

12/10/86

Dear Mr. Rizer,

Thought you'd find this article of interest. It appeared in the March issue of Science'86.

Joe Fallon



THE LOST LANGUAGE OF COBA

With the help of a 20-year-old scholar, the writings of the ancient Maya may soon be ours to read.

BY VIRGINIA MORELL

On a warm January day in 1981, David Stuart, a precocious high school sophomore, entered the dark recesses of a limestone cavern in northern Guatemala. Following his father and a guide, he made his way through narrow tunnels hung with stalactites, past pools of springwater, and into chambers visited 12 centuries ago by Maya priests and scribes. On the walls of the cave the scribes had painted scenes in black carbon: a sacred ball game, three musicians, dwarfs contemplating conch shells, homosexual lovers locked in embraces, columns of intricately entwined hieroglyphs.

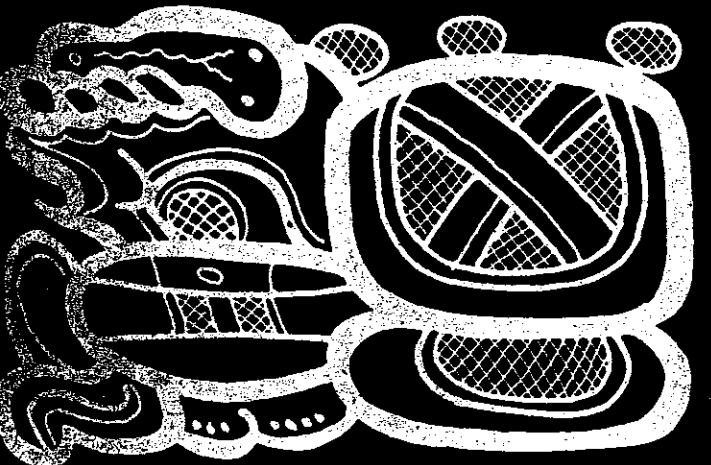
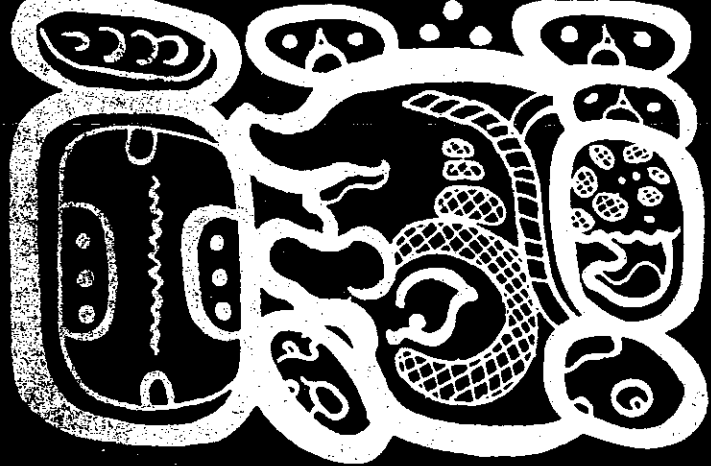
At the first set of hieroglyphs Stuart paused for a moment, stunned by what he saw. Or rather by what he read. Facing him was a hieroglyph that he had

never encountered before, one that combined two phonetic symbols in one word. Stuart knew the first part—it represented the syllable *pa*; the second part, although it had been seen elsewhere, had never been deciphered. Here in the cave, though, the combination glyph's meaning and pronunciation were given away by its context; it represented *Pax*, one of the 18 months of the Maya calendar. If *pa* was the first phonetic, the mystery hieroglyph that followed it could mean only one thing: *xa*. Symbol and sound and word seemed to "jump out" at him, Stuart would say later. But at the moment of discovery he managed only a whispered expletive.

"It was something I'd been thinking about," Stuart said, explaining his sudden epiphany in the cave. "I knew other

The inscription, right, from a tablet at Palenque tells the story of a coronation. Read left to right from the top, its first glyph is the phrase, "it came to pass." The next (containing a hand) and third (a skull) signify the date equivalent to March 4, A.D. 764. The fourth glyph means "was seated as ruler." The fifth and sixth are titles that have not yet been deciphered. The seventh glyph is the name Jaguar Quetzal (note the jaguar's ear appended to the bird's head). And the last (a deer skull) is the emblem for Palenque. In all: "On March 4, 764, it came to pass that Jaguar Quetzal was seated as ruler of Palenque." Above, Noh Och Mul, the pyramid at Cobá.

LEFT: COURTESY ELLIS RUBINSTEIN RIGHT: LINDA SCHELE



examples of Maya words written in phonetic glyphs, and I thought maybe this one would eventually turn out to be the sign for *xa*—I'd even written myself a note about it. And then, there it was."

Since he was nine years old, Maya hieroglyphs and their eventual translation have been David Stuart's passion. Now age 20 and a freshman at Princeton, he has become one of the world's prominent Mayanists. It is not a position he is entirely comfortable with—or at least he is not enamored of the attention focused on him because of his age—and he objects to being considered a latter-day Champollion, the 19th-century French linguist who had mastered six ancient Oriental languages, Latin, and Greek by age 16 and who went on to decipher the Egyptian hieroglyphs. Stuart dismisses his own discovery in the cave as something anyone else would have done if they were as steeped in "Maya stuff."

