

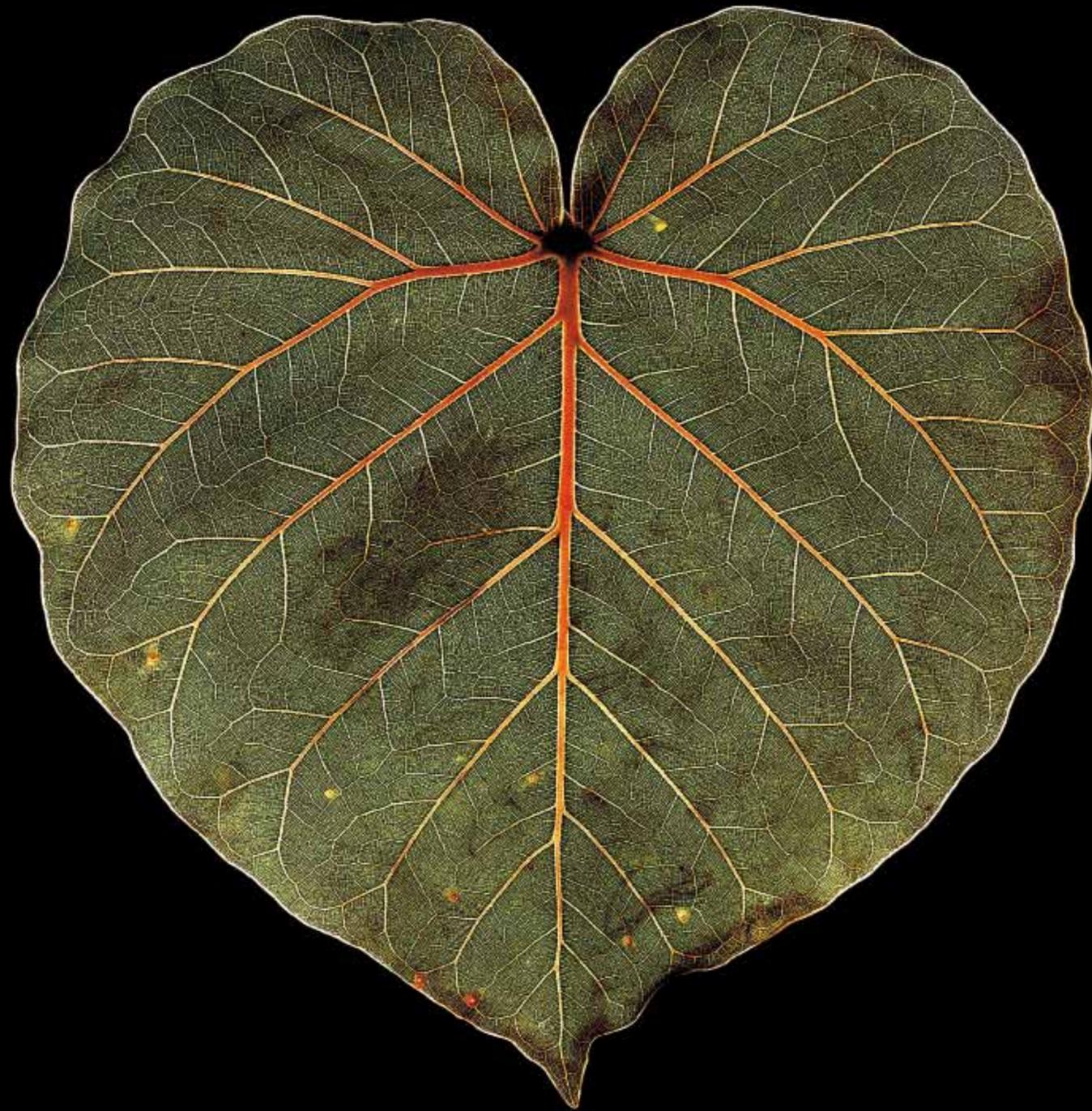
# THE TREE IN THE MAYA WORLD

ARTISTIC AND ENVIRONMENTAL POINTS OF VIEW

FOREWORD BY HRH THE PRINCE OF WALES

OBREGÓN EDITIONS





## A BUDDHIST MONK'S REFLECTIONS ON ECOLOGICAL RESPONSIBILITY

*His Holiness the 14<sup>th</sup> Dalai Lama  
Tenzin Gyatso*

During the course of my extensive traveling to countries across the world, rich and poor, east and west, I have seen people reveling in pleasure, and people suffering. The advancement of science and technology seems to have achieved little more than linear, numerical improvement; development often means little more than more mansions in more cities. As a result, the ecological balance—the very basis of our life on earth—has been greatly affected.

On the other hand, in days gone by, the people of Tibet lived a happy life, untroubled by pollution, in natural conditions. Today, all over the world, including Tibet, ecological degradation is fast overtaking us. I am wholly convinced that, if all of us do not make a concerted effort, with a sense of universal responsibility, we will see the gradual breakdown of the fragile ecosystems that support us, resulting in an irreversible and irrevocable degradation of our planet, Earth.





# THE TREE IN THE MAYA WORLD

ARTISTIC AND ENVIRONMENTAL POINTS OF VIEW

**EDITOR**

Regina Esquivel Obregón

**PRODUCTION**

Cecil Esquivel Obregón

Ian M. Obregón

**ARCHAEOLOGICAL SITES**

Palenque, Yaxchilan and Calakmul in Mexico,  
Tikal in Guatemala, Caracol in Belize, Copan in Honduras  
and the reserve of Montes Azules in Mexico



## CONTENTS

### FOREWORD

HRH The Prince of Wales

Victoria R. Bricker Tulane University	<i>Trees in the Dresden Codex*</i>
Julia Carabias National Autonomous University of Mexico (UNAM)	<i>The Maya Rainforest</i>
His Holiness the 14 <sup>th</sup> Dalai Lama Tenzin Gyatso	<i>A Buddhist Monk's Reflections on Ecological Responsibility</i>
Paul Ehrlich Stanford University	<i>Mayans, Trees and Morals</i>
Thomas Lovejoy The H. John Heinz III Center for Science, Economics and the Environment	<i>The World of the Maya</i>
Simon Martin University of Pennsylvania Museum	<i>Cacao: The Magical Tree of the Maya</i>
Mary Miller Yale University	<i>Pakal's Orchard</i>
Norman Myers Duke University, Oxford University	<i>The Grandeur of a Tropical Forest*</i>
Peter Raven Missouri Botanical Garden	<i>The Maya World and Us*</i>
José Sarukhán National Autonomous University of Mexico (UNAM)	<i>Tropical Trees</i>
Karl Taube University of California, Riverside	<i>Trees and Ancient Maya Cosmology*</i>
Edward O. Wilson Harvard University, Oxford University	<i>Excerpt from The Future of Life*</i>

*\* Essays marked with an asterisk are available in the complete book and not included in this maquette.*





## CLARENCE HOUSE

For me, there is no richer manifestation of the miracle of life than that seen in the teeming diversity of the tropical rainforests. While today they cover less than five per cent of the Earth's land surface, these incredible ecosystems harbour much more than half of all terrestrial species of wild animals and plants.

