Gran Desierto gathering grounds, scattered through such towns as Ajo, Caborca, Gila Bend, Sonoita, Stanfield, and Roll. Some wish to have a reservation of their own, to be located near Ajo, while others prefer not to have to deal so much with the BIA.

Wherever these families now reside, there remain a few old folks, some still quite lively, who roamed the dunes and lava fields when they were young. Oral histories have been collected in the O'odham language by their kin, in-laws, and descendants. These scattered records document a manner of living that has been rich in ways that modern society can hardly fathom or measure. Clearly, the Sand Papago do not see their ancestors as having been poor in things that matter.

These people remember a dynamic life, a life too varied to be caught like some overexposed snapshot out in the dunes. Seldom did they have a year or even a season exactly like the preceding ones. The Sand Papago might have resided parts of the year in sites one hundred fifty kilometers away from one another, and now travel similar distances in pickups to stay with relatives for a few days at a time. They could be at the ocean when the tides brought in fish, then move up to the Tinajas Altas to hunt. After digging in the dunes for sandfood, they might trek to Yuma or Gila Bend or Caborca to help harvest wheat. The wheat harvest was followed by a reunion of relatives at Vak (Quitovac, Sonora), where organpipe and saguaro fruit were gathered for the *Vi'igita* celebration. If rains came in July and August, they would plant fields hidden between the lava flows of the Pinacate, fueled by the runoff from infrequent storms. After harvests, some would take their produce up to Quitobaquito, Sonoita, or Ajo, to trade for dry goods. On a visit to the Gila River, they would catch freshwater fish, perhaps humpbacked suckers; they would exchange "fish stories," medicines, and other products with relatives.

Mobility kept them healthy in an area where today Park Service, Border Patrol, and military men go stir-crazy, resulting in a high turnover on various government jobs. Now in her eighties, Candelario Orozco recalled her rambling days: "A long time ago, moving around did not cost very much. People could walk anywhere to change their residence." They generally traveled lightly, but devout Catholics had more of a burden in that they carried around all of their santos, as one woman

explained to Ofelia Zepeda; they took holy pictures and small statues with them wherever they went.

Miguel Velasco remembered roaming across areas where today's boundary fences and border guards inhibit human movement: "It was the custom of the Sand Indians to travel all over....They went to Mexico, because there was no fence then." They drifted, Miguel told his relative, Fillman Bell, because they were like the sand they had come from:

> We are all Sand Indians. We are not known as on top of the sand. We are from the sand, and known as Sand Indians, to find our way of life on the sand of the earth. That is why we go all over to seek our food to live well. We cover a large portion of land in different harvest seasons to gather our food to store in the time of the winter season....Yes, we are one of the same the Mexican Papagos call *Hia Tadk Ku:mdam,* 'Sand Root Crushers.' We have been given many names. We don't stay in one place. We are the Sand Indians originated out of the sand to roam on top of it.

To live well, Molly Jim Orozco said that they drew upon a diversity of foods, sandfood being primary:

> They also call us Sand Root Crushers. It must be true. We do dig the sweet potato-like plants with long roots. It is very good and sweet. We eat many different plants. The mesquite beans we pound and make a drink out of it. The desert asparagus [broomrape] that grows in the soft banks of the arroyo...We eat fish from the ocean...Sometimes we come [to the Pinacates] to gather cactus fruit and deer.

Scientists have occasionally tried to reconstruct the diet of the Sand Papago, guessing from what adjacent people are known to have eaten and from what potential food resources exist even in this arid core. Such lists of foods contrast oddly with that which can be compiled from the oral histories of Sand Papagos themselves. As foods that they truly relished, they casually mention twenty-one wild plant species, nine cultivated plant species, and at least twenty-three animal species. Altogether, these represent thirty-two families of flora and fauna. Sand Papago elders such as Miguel Velasco lament the demise of this dietary diversity:

> Long time ago, this was our way of life. We did not buy food. We worked hard to gather our food. We never even knew what coffee was until the white people came. We drank the desert fruit juices in harvest time. The desert food is meant for the Indians to eat. The reason so many Indians die young is because they don't eat their desert food. I worry about what will happen to this new generation of Indians who have become accustomed to present food they buy at the markets.