Stuart's contributions to the field of epigraphy have been significant enough to make him a key member of a loosely defined group of academics intent on deciphering the Maya hieroglyphs—a goal that they have very nearly reached. Over the past three decades, these epigraphers have succeeded in translating many of the key passages on Maya temples, monuments, and palaces and have also linked the hieroglyphs to the phonetic sounds of the ancient Maya language. Now, scholars like Stuart are refining their readings of individual symbols, translating still undeciphered glyphs, and, from their translations, seeking an overall understanding of the mind and world of the Maya. Stuart's reading of the *xa* hieroglyph was thus a small but integral part in piecing together the thoughts of a people who flourished a millennium ago.

"Deciphering the hieroglyphs is mostly a matter of recognizing patterns," says Linda Schele, a Mayanist from the University of Texas and Stuart's mentor. "David is very good at that, plus he's a hunch-player. He knows the material and he's perceptive."

The combination has paid off. His translations have earned him positions on archeological expeditions to Maya sites, plus a junior fellowship in pre-Columbian studies at Dumbarton Oaks Museum in Washington, D.C., and a prestigious MacArthur Foundation Award. He was 18 when he received this last honor, making him the youngest recipient to date.

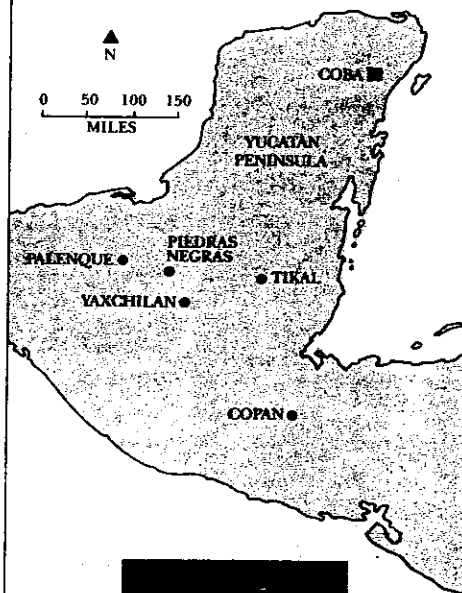
"Give him 10 more years," says David Kelley, a Mayanist at the University of Calgary, "and he will be the leading Maya

scholar with respect to the glyphs. There is very little doubt of that."

Until his entrance to Princeton University last fall, Stuart worked at his parents' home in Silver Spring, Maryland, most days. He is collaborating with Schele and his father, George, on a book documenting the known translations of Maya hieroglyphs—a task that has already led him to new readings of several previously undeciphered glyphs. The project is enormous and appears to have engulfed the entire basement of the Stuart home, where volumes on Maya hieroglyphics and boxes of research papers wind from office and library into the laundry room. Windowless and smoke-filled, with three computers, three cats, wall-to-wall shelves of books, and a clutter of archeological reproductions, the basement is a curious blend of monastery, menagerie, and museum. It feels of ideas and hard work, and when Schele and Stuart launch into their favorite subject (anything Maya), the outside world slips away.


"We're basically friends working together on this stuff," says Stuart. "We argue over our readings and we have our disagreements. Sometimes one of us wins; I win sometimes."

In the darkness of the basement on a summer afternoon, lounging on a sofa in cut-off corduroys, T-shirt, and sandals, he looks like any other teenager on vacation. It is his preferred image and one he perfected in high school, where none of his teachers and few of his friends knew about his all-consuming interest or that he inhabited another world, a world of ritualized sacrifice and war, templelike pyramids, chanting priests, and godlike kings. Stuart first entered that world in 1975, when his father, a staff archeologist at the National Geographic Society, was sent to map the ruins of the ancient Maya city of Cobá on the Yucatan Peninsula. George Stuart moved the whole family—his wife, Gene, three sons, and a daughter—to the site for five months. There they lived in a traditional Maya house built of saplings lashed together with vines and thatched with palm fronds. The floor was earthen, and David remembers digging up pottery sherds



A nine-year-old David Stuart, left, stands before a stela on his first visit to the Maya ruins at Cobá. Almost ten years later, right, he examines a door lintel at Yaxchilán, near the heart of the classic Maya empire. His work on these carvings provided missing pieces of the Maya dynastic history.

LEFT: GEORGE STUART RIGHT: DAVID HIBER/ASPEN



and a part of a figurine from the hard-packed dirt of their living room floor.

Cobá itself was—and still is today—vast and unexcavated, a tumbledown, jungle-covered city spread along the shores of five blue lakes. Toucans, macaws, and turquoise-crested motmots flew among mahogany and ceiba trees hung with Spanish moss. Screeching monkeys, deer, and jaguars slipped in and out of the forest shadows. And everywhere there were ruins: temples edging huge plazas, broken monuments and stelae (carved tablets), and piles of rubble, all of it unexcavated. In the middle of the broken city lived a small settlement of modern Maya (who speak a language descended from that of the ancient Maya) in their pole-and-thatch homes. Like their ancestors, they planted maize and hunted in the jungles, and although ostensibly Catholic, they also lit candles before the carved stelae.