It is not only for the richness of natural diversity that these forests are of such importance. We know today that they provide a whole host of hugely valuable services. They remove vast quantities of carbon dioxide from the atmosphere and are a source of rain clouds that enable many crops and much of our food to be produced. The forests provide the homes and support the livelihoods of many indigenous and other forest-dependent societies. With this in mind, one can only conclude that this great green mantle is not only an ecological miracle, but also an asset of incalculable economic and social importance.

For many years, I have been deeply concerned at the continuing loss of these ecosystems. While in our ever more human-dominated world the clearance of natural habitats is so often a cause for great regret, it seems to me that there is a particular urgency to slow down and, where possible, reverse the clearance of the tropical rainforests. I have devoted a great deal of personal effort towards this goal over many years, not least through my Rainforests Project and my International Sustainability Unit (I.S.U.), and I am happy to say that it is possible to make progress. For example, the R.E.D.D.+ Partnership was launched in Oslo in 2010 and, while there is still much work to be done in allocating the \$4.5 billion of funding that has been committed so far, some progress has been made in developing programmes to address deforestation that include the agriculture sector.

Equally, my I.S.U. is facilitating the development of a consensus between the public, private and N.G.O. sectors on how the issues of resilience and adaptive capacity can be integrated into rural development policies in such a way that the relationship between energy, water and food security is clearly defined and anticipated. This, of course, is essential if there is to be a longer term solution which allows for the protection of the rainforests, conservation, biodiversity and sustainable economic growth.

Time is, however, of the essence. Not only is today's tropical rainforest clearance the main cause of animal and plant extinctions (thereby increasingly threatening our own survival as a species, as well as denying ourselves the opportunity to develop many plant and animal-based medical treatments for the future), it is also a massive source of carbon dioxide emissions, as trees are cleared to make way for farmland and mines,

or as forests are logged to provide our resource-hungry world with timber. Many communities face a loss of livelihood and cultural oblivion.

The remaining rainforests of Mesoamerica are at the frontline. Dense rainforests once covered much of this region, but today they are fragmented and under severe pressure in the face of rising demand for land and resources that expands apparently inexorably. Fuelled by economic growth on the one hand and population growth on the other, the frontier of deforestation grimly moves forward, year after year. Only a fraction of the original forest remains. I was shocked to read in the pages that follow how in Mexico just fourteen per cent is left.

While there is apparently no reason to believe that the Maya people who once built a great civilization here would have been aware of the folly that accompanied large-scale forest clearance, today we can gain no comfort from ignorance. There is compelling evidence to suggest the collapse of the Maya civilization was caused, at least in part, by ecological change. In our modern context, at a time when we know so much about the consequences of our actions, should we not pause to review our direction of travel? After all, learning from past mistakes is surely the hallmark of intelligent behaviour...

There are of course no silver bullets that will instantly halt or, less still, reverse the juggernaut of deforestation, but there are many actions that could begin to channel the momentum of development in more sustainable directions, to meet the needs of people in ways that do not incur unaffordable environmental costs. While many of the policies and measures needed to achieve this vital goal are becoming better understood, it is perhaps the willingness to embark on this path that is the prerequisite for the more sustainable future we must move towards. The beauty, culture, archaeology, flora and fauna of the home to the Maya people is without doubt one of the great riches of our world and I hope this book will inspire a redoubling of efforts to cherish what remains.

And that is why, in my opinion, this beautiful book is so valuable. By raising awareness and through inspiring us to be concerned about the future of these irreplaceable forests, we might yet achieve the breakthroughs needed to pass on this precious Earth, in all its richness, intact to our grandchildren. This is an ambition that is achievable and I hope that in the pages that follow you will be inspired to join with the millions of people worldwide who are working towards that end.

*Manley*







## THE MAYA RAINFOREST

*Julia Carabias Lillo*

It doesn't matter how many times you enter the thick growth of rainforests, invariably something new appears and something different occurs. The variety of colors, the unimaginable range of greens, the unknown sounds, the sopor of the humidity, the excess of oxygen, the high temperature unsettle and overwhelm, but above all, they bewitch whoever knows them. The jungle allows us to recall we have still not lost the capacity to be surprised, which is no small feat in the twenty-first century, a time in which we think we have lived and seen everything.

The Maya Rainforest of the humid tropics shelters one of the greatest cultural and biological diversities in Mexico, Guatemala, and Belize. Furthermore, for Mexico, this jungle is the space for the greatest catchment areas for freshwater in the country.

The humid tropical rainforests are the most complex, fragile, intricate, and diverse ecosystems on earth that are known. Millions of years of evolutionary history are enclosed in them. Stable climatic conditions throughout the year and through geological time, the almost unlimited availability of water, and the self-generation of nutrients that exist in the jungles have made it possible for the history of life to test different expressions and to be successful with them as no other space on the planet.

Despite the fact that they only occupy 7 percent of the planet's surface, between 60 and 70 percent of the world's biodiversity is concentrated in the humid tropical rainforests. The natural wealth of the rainforests is still not known in its entirety. Science has barely been able to describe a small fraction of the species that constitute it, and each day a new species is discovered.

Nor is much known as to the complex way it functions and as to the thousands of interactions that take place between its species, despite the fact that studies of tropical ecology have intensified in at least

the past three decades. In the most humid regions, these rainforests come to have trees scaling heights that surpass 50 meters and never losing their foliage thanks to annual rainfall of more than 2,500 mm.

The rainforests are not only these magnificent genetic banks, but also they offer indispensable environmental services for the proper workings of the planet as a whole. They stabilize climate and atmosphere; they are regulators of the largest hydrological basins in the world; they generate and conserve soil; they are the source of an extremely wide range of products and basic needs for society, and they contain yet unexplored potential.

The use of rainforests was well known to the ancient Mayas. Some ethnobiological works have documented the exploitation of hundreds of animal and plants species from the jungles. Animal protein was obtained from hunting, fishing, and the domestication of some species, plant carbohydrates through underground tubers, and vitamins from fruit and seeds.

Unfortunately, the fate of rainforests has not corresponded with its importance, wealth, and beauty. Rainforests have not been valued for the natural resources they contain and for the environmental services they produce. Both in Mexico and in the rest of the world, the way they have been used in the last decades, after looting precious woods and changing land use for agricultural activities, has led to the loss of much of the original habitat.

In the world, these ecosystems have been reduced to less than half of what they once were. Of the almost 100 million hectares that they originally occupied, today they cover only about 49.5 million hectares. In Latin America and the Caribbean alone, it has been estimated that the loss has been close to 3 million hectares per year. Norman Myers has suggested each day might represent the disappearance of one species, and this means extinction for all time.

In Mesoamerica, the humid tropical rainforest originally covered the majority of the territory; however, today the immense extension of this plant mass has been reduced to a few fragments, which are still extremely important, but they are scarce and isolated pockets.

In Mexico the moist humid rainforest originally occupied more than 10 million hectares in the country, throughout the states of Chiapas, Oaxaca, Tabasco, and Veracruz. Today, only 14 percent of this habitat remains. The rainforest has been reduced to 1.4 million hectares, mainly as the result of the expansion of cattle ranching for the last forty years. Fortunately, almost 40 percent of this remaining surface has been decreed as protected natural areas (PNA). The Montes Azules Biosphere Reserve in the Lacandon Rainforest of Chiapas is the largest of them with a surface area surpassing 330,000 hectares.

