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Rivers Among the Ruins: The Usumacinta¹

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Río Usumacinta Navigation Survey

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The Usumacinta watershed includes two extensive systems of navigable rivers: an enclosed interior basin above the Boca del Encajonado, and a large part of the Grijalva-Usumacinta compound delta below the Boca del Cerro (Figure 1). Between them are a series of eight swift canyons. Most are navigable with skill and care.

Usumacinta, written phonetically as "Usu-matsintla" by Teobert Maler (1901), is a compound place name formed from the Nahuatl roots *osomahtli* "monkey," *-tzin* "small" or "revered," and *-tlan* "place where X abounds" (Herrera 2004; Karttunen 1983). Thus, *osomahtzintla(n)* can be literally translated as "Place of Many Sacred (or Small) Monkeys," though it is usually given more broadly as "River of the Sacred Monkey." It was also the name of a Postclassic town on the river near Balancan. Spanish expeditions referred to the upper Usumacinta as the Sacapulas.

One source gives the Postclassic name of the Usumacinta above the canyons as Xocolha (Jones 1985), and Scholes and Roys (1968) give the name as Tanochel at Tenosique. *Xocolha* means either "Shark River," or simply "The River" in Chontal. A text from Pomona suggests that *Pipa'* denoted the Usumacinta locally in the Classic. Louis Halle nicknamed the Usumacinta the "River of Ruins" in his book of the same name (1941), and that name has also stuck.

The strong current is a constant of the river from Boca del Encajonado to Boca del Cerro. It would have made the Usumacinta an excellent route to deliver bulk goods such as salt, corn, or metates from upstream sites to Yaxchilan or Piedras Negras. Hauling loads upriver would have been tedious, though still more efficient than by land.

The Usumacinta is much like both the Rhine in Germany and the Nile in Egypt—each a swift commercial highway, gorge-bound in the middle, and studded with ancient sites. Four thousand years ago the

Nile was modified with wing dams, portage roads, and forts to make it safely navigable year round for ships 30 m long. The Ch'ang Chiang (Yangtze), backbone of China, and the Missouri River of the western USA are also analogous in many ways. By examining the documented workings of rivers that posed similar transport benefits and challenges, it should be possible to better understand the past use of the Usumacinta.

The huge meander loops in the lowlands of Tabasco, a long portage past several canyons, and the strong current all combine to make the Usumacinta a less than ideal route from the Gulf of Mexico to the Río Pasión. The Usumacinta watershed offered at least three parallel routes between the Tabasco lowlands and the upper basin. Each had advantages and limitations. The Usumacinta itself was a swift path downriver but slow upriver. The parallel Río San Pedro Mártir was overall much easier to ascend, but would have required a long portage back into the Usumacinta basin. A route up the Tulija, overland past Tonina to the Jatate, and then downstream to the Usumacinta above its swiftest part works out as being faster than a long slow ascent of the Usumacinta. The Jatate requires whitewater skills to travel safely.

The most efficient approach would have been a circuit trip by land and water. Traders could use the Tulija/Jatate or the San Pedro to go from west to east, visit the cities of the upper Usumacinta basin, and then return by the main river, stopping at Yaxchilan, Piedras Negras, and Pomona on the way out. Though traders could do a loop through the region, the canoes themselves still had to go back up the river.

¹ This article is part of a larger work in progress on river navigation and portages from the perspective of modern and Classic Maya canoes. A version has appeared online at *The Daily Glyph* <www.gomaya.com/glyph>.



Figure 1. The Usumacinta and other waterways discussed in the text. (Precolumbia Mesoweb Maps.)

A useful approach to understanding navigation on the swift, gorge-bound Usumacinta is to find a well-documented analog. The Missouri Breaks in the USA are in many ways like the Usumacinta between Boca del Encajonado and the mouth of the Chocholha. Both high volume rivers have distinct wet and dry cycles, with corresponding rise and fall. Both are confined for more than 100 km in gorges averaging 200 m deep. Most important, both run at 3 or more kilometers per hour, so that travel is much harder upstream than down. Unlike the Usumacinta, the Missouri Breaks hold no major rapids.

The Lewis and Clark Expedition, in May-June of 1805,

hailed its keelboat and pirogues up against the swift Missouri River between the walls and towers of the White Cliffs in Montana. Despite the constant current and occasional Class 1 rapids, the party averaged 29 km per day. Days were voyageur days, 14 hours long, so average speed was only 2.1 kph.