For Stuart the combination was magic. "To be at a site that had been abandoned 1,000 years ago and then to see the modern Maya performing their ceremonies at their ancestors' temples—it made the past really come alive for me. I'd go out to the main acropolis with my dad when he was mapping and do my own archeology. I had bags of potsherds I'd found, and I'd try to piece them together; it was exciting."

When Stuart began asking questions about the inscriptions found on the temples and monuments, his father helped him untangle the complicated Maya calendar system. But that was all the assistance he could offer. "The rest was just horsies to me," says George Stuart.

The next year they returned to Cobá for a second season, and by its end, it had become clear that young Stuart was beginning to know quite a lot about Maya hieroglyphics. "What I liked about the hieroglyphs was that they were more than just a cipher," he explains. "They had pictures to work with—monkeys and birds and jaguars. Recognizing that a jaguar was more than a jaguar, that it was part of a cipher with its own meaning, was kind of neat."

Shortly after that trip, Stuart was sitting in his father's office in Washington, D.C., when Linda Schele, then a fellow at Dumbarton Oaks, stopped by to help George review a *National Geographic* article. The three of them looked over some new inscriptions. "They meant nothing to me," says George, "but David looked at them and said, 'Oh, that reminds me of such-and-such a glyph,' and 'I've seen that one on such-and-such a monument.'

Schele turned to him and said, "How would you like a job this summer?"

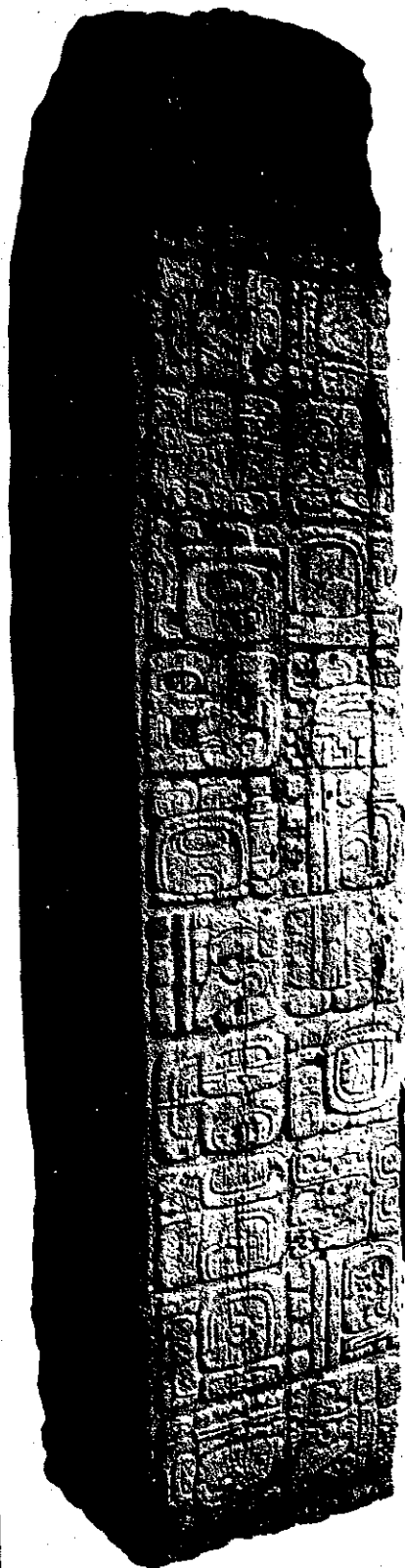
Schele says now that she meant it as little more than a joke, but the Stuarts took her up on the offer, and 11-year-old David was packed off to Palenque, Mexico, a site famous for its Maya ruins. Not completely overjoyed at having a "young kid" to oversee, Linda stuck him on the back porch of the Palenque Research Center with a copy of an inscription from the Temple of the Sun (recording the accession of Lord Snake Jaguar in A.D. 683) and told him to figure out everything about it that he could. "I was really trying to get rid of him," she confides. "But after two days he came back, and I was stunned by how much he'd done. He was perceptive, he saw patterns, and he worked hard. By the next summer he was well on his way to making his own individual discoveries."

And so, at age 12, Stuart presented his first paper on the decipherment of a particular Maya hieroglyph at a conference for Mayanists in Palenque. One hundred and fifty of the top scholars in the field had gathered for this event, and at the end of his talk Stuart had entered their ranks.

OF THE ANCIENT writing systems, the Maya hieroglyphics have proved to be the most difficult to crack. Linguists have never had the benefit of a key like the Rosetta stone (a stone inscribed with parallel texts in Egyptian hieroglyphs and Greek, which gave Champollion the first clue to deciphering the Egyptian glyphs), and by the 1960s, had come to believe that the hieroglyphs were not a writing system at all. Not only did they view the inscriptions as purely pictorial, lacking phonetic dimensions, they also believed that the glyphs were primarily concerned with mythological characters and deities.