> They will not know how to survive if the Anglos stopped selling food. The old Indians lived well with their old way of life.

Fillman Bell was told by Alonso Puffer at Hickiwan that since Papago gathering had diminished, sandfood itself may be changing for the worse:

> There was plenty of rain in those days and the desert yielded lots of food....The Sand Indians dug a sweet potato-like plant with long roots that grows in the sand, and [they] ate it raw. Now these same plants are very bitter. They don't taste the same.

What does sandfood taste like growing in superheated asphalt on a late May day? Just off the edge of old U.S. 80 in California's Algodones Dunes, it comes up through fifteen centimeters of soft tar next to a metal fencepost. This is one of the few spots in the surrounding thousand hectares where sandfood can grow without being run over. Dune buggies dodge the fencepost, tearing off the old road that is now half inundated with sand drifts, on their way to tackle the monstrous dunes a hundred meters high nearby. Host plants such as *Tiquilia* regularly get creamed as off-road vehicles (ORVs) cross and crisscross the Algodones.

Here, another nomadic group currently inhabits a portion of sandfood's natural range, at least on weekends. I have not the anthropological expertise to know if this group can properly be considered to be a tribe of its own. At first glance, their material culture sets them off from other humans: balloon tires, Honda ATC-110 three-wheelers with Enduro front suspensions, Escapade trailer homes, and beer carried only by the caseload. They crack off pop tops from their beer cans, hop on their seats, tip their sunglasses down over their eyes, and scream away. I take flight from their trajectories, landing in the shadow of a telephone pole, where I notice one last sandfood poking up out of the sand. No host plant in sight. Perhaps it is parasitic on the telephone pole.

Few of the dune-buggy jockeys ever notice sandfood. They are in a place where one looks for fun, not for food. Instead, they gather food at a U-Totem fifty kilometers away. This storehouse regularly provides foods derived from forty-two species of plants and six species of animals, which cumulatively represent twenty-four families of flora and fauna. On holiday weekends, ten to fifteen thousand of these southern California nomads bring in two to five thousand bikes and buggies for their tribal rituals in the dunes. The Algodones Dunes bear the brunt of more ORV use than any other dune area in southern California. Hilary Kaye and Harold Koopowitz tell of one weekend when 151 competitive ORV events were held in this sandfood habitat, drawing 67,000 participants and 189,000 spectators. The

dust raised by this fossil-fuel-powered powwow was so thick that it showed up in satellite photos as a huge cloud over the Algodones Dunes.

But do ORVs actually have any effect on sandfood? Since the plant is so cryptic, we can only answer this question indirectly. Roger Luckenbach and Bruce Bury have compared Algodones Dune areas where buggies and bikes abound with those which are off-limits to ORVs. They found marked declines in herbaceous annuals and woody perennials, in arthropods, lizards, and mammals on the tire-compacted dunes. Even low levels of drag racing significantly decrease the volume of vegetation on the dunes. They further observed that "all sand-adapted species, including several plants considered rare or threatened species, were greatly reduced in habitats where ORVs operate."

Sandfood may be grouped with this latter bunch. It is particularly vulnerable, since it is dependent upon shrubby host plants easily mauled by oversized tires. Accordingly, it has been placed on California and Arizona special-plants lists and has been nominated for listing as an endangered species in the United States. Yet because much of its natural range lies in northern Mexico, some have claimed that it is not really endangered over a significant portion of its range. That claim was stronger in the years before dune buggies spent much time playing in the Gran Desierto of Sonora. Today, the ORVs crisscross the Gran Desierto, from Puerto Peñasco and El Golfo on the coast to the jeep trails of the Pinacate to the east. Whenever I see a dune buggy down there, I pray for a way to teach both sandfood and its host plant to duck.

Still, there remain places within sandfood's 6250-kilometer-square range that dune buggies seldom reach. During a full moon, go south of the border, between the Colorado River delta and the Pinacate lava fields. Stop your vehicle, take your shoes off, and walk. Walk toward the soft shape on the horizon, dunes like hips of women sleeping on their sides. Wander through the tracks of side-winders, lizards, windswept bushes, and beetles. Look down at your toes. There it is, like another moon coming up through the sand: sandfood, reflecting back at you.