At the same time, the rainforest slightly less humid than the moist humid one, is preserved on the Yucatán Peninsula. A large part of this is thanks to the Calakmul Biosphere Reserve in Campeche, which covers more than 729,000 hectares, and also as a result of the sustainable forestry management programs that have been promoted for years by the Forestry Pilot Plan in the Maya rainforest. Although this zone had resisted the avatars of agriculture and cattle ranching, in 2007 Hurricane Dean took charge of severely damaging it.

The annual deforestation of these rainforests in Mexico continues to be, unfortunately, at least double the national average. Each year 2 percent of its surface area is lost. Nonetheless, if we consider that deforestation is concentrated in areas that are not protected, then the annual rate outside of the Protected Natural Areas could be almost 4 percent annually, just as is taking place in the region of Marqués de Comillas in Chiapas. At this rate of deforestation, within 25 years Mexico will have this type of rainforest only within the limits of the PNAs.

With the destruction of these ecosystems, part of the biological richness of the country is being lost. It will affect the availability of water, it will modify the channels of rivers, and springs and streams will dry up, erosion and the risk of flooding will increase, regional climate will be altered, to mention only some of the most serious, underrated impacts of deforestation. If the country were to lose all of its rainforests, it would have a much more profound development crisis in the near future.

Farming and forestry exploitation policies never took into account the noxious effects of the loss of humid tropical rainforests. The lack of environmental criteria in planning and the application of policies were the main cause for the destruction of these ecosystems of unequalled ecological value.

The most unfortunate thing is that the transformation of this region in productive activities, mainly farming, has not had a positive impact on its development. In the humid tropics of Mexico, some nine million people live in almost 32,500 settlements, and despite the natural wealth that exists there, in more than 90 percent of these locations, 4.4 million people live in conditions of abject poverty.

We still have time to save what we have and to recover part of what has been destroyed. However, this requires a national policy coordinated between the government, society, and all sectors involved, whose objective must be sustainable regional development that reconciles conservation of original ecosystems that still exist along with the promotion of productive activities appropriate for the specific conditions that prevail in the tropics, and in this way to achieve the social wellbeing of its inhabitants.

I hope that the beautiful images in this book motivate the reader to join in the conservation of the natural wonders of the Maya Rainforest.

*Julia Carabias Lillo*







## TROPICAL TREES

*José Sarukhán*

*God has cared for these trees, saved them from drought, disease, avalanches,  
and a thousand tempests and floods. But He cannot save them from fools.*

*John Muir*

We live of the Sun. We depend on water. Plants are the bridges that cover the distance between us (as well as all other animal life) and these two sources of life. Trees are the most striking terrestrial expression of plants. Anchored firmly on the soil, which they protect and nurture, they soar in all majesty towards the sky, as if suggesting the infinity of the universe.

The assemblages of trees, together with many other plant, animal and micro-organisms form the forests, whether tropical or temperate, that have constituted—and still constitute—the material and spiritual sustenance of the human civilization since its beginnings.

Mexico is one of the few, privileged countries of the World which possess a high level of species diversity. Despite good and long standing efforts to know the flora of the country, we still have no complete knowledge of how many plant species inhabit the Mexican territory. Approximately 23,000 species have been collected and named for Mexico; based on this number, the best estimations of the total number of flowering plants living on the country is close to 31,000. Of these, around 600 may be arboreal species which are components of the tropical forests that still cover the Mexican territory; of those, some 200 probably constitute the tree flora of the Mayan region in Mexico.

We are losing in Mexico around 700,000 Ha. of forests every year due to clearings for agricultural and grazing purposes, as well as by the effect of —mostly

provoked—forest fires. Currently we only have, in various states of fragmentation, about 17% and 26% of the original area once covered by rain and dry deciduous tropical forests, respectively. Every Ha. of tropical rain forest lost through deforestation signifies the loss of hundreds of individuals belonging to between 75 and 125 species of trees. Many of those species are represented by one individual or less per Ha., a situation that implies a severe isolation for reproductive purposes for a large number of species that are consequently confronted to an insidious and relentless process of extinction, even if individuals of those species are still present in a given area.

Our tropical forests, with all their trees and other component species, have been lost at a frightening rate; with that loss we have also lost a great part of the evolutionary theatre where the history of our valuable and diverse biological patrimony developed. What has been left behind is mostly misery, social marginalization and frustration, together with the loss of cultures and languages. Would we be able to stop this disastrous process before all is gone? There are some hopes: the Mesoamerican Biological Corridor project, located in the Mayan Area (the Yucatán Peninsula and Chiapas) represents a particularly important way to halt the deforestation process, restore degraded systems and give forest owners a way to combine a stable income and protect their natural capital. Let us wish that it attains a good number of its goals for the future generations of the inhabitants of the Mayan area.





## THE WORLD OF THE MAYA

*Thomas Lovejoy*

The world of the Maya is one of intertwined relicts of the great civilization and Meso-American rain forest. It seems almost everywhere one turns that what at first seems like a forest hill is actually a Mayan ruin beneath the mantle of the forest. It makes one appreciate both the extensive world the Mayans constructed and how it always was related to the forest even as it over reached itself with deforestation followed by the forest's return.

Today of course there is a renewed threat of deforestation and the wondrous world of the Maya needs international help. Fortunately there are multiple sources of assistance. There are major international conservation organizations to assist and government programs as well.

In 1984 at a time when many nations were deeply indebted to banks in the United States and elsewhere, I was in a hearing in the United States Congress on the environmental and other unintended effects of multilateral development projects. As I listened I realized that the debt itself was causing environmental problems. That led me to propose turning it around so that debt could be used to help nations support conservation and environment projects. This idea became what is known as debt for nature swaps which have provided literally billion of dollars for conservation.

Agile minds soon took the idea beyond the first formulation which involved acquiring debt at a great discount from the banks and redeeming it at much closer to face value in the currency of the country in question. Soon they involved government to government debt. But the idea was pretty much the same: alleviate the hard currency obligation in return

for local currency going in to conservation projects. In the United States this was formalized by legislation entitled "Enterprise for the Americas" but it was as the name suggests pretty much confined to the western hemisphere. This was succeeded by the Tropical Forest Conservation Act which still operates to this day.

Although it was obvious to some of us twenty years ago it is now widely recognized that the world needs tropical forests to aid in addressing the gargantuan threat of climate change. In addition to the annual atmospheric increase in carbon dioxide from the combustion of fossil fuels, perhaps as much as 20% of the annual emission of greenhouse gases comes from the destruction and burning of tropical forests. Much as the Mayans overreached environmentally, today the entire planet is over reaching. The time is very short and a massive effort is needed on many fronts. Clearly tropical forests are an important element in a multi-faceted solution.

So now there is active discussion of ways to reduce deforestation and also promote reforestation for the climate benefit. Funds will flow to tropical forest countries and the world of the Maya and in the nick of time. These are essentially payments for the carbon storing function of these forests. In a sense it is like valuing a computer chip for its silicon rather than for what it does, but nonetheless it helps along with other non-destructive uses of the forest to create incentives and rewards for using but keeping the forest in place.

So future of the great forest of the Maya with all its wonderful plants and animals will again be secure.