But after the breakthroughs of the last three decades, scholars have amassed a wealth of historical data about the Maya from the glyphs. "People believe that history in the Americas began with the arrival of Columbus," says Schele. "But it didn't. We have histories now of the entire Jaguar dynasty from Yaxchilán, beginning in the eighth century, and we can tell you details from the life of Lord Pacal who ruled Palenque in the seventh century. These were real people who did real things in their lives, and we've learned about them from reading the glyphs. They are a window into the history and minds of the ancient Maya."

That history began in earnest around A.D. 250 in the lowlands of the Yucatan




and ended at the beginning of the 10th century. It is now thought that advances in agriculture and trade were largely responsible for the Maya flowering, but whatever the cause, the results were spectacular. Temple-pyramids, monuments, and palaces of limestone masonry were erected in a dozen states extending across the Yucatan Peninsula and into what is now Honduras, Guatemala, and Belize. The Maya decorated their buildings with elaborate bas-relief carvings, paintings, and hieroglyphic texts; created both sculptured and polychrome pottery; built reservoirs for drinking water; constructed sweat baths complete with drainage systems, and courts for playing a sacred ball game; and developed an extensive trading network with specialized markets where cacao beans were used as money. They also wrote books on folded bark concerning historical, mythological, religious, astronomical, and mathematical matters (only four of these books have survived), and used their astronomical skills to link earthly events to those of the universe.

Although they did not invent either their calendar or hieroglyphics (the cyclical calendar of 52 years is known in all Mesoamerican cultures, and the earlier Olmec people, dating to 1200 B.C., carved scenes of ritual and warfare in a sort of shorthand pictographic style that seems to be a source for the later Mayan glyphs), they pursued both almost fanatically. What the Maya were so busy recording was lost when their civilization collapsed, an event that leading scholars now believe was a result of a combination of factors, including overpopulation, drought, and the collapse of central authority. The Maya as a people did not vanish, but they did abandon their vast city centers to live in small, scattered, primitive agricultural villages. By the time Cortés arrived in the 16th century, the Maya's previous glories had long been forgotten. Jungle vines hid their cities and temples, and few remained who could read the writing on their walls.

Several of the early Spanish fathers explored these ruins. The bishop of Yucata, Diego de Landa, asked a Maya informant to write down the hieroglyphs that corresponded to the letters of the Spanish alphabet. For many years de

Glyph-covered stela from Tikal, left, may once have had an important ceremonial role. George Stuart, right, draws the crown of another stela, 1,200 years old, that was found in Cobá in 1974.



Landa's work was discounted by linguists because its identification of glyphs with individual letters was clearly unworkable. Then, in the 1950s, researchers began to realize that the glyphs represented complete syllables containing combinations of consonant and vowel sounds. The phonetic nature of the glyphs was reestablished, and de Landa's text became a useful source of linguistic clues.

Despite his apparent interest in the Maya's writings, de Landa was also responsible for the destruction of many of their remaining books in an *auto de fe* in 1562. (Michael Coe of Yale University believes that the Maya had purposely destroyed most of their books from the classical era, A.D. 250-900, in the ninth century when their civilization was collapsing.) "We found a large number of books in these characters," wrote the Bishop, "and as they contained nothing in which there were not to be seen superstition and lies of the devil, we burned them all, which they regretted to an amazing degree, and caused them much affliction."

Fortunately, the Spanish fathers did not deface the hieroglyphs on the monuments and temples. When the Maya ruins were rediscovered in the 19th century by people of a more archeological bent, it was suggested that the inscriptions contained historical records. The popular 1840 account of the Maya by the American lawyer, diplomat, and explorer, John Lloyd Stephens, noted that the Maya sculptures were probably portraits of "kings, chieftains, or sages," and speculated that Maya "history is graven on its monuments." But by 1900 only the intricate calendar system of the Maya had been deciphered. In some ways this further confused matters. The complicated calendrics referred to dates as far back (and as precise) as August 13, 3114 B.C., and calculated the times of astronomical events—such as solar eclipses—that had taken place thousands and even millions of years ago. Carvings of two-headed serpents and elaborately dressed individuals often accompanied these dates, and most scholars assumed that these were images of gods or priests who were very likely celebrating the passage of time itself.