While the crews struggled up the river, scouts ranged ahead on shore. They easily outdistanced the boats. The expedition never considered abandoning their boats because it would also have meant abandoning most of their trade goods and supplies.

The situation in the Classic along the Usumacinta

would have been very similar. As the Lewis and Clark expedition demonstrated, a slow but respectable pace of 2 kph upriver is possible against a 3 kph current. Maya travelers in a hurry could go overland from Piedras Negras by way of La Pasadita to Yaxchilan and the central Peten, but heavy loads could still go most efficiently by water.

In 1994 bandits ambushed and shot up a raft trip near Busilja Falls. This brought the commercial rafting business on the Usumacinta to a sudden halt. Bandits (not guerillas) were still roaming around, and rafting was still iffy when we conducted the Usumacinta Navigation Survey in 2004. *Lancheros* daily run the river as far as the Río Choccolha, carrying *mojados* (illegal immigrants) headed for El Norte. Today the situation is no better, and arguably worse (see Golden and Scherer 2006).

Rafting had altered the local economy with the promise of cash and consumer goods, but it had also built international support for protection of the river. Plans to dam the river, and incidentally flood many Maya sites such as Chuncheje, El Cayo, and parts of Piedras Negras and Yaxchilan, were shelved because of international pressure. New plans, this time for a dam at Boca del Cerro, are unclear, with public denials but some Comisión Federal de Electricidad (CFE) activity at the site.²

UPPER USUMACINTA

Junction of the Pasión and Salinas rivers to Boca Lacantun - 45 km

The Río Usumacinta is flat with a definite current for the first 45 km to the mouth of the Río Lacantun (Figure 1). The most remarkable feature of this first part of the Usumacinta is how unremarkable it is. It is a flat river winding through flat country. The river travels 45 km to advance seventeen. At about the halfway mark is the Mexican town of Benemérito de las Américas, a rough and ready boomtown on the Carretera Frontera.

Altar de Sacrificios, a city in the squarish peninsula surrounded by the Ríos Pasión and Salinas, is the only noteworthy ruin. Five km downstream is a minor site, El Pabellón, on the left bank. Few others are recorded along the river. Since the river course shifts steadily over the years, other sites may have been either left behind in the bush or simply erased.

Boca Lacantun to Frontera Corozal - 46 km

The Usumacinta leaves its huge meanders behind but continues as a flat river, with a definite but moderate current, for 21 km to Boca del Encajonado (also known as Boca del Cerro, but not to be confused with the point many km downstream where the river emerges onto the Tabasco plain). Islands on the Usumacinta are generally caused by side streams dumping sand and mud into the main river. Interestingly, islands form as often just above the mouths of tributaries as below. Small Maya sites are spaced roughly 7 to 9 km apart along the river.

Along the right shore 6.5 km below the mouth of the Río Lacantun, Arroyo el Chorro braids and tumbles over travertine falls. Five km downstream the river splits around Isla Grande, the first of several large islands. After another

9 km the river picks up speed, the hills close in, and the first of the river's many canyons begins at Boca del Encajonado (at the far right edge of the insert map).

Through the 7 km of Encajonado de Gonzales the river is swift and deep, surging between escarpments averaging 100 m high. There are no significant rapids, but the constricted channel causes strong whirlpools (*remolinos*) on eddy lines. According to Mario Aliphath (1994), the Usumacinta runs within the core of the Usumacinta Anticline, a preference it displays from here to the Río Choccolha. While anticlines, which are folded arches of rock, would seem logically to form ridges, this is not always true. In this case, the crest of the anticline has stretched and fractured, making a narrow zone of weakness. The river's course down the center of an anticline gives it a unique character, bound within narrow gorges while flanked by broad valleys.

Below Arroyo el Mocho and the abandoned Agua Azul (Philadelphia) airstrip, the hills recede. At Bethel, 7 km downstream, there is a Guatemalan customs station, bus service to La Libertad (Sacluk), and a Maya site. Two km below Bethel, bedrock and boulder shores pinch the river for 1 kilometer. On the right is a Guatemalan hill called Punta de Gallo. Just downstream of the narrows is El Tornillo, a Mexican village and a moderate-sized Maya site.

The Mexican river port of Frontera Corozal is only 5 km farther. Where the Frontera waterfront begins, minor Class 1 rock ledges angle across the river. Several islands and bars at Frontera have formed upstream of the mouth of Arroyo Agua Azul. The largest is Islote Agua Azul, which rises above bankfull level to support a crown of forest.