## CACAO: THE MAGICAL TREE OF THE MAYA

*Simon Martin*

Hidden in the shade of the forest, where the air is at its most humid, we find an unremarkable looking tree with some remarkable properties. The flowers and fruit of the cacao emerge not from the leafy upper story, as one would expect, but directly from the trunk and branches. The flowers are small and white, and can only be pollinated by a tiny midge. The resulting fruit is a ribbed pod, which is initially green, but ripens into yellow, orange, and ultimately a deep red. Within lies a succulent white pulp that surrounds a group of large seeds, shaped like almonds, closely packed together like a corn cob. The sweet-tasting pulp is a magnet for birds, bats, monkeys, and squirrels. But for humankind it is the hard, bitter seeds that represent the real prize—since, when dried, roasted, and ground, they are transformed into the stimulant-laden bounty of chocolate.

To find cacao growing wild in the forests today one needs to be in the environments it favors, although in ancient times it seems to have been cultivated right across the Maya region. Its origins are unclear, although many believe that it originated in South America and was brought north to Mesoamerica by human agency before 1500 BC. It was here that the complex processing of the seed was developed and where it was used to flavor both food and drink—becoming so valuable that it was used as money.

For the Maya, in particular, the cacao tree had a deeper significance and a special place in their religious world. In the great epic of the *Popol Vuh*—a sixteenth-century text produced by the K'iche' Maya of Guatemala that preserves far older myths—the Maize God descended into Underworld to meet a challenge issued by the Lords of Death. There he was outwitted, defeated, and sacrificed by his netherworld enemies. They gleefully cut his body into pieces, setting his head into the branches of a barren tree. After a time, however, the tree miraculously sprung to life and bore

fruit. Each fruit resembled the face of the Maize God so closely that it was impossible to tell one from the other. In many modern Maya languages the words for “fruit” and “face” are the same—seemingly a distant memory of the old story.

In the K'iche' version, this fruit is compared to the calabash, a vine that grows large spherical fruits. But in the art of the ancient cities of the tropical lowlands—the heartland of Maya civilization—the tree was clearly cacao. This is best seen on a painted ceramic vessel, where the Maize God's head is set among cacao pods and grows directly from the trunk of the tree (figure 1). In another, this time a carved stone vessel, we see the Maize God fully embodied as a cacao tree—with the ripe pods sprouting from his body. The hieroglyphic caption tells us that this is the *Iximte'*, or “Maize Tree” (figure 2). A third scene, this time from a carved clay vessel, provides another reference to the story, this one concerning the apotheosis of a human lord who is following in the Maize God's footsteps. In this case we see the Maize God in skeletal form buried within his mortuary pyramid (figure 3). Above this tomb sprout three anthropomorphic trees, representing the dead lord and his parents, each of them fertilized by the decaying body of the Maize God. Only the central tree, the dead lord himself, produces cacao pods.

Corn and cacao were clearly viewed as a conceptual pair—in some sense two sides of the same magical plant, in which all the powers of fecundity and sustenance were concentrated. Maize is light-loving and flourishes under the open sky—cacao is its opposite, thriving only in the shadows. These natural differences led the Maya to see the same tree in two guises: one appropriate to the light of the earth and heavens, the other to the darkness of the Underworld. Within the mythic tale, the Maize God's regeneration as a cacao tree allows him to cheat death and prepare for his ultimate, earthly resurrection as maize.



Funeral Tomb  
Staatliche Museen Zu Berlin  
400-500 AD

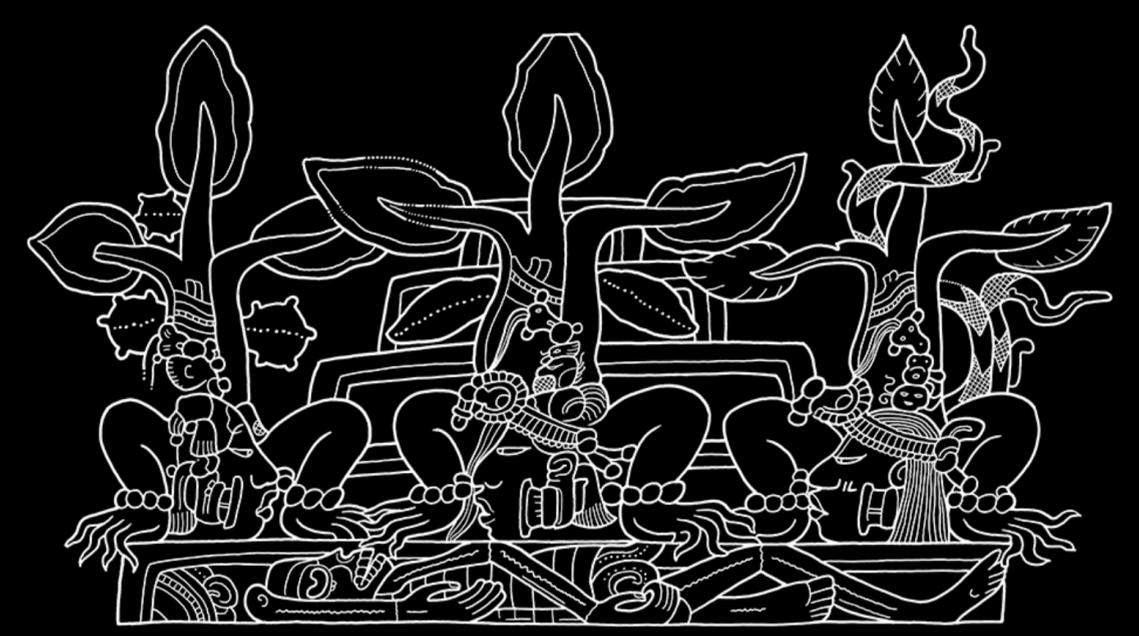


Figure 1

Figure 1 is a rendering of part of the Funeral Tomb. It represents the Maize God in skeletal form buried within his mortuary pyramid. Above his tomb sprout three anthropomorphic trees, representing the dead lord and his parents, each of them fertilized by the decaying body of the Maize God. Only the central tree, the dead lord himself, produces cacao pods.

In the Popol Vuh, we are told how the head of the Maize God hung in the fruit tree seduces and impregnates a maiden, who escapes the Underworld to give birth to his sons, the Hero Twins. Many adventures follow as the Twins return to the Underworld and struggle to avenge their father and restore him to life. Their eventual success marks the triumph of life over death, of light over darkness.

Only one thing remained, the means by which the magical tree might be released from its Underworld prison. For this the ground would need to be split open, a challenge taken by the storm god Chahk and the personified bolt of lightning called K'awiil. In a story repeated in different forms across Mesoamerica, the lightning bolt is the fiery force that liberates the hidden bounty of maize by making a great cleft in the earth.

The greater purpose of this narrative is clear: to conceptualize the natural cycle of life, with corn and cacao as symbols for all foodstuffs. The beheading of the Maize God represents the harvest, while the sowing of the seed constitutes his burial in the netherworld. Although the dry kernel appears to be dead, it is only dormant. For the Maya, the struggle to germinate—to restore life underground—resembled the regeneration of the cacao tree in its darkened environment, where vitality emerges from the seemingly barren trunk. After the summer storms, with their impressive displays of lightning, fresh shoots break through the earth's surface and struggle skyward. The glory of the maize, its swaying green foliage and crowning cob, was now complete and the world was made ready for the arrival of humankind.