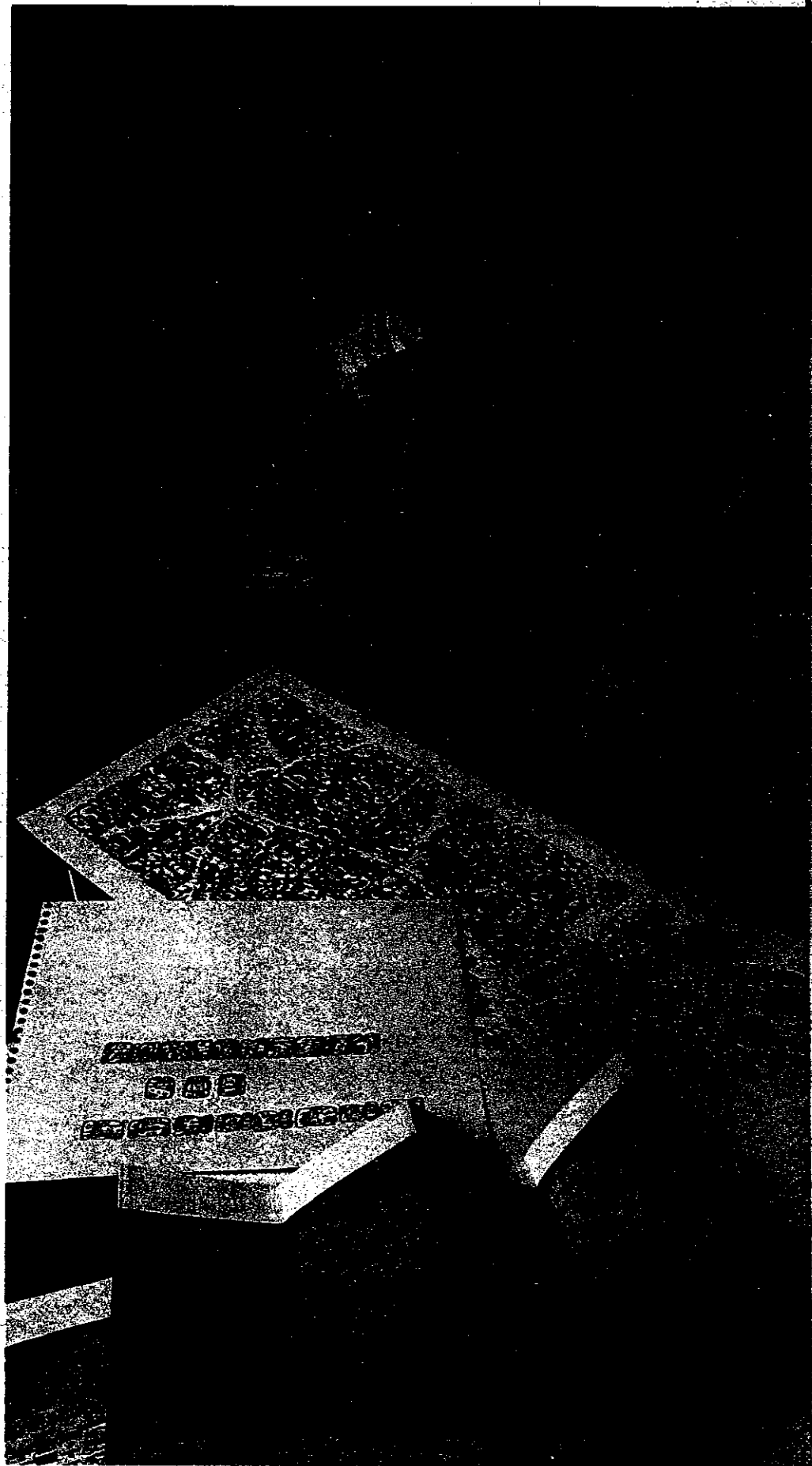
Then, in rapid succession, came three key breakthroughs: in 1958, Heinrich Berlin, a German-born archeologist living in Mexico, proved that each of the monuments contained an "emblem" glyph, in essence giving the historical name of the city; in 1960, the late Tatiana Proskouriakoff, an art historian with the Carnegie Institution in Wash-

ington, D.C., identified a series of glyphs meaning birth, ascension to power, marriage, and death, as well as name glyphs for individual rulers, proving that the monuments did, in fact, record real life events; that same year, David Kelley, then of Harvard University, substantiated the work of a Russian linguist, Yuri Knorosov, who had suggested that the hieroglyphs were a writing system with a grammatical structure and phonetic symbols. (Knorosov relied on Bishop de Landa's alphabet for his phonetic interpretation.)

Proskouriakoff's discovery is a classic one in Maya translation annals and is illustrative of the pattern recognition skills and hunch-playing that epigraphers like David Stuart rely on. While analyzing 35 stelae at Piedras Negras, Proskouriakoff noticed that the monuments were not arranged in a random pattern, but rather were placed into seven groups of five monuments each. Dates were recorded on the monuments within each group, and these, she noted, corresponded to the amount of time in an average person's life-span. Playing off this idea, she suggested that the monuments celebrated major events in the lives of the Piedras Negras rulers, and by closely analyzing and comparing the individual hieroglyphs, she deciphered those which stood for birth, marriage, and death.

All at once the Maya had become a people with a recorded history of their own—the only ancient historical civilization in the Americas, since the Incas had no writing and the Aztecs did not use their glyph system to reliably recount historical events. Proskouriakoff's discoveries provided a groundswell for the field, and breakthroughs (the term Mayanists like to use to describe the moment when patterns give way to meaning) became the order of the day. Taken together, the discoveries have revealed a written language rich in puns, poetic couplets, and metaphors and filled with dynastic lineages, biographies, and accounts of ritual and warfare. Linguists have also succeeded in tying the glyphs to the phonetic sounds of the current Maya languages, Chol and Yucatec, which helps the translation of some inscriptions into English and allows many of them to be read in a close approximation of their original tongue.