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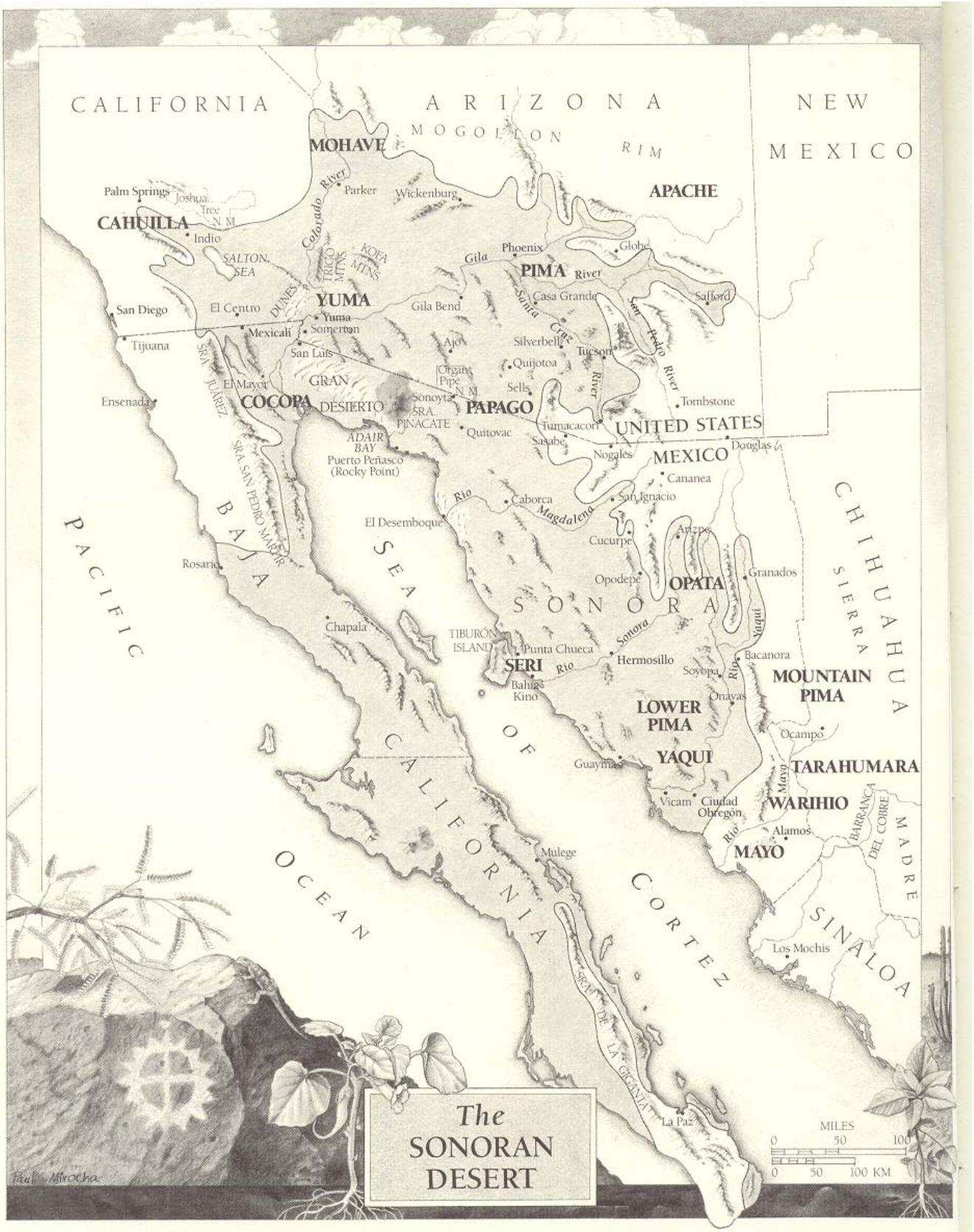
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Gathering the Desert

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