*Simon Martin*









## PAKAL'S ORCHARD

*Mary Miller*

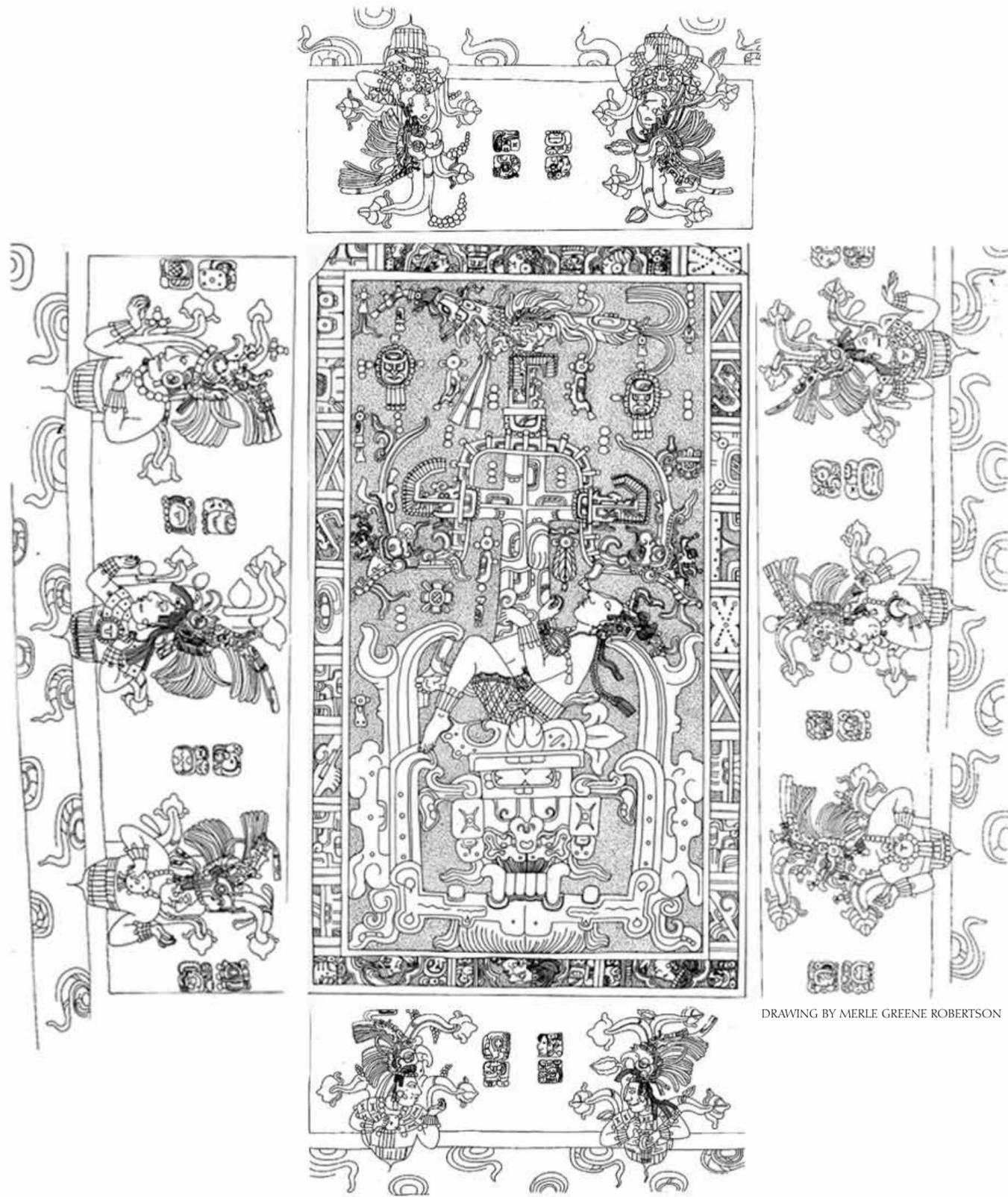
When the great King Pakal of Palenque died in 681, his body was carried up the front steps of the Temple of Inscriptions and then carefully delivered down the hidden, internal staircase, delivering him to the sarcophagus that lies just off axis at the base of the building. Laden with jade and probably wrapped in a shroud of fine white cotton, Pakal's body came to rest within the uterine-shaped carved monolith where he would lie undisturbed until 1952, when archaeologists opened the chamber. Once his body was in place, a team of men would have then slid the sarcophagus lid into its final position.

As this giant slab of stone took its place, it activated—and indeed, completed—a religious belief system: depicted on the surface of the lid was Pakal, rendered with the attributes of both the Maize God (God E in the commonly used alphabet system of Maya deities) and K'awiil (God K); he emerges from the Underworld jaws, seemingly floating in space, and from his body issues a World Tree (Fig. 1). He wears on his chest a turtle shell—itsself the place of rebirth and emergence for the Maize God. He thus carries the agent of his own rebirth. On the sides of the sarcophagus, named ancestors of Pakal emerge from split earth signs—the Maya *kab*—each ancestral body joined with a fruit tree. The head and foot of the sarcophagus repeat Pakal's own parents, Lady Sak K'uk', who is identified with cacao, or chocolate, and Kan Bahlam Mo', who is nance, such that cacao frames the right side and nance the left (Robertson 1983). On the sides, ancestors emerge in a repeating pattern of guava, zapote mamey, avocado, but without gender specificity; the zapote mamey, for example, is a female

ancestor on one side and male on the other. Each ancestor wears the sign of Ik', or breath, the sign of life, as if brought back to life in tree form, and through the death of Pakal.

What we see here is that ancestors live on after death as trees, but not just any trees: as the generous trees that sustain human existence, many of them with pits and seeds that can be easily propagated for future human sustenance. These are the trees of the Maya orchard, some bearing fruit in different seasons and in some cases, like the guava, bearing fruit all year round. Each one of these tree fruits held special value for the Maya: cacao contains theobromine, a stimulant, as well as useful fats; avocado, fats and potassium; zapote (mamey) provides a surprising amount of protein for a fruit; guava trees yield fruits in different seasons, allowing for year-round harvest of what has now been labeled a "super-fruit" by scientists; nance can thrive in adverse soils and conditions and easily ferments for storage out of season. With maize embodied by Pakal, the sarcophagus reveals an idealized world of plants to be consumed by humans.

As the Maize God Pakal represented several important concepts for the Maya. The Maize God embodied both human perfection and human mortality. The *Popol Vuh* recounts that the Maya understood that deities had formed human beings from masa—the ground maize that had been soaked and softened with calcium carbonate (*cal*)—and the Maize God models ideal human appearance that links human form with the ancestral maize of humanity's facture. The ideal human head, according to this program, emulates the ear or cob of maize.



DRAWING BY MERLE GREENE ROBERTSON

Figure 1

Each kernel of maize requires a strand of corn silk in order to be pollinated—thus luxuriant tresses, like those of Pakal, also indicated fertility and abundance. But the annual cycle of life and death of maize requires that it be harvested as the plant dies. The Maize God is decapitated, like the maize ear is removed from the stalk. Rebirth occurs in the following season, when the kernel returns to the soil. In this way, the Maize God embodies the metaphor of rebirth and renewal.