"I think we can read about 75 percent of the glyphs on the monuments now," says Stuart. "And from this it seems that



David Stuart in his basement study.



A Maya primer

Pick a word, and the Maya could probably have written it in any of a number of ways. Thus, the Maya scribe of about 700 A.D. was faced with a choice when writing *jaguar*—a word often used as part of personal names such as Shield Jaguar or Bird Jaguar. The most common and straightforward portrayal of the word is a picture of a jaguar head (example 1). But if the scribe wished to be a bit



more complex in his visual rendering of the sign he could use a picture of a full jaguar body (example 2). These are known as full-



figure glyphs, and combinations of such signs make up the most intricate and beautiful of Maya inscriptions. Both of these glyphs were pronounced *balam*.

Besides using pictographs, a scribe could spell out words phonetically. Since the word for jaguar is *balam*, the pictograph could be replaced by a phonetic combination of the syllables *ba-la-ma* (read clockwise from left in example 3).



Often the syllabic signs could be combined with a pictograph to indicate a desired pronunciation. Our jaguar sign, for instance, could be placed between the first (*ba*) and last (*ma*) syllabic signs in *balam* (example 4). This mix-and-match variety in how a word is represented has been very helpful in our deciphering efforts. Finding an untranslated glyph in a known context allows us to pattern it out, or deduce its meaning.

For many years we Mayanists have known the glyph that stands for *Pax* (pronounced "pahsh"), one of the 18 Maya months (example 5). In a couple of instances this one sign (we are not sure what it visually represents) is written with a second sign beneath it—an additional and apparently optional element we did not understand (example 6). While visiting Najtunich cave in Guatemala in 1981, I noticed a glyph, part of a long inscription paint-

ed on the wall, that finally solved this mystery. Because of its context it was clear that this glyph (example 7) had to stand for the month *Pax*. The first sign of this glyph was the phonetic syllable *pa* and the second was the mysterious sign we knew from other *Pax* glyphs. Since we already knew the glyph's pronunciation it became clear that the second sign had to be the syllable *xa*, in the spelling of the month *pa-xa*.



One of the more confusing aspects of deciphering Maya glyphs is the existence of polyvalent signs—single signs that have multiple functions and readings. One example is the glyph *zotz'*, which means bat and is represented by a drawing of a bat's head (example 8).



This sign was commonly used to stand for another Maya month, *Zotz'*. However, it also stands for the phonetic syllable *tz'i*, as in the spelling of *tz'i-ba*, or *tz'ib*, which means "to write." The way in which the bat sign is read depends completely on its particular context.

Along these same lines, the Maya writing system also possessed multiple signs that had the same sound value. The Mayan word *chan* means either snake, sky, or four. Each of these words had a hieroglyphic sign of its own (examples 9, 10, and 11), but all of these were



read *chan*. Often these signs could be substituted for one another in what might be considered scribal puns. Where a scribe might wish to write the number four (*chan*) he would usually use the common four-dot notation, but he might just as easily use the glyphs for sky (*chan*) or snake (*chan*). The abstract concept of "captor" was also *chan*, and this could be written with any of the above symbols. The epithet "captor of Jeweled Skull" (example



12) could be written with the possessive *u* attached to a snake *chan* next to the glyph for Jeweled Skull. Or, by expressing *chan* as four, it could be condensed into a single glyph block (example 13). Again the real meaning of a given *chan* sign is understood by context, but it is not always so simple for Mayanists to see through such ingenuity.

One aspect of the writing system that contributes greatly to its visual richness is personification. Sometimes the Maya could add liveliness to inanimate signs by drawing certain features onto the sign itself. Thus the syllable *ba* (see example 3 or 4) might be rendered within the shape of a human profile with nose and lips (example 14). Likewise, a royal cush-



ion, or throne—a pillow covered with jaguar skin—might have attached to it a supernatural's face—a "long-lipped" sign—perhaps to reflect divine power (example 15).

Let us now analyze the hieroglyphic sen-



tence at the top of the page, taken from a carved lintel at Yaxchilan, Mexico. The first glyph in this sequence is the verb "was captured,"—*chucuh*—written out with the phonetic syllables *chu-ca-ha*, read counterclockwise from upper left. The subject of this verb, the one captured, Jeweled Skull, is named with the second glyph. These two glyphs compose the main part of the sentence, because the final four glyphs merely express the relationship between Jeweled Skull and his captor, the king of Yaxchilan. Following Jeweled Skull's name is a glyph of three elements, read clockwise from left: *u-ba-ci*, or *u bac*, meaning "the captive of" (again, the *u* signifies the possessive). Next comes the name of the king, Bird Jaguar. Finally, there is an epithet for the king which reads *u chan Ah Uc* (note the snake for *chan*), which translates as "the captor of Ah Uc." (We don't know who Ah Uc was, but he must have been prominent to warrant such attention. In other inscriptions Bird Jaguar is dubbed "the captor of Jeweled Skull.") This sentence therefore translates as: Jeweled Skull was captured, (and) he is the captive of Bird Jaguar, the captor of Ah Uc.