The jaws of the Underworld, then, are not the locus of death but rather transformation and rebirth in this understanding. This Underworld is a place where seeds and pits germinate, sending up shoots, trunks, branches, and ultimately fruits, sustaining humanity. K'awiil also supports this ideology: he personifies lightning, which cracks open the earth where maize may flourish; he also personifies the noble lineage and its continuity from one generation to the next.

This ideology—an ideology of death and agriculture, an explanatory model for ancestor veneration embodied in soil, darkness, and moisture—has by and large seemed to modern scholars to be restricted in its visibility and transparency to Palenque. That is, these sorts of agricultural metaphors—particularly with the focus on the collective orchard of the sarcophagus—have not been recognized elsewhere among the Maya. But everything at Palenque is spelled out in ways that exceed representation and text in most other Maya contexts. A few examples stand out in addition to Pakal's program at the Temple of Inscriptions. Without Kan Bahlam's Cross Group tablets, the segue between the early San Bartolo, Guatemala, depictions of trees, directions, birds, all framed within specific sacrificial practice and the depictions made just before and after the Spanish invasion in both Central Mexican (as seen, for example, on page 1 of Codex Fejervary-Mayer) and Maya manuscripts (Codex Dresden; we can also consider the accounts in Bishop Landa's *relación*). From those same monuments commissioned by

Pakal's successor, we also learn of deep ancestral founders and practices set at the dawn of the era, circa 3114 BCE, suggestive of the sequential ages of humanity and creations, once again shared beliefs recognized in the latest Central Mexican ideology.

So it is not surprising that the orchard is seemingly unique to Palenque. But let us look just a little more broadly at the imagery. Pakal's body is suspended atop a lidded cache vessel, specifically marked with signs of sun and sacrifice; from the side of the vessel germinate curled maize sprouts. This cache vessel forms the headdress of a skeletal head that embodies the rear head of a serpentine monster that travels across the heavens and through the Underworld. And all this is set within two open, skeletal jaws that form the bearded maw of the Underworld. A single unanchored molar flanks four incisors and a pair of canines in a row as tidy as those of maize, like a kernel loosened from the cob and ready to sprout. These jaws, deathly in all but the promise of renewal, are the "Black Hole" place named elsewhere and understood to be synonymous (but not quite identical) with the Quiche Xibalba

Elsewhere, such jaws function as a cutaway view of a cenote. Characteristic of Yucatan, these cenotes, or sinkholes, were visible ancient sources of water and fertility; they provided a microclimate in Yucatan where cacao flourished (Gomez Pompa et al 1990). Today, lemons, avocados, guavas, and oranges thrive at the mouths of more than a dozen cenotes at Mayapan, cultivated by local entrepreneurs. Despite the addition of members of the citrus family, native to Southeast Asia, one sees Pakal's orchard still in play at these focused sites of Mayapan, where otherwise the thin soils atop visible limestone cannot support such abundance. That the cenote—the "black hole"—has always served as a source of tangible fertility can be seen in the drawing of a now-lost capstone from the Temple of the Owls at Chichen Itza (Fig. 2). There

K'awiil rises up out of the cenote into a skyband bejeweled with cacao pods—indeed, like the skyband that frames Pakal, whose human essence has merged with K'awiil and the Maize God. On the capstone, additional pods hang from the cenote itself, along with what may be other fruits (Miller and Martin 2004).

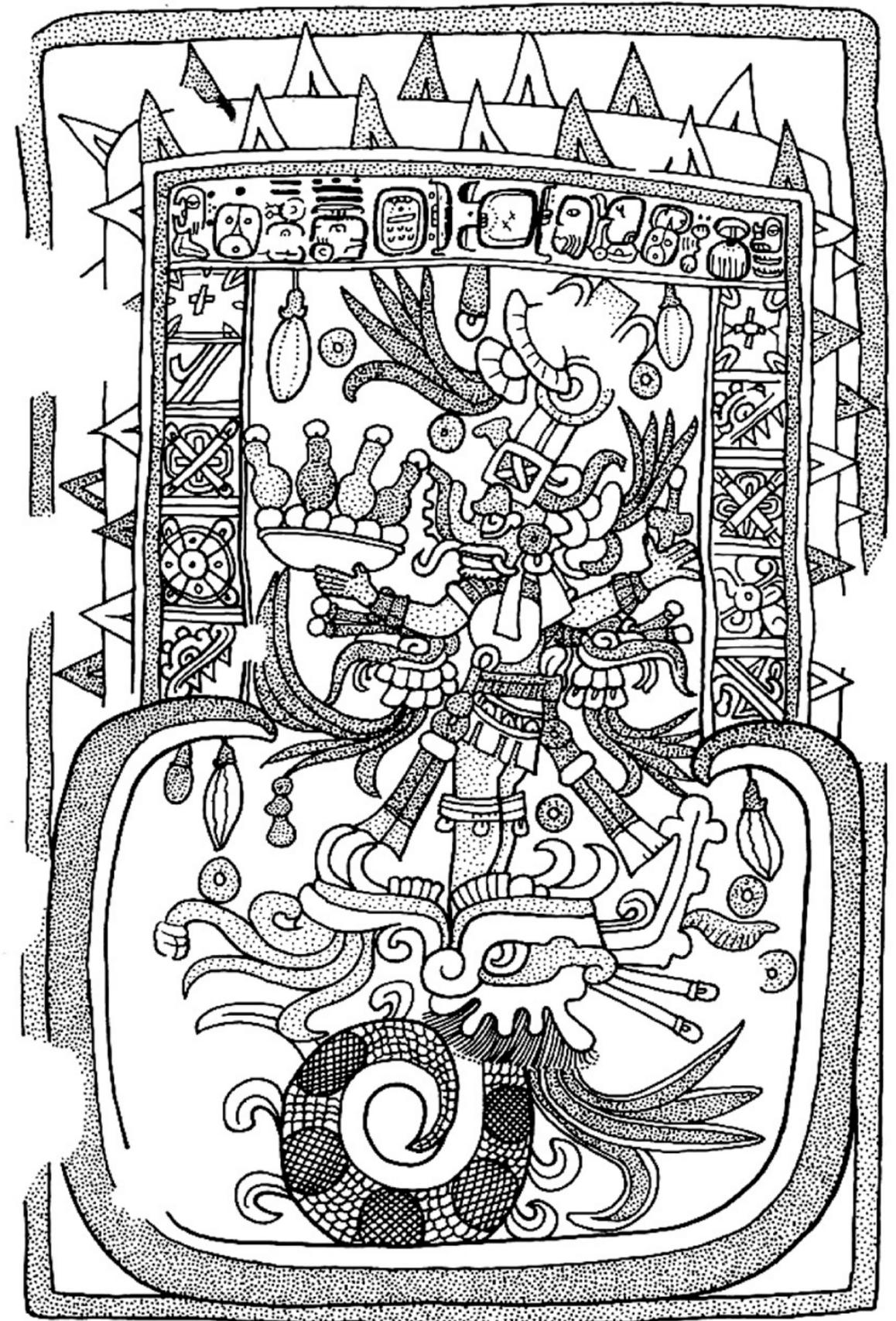
Meredith Paxton has recently identified the painted framework of the best-preserved painting within Structure 16, Tulum, as that of the cenote, and she has likened it to the lost Chichen capstone (Paxton 1999). On this wall painting, various deities—among them Goddess O, or Chak Chel, who carries one Chaak on her open hand and another in a backpack—move along twisted cords. Squash and beans hang luxuriantly from the framing devices and from the deities themselves.

Pakal's orchard may have been an ancient reality—after all, cacao, guava, nance, zapote, and avocado grow wild in the forest today—but the orchard was also a conceit of renewal, a renewal that recognized that the tree lay at the heart of life itself. The orchard also reveals human agency: that Pakal's ancestors live on as trees helps us see that the orchard is as domesticated as the Maya family itself. Moreover, the Palenque

Black Hole was a concept, rather than the specific site of the cenote, and it underpinned the arc of heavens, conceptualized as the sky band that frames Pakal's sarcophagus. At Chichen and at Tulum, the cenote became the underscored site of fertility in places of greater scarcity; the focus on beans and squash at Tulum may speak to limited expectations, although the many lost painted walls might have addressed themselves to different agricultural products.

Finally, in the years that followed the Spanish invasion, Bishop Diego de Landa noted that the Maya persisted in the practice of placing a jade bead in the mouth of the deceased. What was the meaning of this? Was it, as he hypothesized, the wealth to use in the afterlife? Jade, of course, did serve as a means of concentrating wealth. But it also embodied concentrated maize, and the permanent maize kernel. The point was not for the jade bead to function as a comestible, or as money. Rather, as the maize kernel it could germinate and grow, forming a maize "tree"—or perhaps other trees as well—like those embodied in Pakal at Palenque or in K'awiil at Chichen Itza. In this way, each buried lord could become a venerated lord, one whose presence could be recognized in a live orchard.

*Mary Miller*



DRAWING BY SIMON MARTIN

Figure 2





## MAYANS, TREES AND MORALS

*Paul R. Ehrlich*

I recently had a chance to return to the Maya world, and thrilled again to the unbroken forest of tall trees that one sees from the top of Tikal Temple II looking toward Calakmul. And I saw my first orange-breasted falcon sitting high on the Temple, and near its base I had my best looks ever at one of my favorite birds, the pale-billed woodpecker (reminiscent of the long-gone ivory-bill). But while enjoying the magnificent towers, stelae, plazas and causeways of long-deserted Mayan cities such as Tikal, Copan, Chichén Itzá, Tulum, and Calakmul, I have tried to imagine what citizens of the Maya world thought of their environments when those metropolises were fully populated. I've done the same when viewing remnants of other civilizations such as the statues of Easter Island, the Pyramids of Egypt, the monuments at Persepolis, the fabulous bas-reliefs of Angkor Wat, the solid buildings of Machu Picchu, the cliff dwellings at Mesa Verde, the Parthenon, or the Coliseum. My thoughts always turn to whether their people, at the height of their glory, ever thought that their civilizations were unsustainable. Yes, they have living descendants, but their "glory" is gone. The collapses of those once-rich cultures raise many questions I believe to be especially pertinent today.

In the classic Maya civilization of more than a millennium ago, warfare, tied to competition for resources, control of trade routes, and obtaining victims for human sacrifice, plagued the society. This was recorded in their language, mostly on stelae celebrating victories. The fortifications, for example, of the rival cities of Tikal and Calakmul demonstrate the warlike nature of Mayan culture to visitors like us. But it seems unlikely that warfare was the main reason for the collapse, as it is unlikely to be the reason today's civilization will collapse unless a war over petroleum, water, or other resources turns nuclear. As we looked at cenotes, sinkholes in the limestone of Yucatan that collected the only accessible fresh water (the peninsula

has no above ground rivers), we were reminded that serious research suggests that climate change was a contributor to the classic Maya collapse. Indeed the questions concerning what actually caused the Maya collapse, brilliantly summarized by Jared Diamond in his book *Collapse*, are similar to the debates today over what could cause the collapse of our own civilization.

Two of the most pressing questions are intertwined: deciding what are humanity's ethical obligations to the rest of the natural world, and to future generations. Is it moral to keep clearing more land for agriculture and other human uses, even if doing so wipes out other life forms, our only living relatives in the universe? Was it all right for Mayan (or the inhabitants of Nineveh or Easter Island) to deforest their surroundings? And, is it ethical for all of us to participate in deforestation today? Even if we do not value trees and all those other organisms, must we preserve them because future generations will suffer severely if they, the working parts of human life-support systems, are severely depleted? How much of this "natural capital," which supplies society with a flow of essential ecosystem services, are people ethically required to preserve?

Trying to read the minds of ancient Mayans, Polynesians, or Assyrians leads me to conclude that they rarely asked such questions, and their highly organized societies suffered as a consequence. They, of course, all lacked the scientific insights available to us today, although the importance of trees, water delivery and soil fertility must have been obvious. But human beings now have a highly interconnected global civilization in which living Mayans are imbedded, and which possesses abundant scientific evidence calling into doubt its sustainability if current trends continue. That means that Mayans today are facing some of the same sorts of situations that confronted their distant forebears. When I think of the biodiverse forests

between Tikal and Calakmul, at first it seems obvious that Mayans should be obliged to preserve that precious resource. Indeed, clearing it for agriculture would contribute to dangerous climate change already threatening humanity globally; destroy animals and plants of worldwide-significance today (jaguars, tapirs, and harpy eagles are good examples), remove a key source of timber and non-timber forest products, reduce income from ecotourism, and eliminate less charismatic organisms that might prove invaluable to future human beings. And that destruction most likely would only provide a temporary increase in jobs, income, and food availability for the local people. But what are today's Mayans to do in order to feed a growing population, when perhaps ten percent of their young children are underweight and their numbers are likely to double by 2050?

The area around Copan was depopulated after the Classic Mayan collapse, and today it is being repopulated. Honduras is projected to go from 7 million people today to 12 million in 2050; Guatemala from 14 to 27 million. Both countries already show many signs of environmental deterioration, especially deforestation and soil loss, much of it in connection with unsustainable farming practices. Elements of what finished the classic Maya society are now gradually threatening the modern Maya, but there's a big difference. Today the people are not isolated but instead are part of a global civilization over which they have little control. Ironically, the leaders of the major units of our civilization appear to be even less knowledgeable about their societies' dependence on the natural world than were Pakal the Great of Palenque or the Pharaohs of Egypt. They mostly stand by idly as, for instance, tropical forests are decimated

to produce palm or soy oil to feed SUVs, as if the fate of those tall trees and the myriad organisms they shelter were none of their concern.

It took many hundreds of years after the Mayan collapses for the natural ecosystems upon which the Mayans had depended to largely regenerate. But Earth's ecosystems will need far more time to recover if the global civilization goes under soon especially if that collapse does feature a nuclear war rather than battles with spears, clubs, flint knives, and bows with obsidian-tipped arrows. But, sadly, the decimation of nature may be much more serious if our present civilization persists for another century or more, completing what many scientist fear is the sixth great extinction, an event as devastating as that which polished off the dinosaurs 65 million years ago. In that case, the recovery of biodiversity might take tens of millions of years, and the opportunity for any surviving Homo sapiens to create a civilization more advanced technologically than the original Mayan one close to nil.