—David Stuart

the Maya were mostly interested in recording the lineage of their rulers, when they took office, how many captives they took in war, and when they performed ritualized bloodletting ceremonies and sacrifices."

As an example, Stuart brought out a copy of an inscription from a door lintel at Yaxchilán, once a major Maya city set above the Usumacinta River. Like many Maya inscriptions, this one illustrates the action in a bas-relief carving—an image of a lord dressed in warrior garb and wearing a feathered headdress, bending down to seize a captive by the hair—and explains the picture in the accompanying hieroglyphic text. "Basically, it says that 'On May 7, A.D. 755, Jeweled Skull was captured by Lord Bird Jaguar at Yaxchilán,'" he said. "Most of the inscriptions are made up of a date, the name of the subject, which can take as many as 30 glyph blocks, and an event. And most of them are written in repetitive couplets, like this one: 'On this day, Ahau was captured; he is the captive of Shield Jaguar, who is the captor of Ahau.' Or, 'She does the bloodletting. She is Lady Kah, and the Mother of the King, who is the Son of his Father.'"

The Maya carved their inscriptions on the lintels and doorjambes of their palaces and temples, on their rulers' tombs, and on monuments and stelae placed in the main plazas. Linda Schele suspects that the prevalence of the couplet structure in so many inscriptions indicates that priests read them aloud at state occasions. "They are like a chant or a prayer recitation, and it's easy to imagine some stentorian priest standing in the center of the plaza reading off these inscriptions to the peasantry. It was a way to let the public participate in the elite's ceremonies."

The couplet structure, first detected in 1976 by Floyd Lounsbury of Yale University (who is celebrated in linguistic circles for his skill in calling square dances in Iroquois) has been a boon to epigraphers. Once one phrase in the couplet has been deciphered, it is much easier to translate the remaining glyphs.

All the hieroglyphs are written in glyph blocks—many with a central sign denoting the meaning and affixes extending to the sides to ensure that the proper meaning is understood. Although some of the signs are abstract, most are strongly pictorial: a bird perched on the head of a jaguar represents the name of Lord Bird Jaguar; a body lowering itself into a sitting position represents accession to the throne; a

star above a shell denotes battle; an up-ended frog announces a birth; an open hand scattering a ribbon of dots tells of a bloodletting ritual.

To decipher such symbols, Stuart and Schele follow a procedure they call patterning out. "For example," says Schele, "if you wanted to decipher what we call the lunar series, you'd collect all the lunar glyphs—hieroglyphs concerned with the moon—and lay them out on your desk. You'd then study them, draw and redraw them, and arrange and rearrange them in as many ways as you could conceive of until a pattern shows up and you can start following it." By drawing copies of the hieroglyphs, epigraphers are forced to pay attention to the smallest detail—an act that often brings to light minute similarities which then trigger a breakthrough.

"You're looking for connections," adds Stuart. "You want to find a pattern and then see if it fits other examples; you want to see if it patterns out."

In essence, this is what Stuart did in the cave in Guatemala. He had seen the *xa* sign many times before and speculated that it might be the phonetic rendering of that consonant-vowel combination. But not until he saw it written with another known phonetic symbol and in a context he recognized—a calendar date that had to contain the month *Pax*—was he certain of his discovery. It had patterned out.

The search of such patterns is complicated by the Mayas' love of word play. Like other ancient scripts, that of the Maya combines straightforward pictorial elements—a tin can symbol (to pick a modern equivalent) meaning a tin can—with rebus signs (a tin can representing the sound *can*). In addition, semantic and phonetic signs would indicate when to read the sign as a reference to a tin can, and when to read it as the verb, *can*. Sometimes the Maya also used the phonetic symbols alone to spell out words. Perhaps most frustrating of all, they delighted in puns—not necessarily humorous in intent—and freely substituted one homonym for another.

"As an example," offers Schele, "the Maya words for snake and sky are pronounced exactly the same: *chan*. So sometimes they used the snake glyph to replace the sky glyph, but it still reads as 'sky.' The trick is understanding the patterns, what goes with what, so that you know when to read it as 'sky' and when to read it as 'snake.'"

"The nuances in the script, the way they pun with it, are right up there with

Egyptian," says Stuart. "It's virtually impossible to say how many glyphs there are, but there must be well over a thousand signs. A lot of those are just different ways of writing the same word. For example, at Copán, the name Smoking Jaguar is written about 20 times, but *never* the same way."

"And then," adds Schele, warning to the complexity of the subject, "they'll take any glyph, put a long-lipped glyph (an abstract image of a face with lip protruding) on it and the whole sign suddenly becomes a personification of power."

The two exchange bemused, exasperated glances, then laugh. "It'll drive you crazy if you think about it," says Stuart.

When the two are at work in the Stuart basement, their days begin at noon and last until the early hours of the morning. David, who used some of his MacArthur money to buy a new computer, often works upstairs in his bedroom while Linda rearranges glyphs downstairs. They get together when one is stuck or whenever one perceives a breakthrough. "We think we found one last night," says Stuart, pointing to a slight upward curl coming off the edge of one glyph block. "You see this little tail on a lot of glyphs, and we think it may stand for the first person inflection, 'I did.' But it's probably not something we'll ever be able to prove."

Their key project now is completing the massive reference work that will show all the hieroglyphs and their numerous variants. Ferreting out the many possible patterns in a system where a monkey's skull and a frog can represent the same word requires documenting all the known hieroglyphs from every source—jade beads, pottery, inscribed bones, plus the books, monuments, and stelae—and then verifying readings with other Mayanists. When the volume is completed (it is scheduled to be printed by the University of Texas), the mass of patterns it exposes may result in further major breakthroughs. "The substitution of glyphs is an extremely important key in their decipherment," says Floyd Lounsbury. "They function as a built-in Rosetta stone."

BEYOND PRODUCING literal translations of the hieroglyphs, Mayanists hope to answer larger questions about the May themselves. Some answers may come from translating the remaining May books and the standard glyph sequence painted on funeral vases, which seem according to Yale's Michael Coe, to contain a chant to assist the deceased on his journey through the underworld.

There appears to be little carryover between the hieroglyphs on the vases, those in the four surviving books, and those on the monuments—perhaps because the subject matter is so different. Schele thinks one of the key differences between the hieroglyphs on the monuments and those in the books is that the latter were meant “to be read by literate specialists. They weren’t merely billboards announcing someone’s achievements that were set up for semiliterate peasants to read.” Consequently, the books are written primarily in phonetic hieroglyphs and contain almanac-type information essential to the priesthood: when, according to the stars, to conduct war, and when to hold the many rituals, such as marriages, that governed everyday life. Once fully deciphered, Mayanists expect, the books and funeral inscriptions will add considerably to their knowledge of the Maya worldview.

“We’re just starting to get a feel for their cosmology,” says Peter Mathews, a Mayanist at Harvard University. “Most of it is painted on their pots. These images mirror what a lot of the inscriptions indicate—that the rulers were the gods’ counterparts on Earth and that after death they were destined for godship.”

Based on the ancient Maya’s love of puns, epigraphers agree that they must have been a witty, humorous people. At the same time, they were brutal and bloodthirsty, believing that human sacrifice was necessary to ensure the precarious relationship between mortal kings and immortal gods. Thus, the events portrayed on the monuments—a ruler’s birth, his accession to the throne, the wars he conducted, his marriage, and death—are almost always accompanied by hieroglyphs denoting bloodletting and human sacrifice. The Maya captured sacrificial victims in wars, and because so many were needed to nourish the gods, warfare was “both continuous and highly ritualized,” says Schele. “It doesn’t appear that their wars were territorial because they don’t record the capture of cities on their monuments. What they do record is the capture of high-ranking individuals who would later be sacrificed. War was the way you got gifts for the gods and kept the universe running.”

Captives were sacrificed in classic Mesoamerican style: priests ripped open their victims’ chests with obsidian knives and tore out their still-beating hearts. Yet the most sacred blood of all came from the ruler and his family, and at the most important celebrations lords and ladies engaged in auto-sacrifice. A scene

from one lintel at Yaxchilán depicts Lady Zoc, wife of King Shield Jaguar, drawing a length of thorny sisal rope through a hole she has cut in her tongue while blood falls, spattering paper held in a bowl. Another lintel shows a different woman performing this same self-mutilation, while Lord Bird Jaguar readies a stingray spine to pierce his penis.

One of Stuart’s key contributions has been working out the overall significance of such bloodletting rites. “It’s something I’ve been working on for the past couple of years, trying to understand all the ribbons of dots that flow from hands and then encircle these two key gods of the underworld. In one inscription describing this ritual at Dos Pilas, I noticed a sequence that contained a birth glyph, a name glyph, and the name of the ruler [Lord Shield God-K] who oversaw the event. I eventually recognized that the name glyph is the name of one of the gods, so that it reads: ‘Lord Shield God-K gave birth to this god at the end of the New Year.’ It’s a weird thing, but I take it to mean that by letting blood, the ruler gives birth to the gods. He’s the filter, the connection between the world and the supernatural.”

“These are the kinds of things we really seek to understand about the Maya,” adds Schele. “Bloodletting had to have been a great public rite like our Superbowl, and it indicates how truly awesome the Maya ruler’s power must have been. The Maya believed that there was a contractual relationship between the supernatural and the natural, and they were looking for huge, never-changing symmetries between the actions of the gods and those of the rulers and the movement of the stars. The question is why did they do it? Why do human beings require this kind of symbolism? That’s what I’d like to answer.”

Stuart says he is not seeking the answers to any such cosmic questions. He portrays himself, at the beginning of his college career, as a “specialist who is about to become a generalist,” and is not very sure of his direction beyond that. “Maybe I’ll continue with ancient languages; I’m interested in Egyptian and Assyrian. Or maybe I’ll become an archaeologist who digs,” he says, brightening. “Maybe I’ll go back to Cobá. No one has excavated it yet, and it is vast. Maybe I’ll dig Cobá.” ■

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