But there may be another choice besides a quick collapse or catastrophic deterioration leading to collapse. It would require a gradual and humane decline in human numbers, a reduction in wasteful consumption by the rich accompanied by an increase in essential consumption by the poor; and changes in attitude about how people should treat each other and their life support systems. Then Mayans a century from now could still look from the top of Temple II with an orange-breasted falcon on the ledge above, admire the emergent trees projecting from the canopy of a forest stretching to Calakmul, and think of the wise and moral decisions made four generations in their past.

*Paul R. Ehrlich*

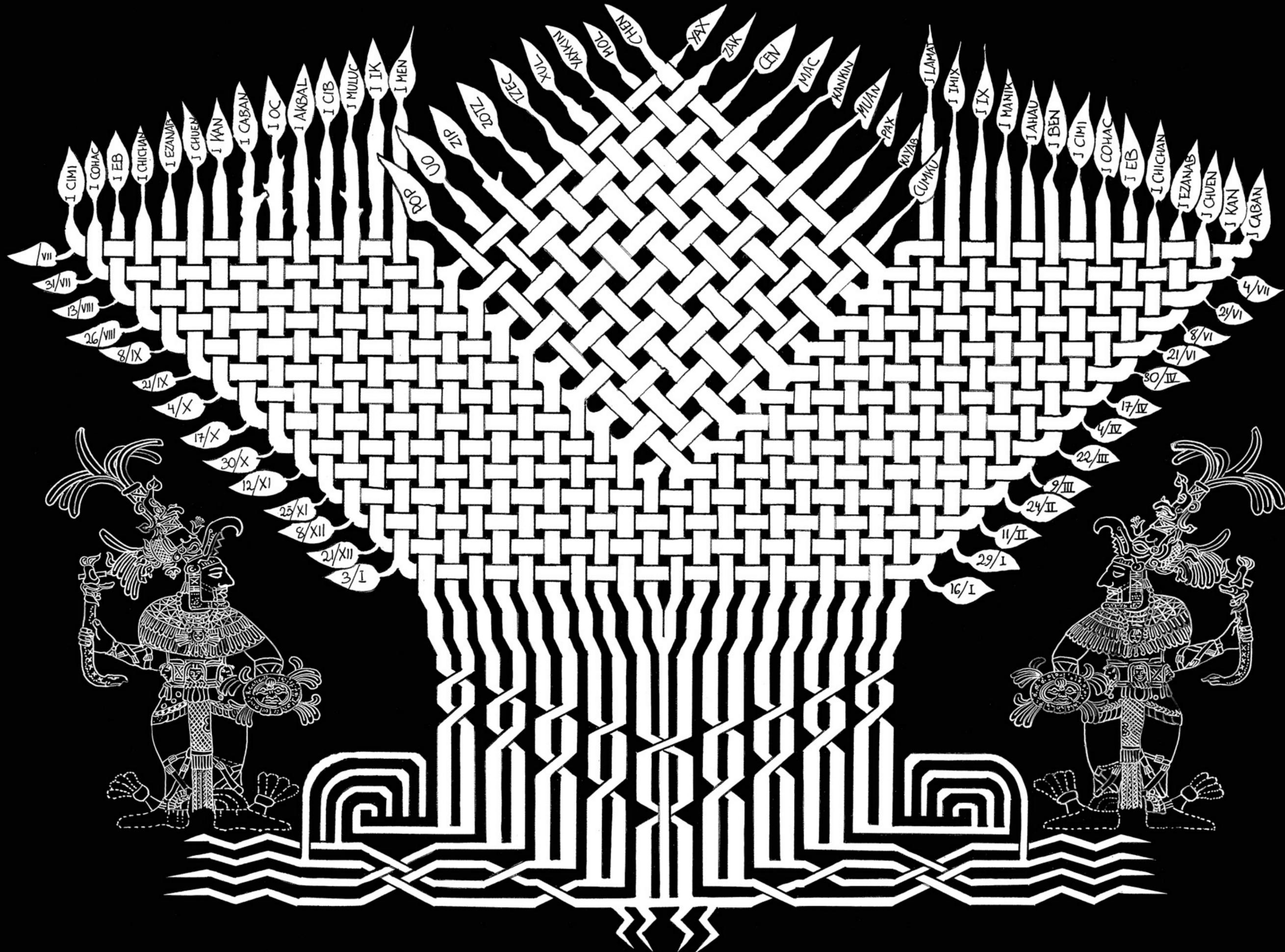














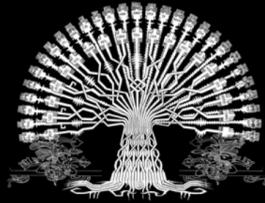
COPAN, HONDURAS  
© REGINA E. OBREGÓN



YAXCHILAN, MEXICO  
© MARK MOGILNER



MONTES AZULES  
MEXICO  
© MARK MOGILNER



MAYA CALENDER  
ILLUSTRATION  
© PEDRO FRIEDEBERG



CARACOL, BELIZE  
© CECIL E. OBREGÓN



MONTES AZULES  
MEXICO  
© MARK MOGILNER



AMATE  
© MARK MOGILNER



CARACOL, BELIZE  
© CECIL E. OBREGÓN



MONTES AZULES  
MEXICO  
© REGINA E. OBREGÓN



TIKAL, GUATEMALA  
© CECIL E. OBREGÓN



CARACOL, BELIZE  
© CECIL E. OBREGÓN



TIKAL, GUATEMALA  
© CECIL E. OBREGÓN  
© IAN M. OBREGÓN



COPAN, HONDURAS  
© IAN M. OBREGÓN



MONTES AZULES  
MEXICO  
© JAVIER DE LA MASA



TIKAL, GUATEMALA  
© REGINA E. OBREGÓN



TIKAL, GUATEMALA  
© CECIL E. OBREGÓN



COPAN, HONDURAS  
© IAN M. OBREGÓN



CARACOL, BELIZE  
© CECIL E. OBREGÓN



FUNERAL TOMB  
© JUSTIN KERR



TIKAL, GUATEMALA  
© MARK MOGILNER



CACAO  
© CECIL E. OBREGÓN



TIKAL, GUATEMALA  
© MARK MOGILNER



PALENQUE, MEXICO  
© MICHAEL  
CALDERWOOD



COPAN, HONDURAS  
© IAN M. OBREGÓN



PALENQUE, MEXICO  
© CECIL E. OBREGÓN



GUARUMO  
© MARK MOGILNER



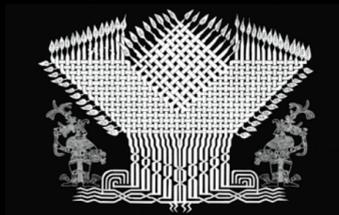
PALENQUE, MEXICO  
© CECIL E. OBREGÓN



MONTES AZULES  
MEXICO  
© REGINA E. OBREGÓN



TIKAL, GUATEMALA  
© REGINA E. OBREGÓN



MAYA CALENDER  
ILLUSTRATION  
© PEDRO FRIEDEBERG

INFO@OBREGONEDITIONS.COM  
WWW.OBREGONEDITIONS.COM