The Frontera waterfront has two principal landings: one at the upper end beside the Escudo Jaguar Hotel, the other 800 m downstream where the bank is cut for a road. The upper landing is in a good eddy behind a rock reef but has no beach at medium river levels. The lower landing's large gravel bar is the last to go under as the water rises. In between, the bank is steep but the shore is used anyway by *lanchas* not fortunate enough to rate spots at the other landings.

Though the Dos Caobas site is several km away, I am not aware of any direct evidence that the Frontera landings were used in the Classic Period. Two Dos Caobas stelae, dubbed the king and queen, are on display in the Frontera museum (see Zender 2005).

Frontera Corozal to Yaxchilan - 20 km

Only 0.6 km below the Frontera landing is a Guatemalan village on the right bank, La Técnica. Its landing is a poor one, narrow with a steep trail up the bank. A rough road with bus service reaches La Técnica so it may eventually supplant Bethel as the crossing from Guatemala to Frontera in Mexico.

Downstream a high, wide cobble bar follows the right shore for about a kilometer. Though the river is wide, the main channel is surprisingly deep. A 15 m lead line did not reach bottom. Several long, low, and narrow bars edge first the left, then the right shore. The river is flat but swift. The current runs 3 to 4 kph per George Stuart and Chris Shaw (personal communications 2000) and personal measurement.

² See www.gomaya.com/dams for updates.

Arroyo Yalchilan, 8 km below Frontera, slips in on the right, and there is a small beach on the left. Below Arroyo Yalchilan 1.3 km there appears the first riffle, little more than wave trains fanning from each shore. Yalchilan and Yaxchilan are confusingly close in spelling, though separated by 12 km along the river.

Downstream 1.5 km the Usumacinta again enters karst hills, but this time it stays within them all the way to the Gulf lowlands. There is a narrow depositional terrace between the river and the foot of the hills. On the point of the sharp right-hand bend 6 km below Arroyo Yalchilan a giant ceiba tree shades a new Consejo Nacional de Áreas Protegidas (CONAP) guard post, Ceiba de Oro.

On the opposite Mexican shore is a long rock pile parallel to the river. At a river level 2 m above low water, the rocks form a breakwater with two entrances into a cove. It is such a fine canoe harbor that the author carefully examined the line of rocks to see if it might be artificial. The boulders are very irregular, of all sizes, and show no cutting. The breakwater appears to be the broken edge of a natural rock layer. The cove is just upstream of the narrowest part of the neck of the meander enclosing Yaxchilan.

Just 1.5 km below Ceiba de Oro a rock rib slides underwater to form a diagonal riffle. There are no more before Yaxchilan.

Yaxchilan

The city of Yaxchilan was a major Classic Period site nestled within a huge circular meander. The name has no real meaning but was erroneously deemed to be Mayan for "Green (Things) Which Lie Scattered About," i.e., Green Stones (Maler 1903:104). It and Piedras Negras downstream were constant rivals throughout the Classic. Though Yaxchilan is better cleared and more visited today, Piedras Negras actually had a larger ceremonial precinct.

Christened Menché in the 1880s after an ancestor of the local Lacandon Maya (Mathews 1988:36), Yaxchilan's real name in the Classic was most likely Pa' Chan, "Broken Sky," according to Simon Martin (2004). The city's emblem glyph is regularly shown with a deep split in its top. Ten examples on Structure 12 show the sky glyph cut off, or even torn, on one side; the "break" could be a physical feature, a mythic locale, or "daybreak" (Martin 2004). Temple 41, oldest and highest in the city, faces across the valley to the ridge of the Sierra del Lacandon 20 km distant. Framed by high peaks, the solstice sun rises through a prominent "V" notch directly in line with the temple door (Tate 1992; Edwin Barnhart, personal communication 2004). The coordinates of the notch are 17-00-03 N/90-48-00 W. The "V" notch combines both a physical break in the skyline and a sunrise freighted with mythic significance.

While exploring the ruins in 1882 Alfred P. Maudsley was given a carefully wrapped paper by one of his men who had been upriver. Inside was a gentleman's card, that of French scientist Désiré Charnay. By coincidence, his expedition had just arrived and was stranded across the river. Maudsley graciously lent his canoe, and in return Charnay shared the exploration with Maudsley, who was officially only an amateur at the time.

Yaxchilan, almost alone among large Maya cities, is sited without apparent relation to good farmland. It is con-

finned within a mountainous meander. However, the meander is as near perfect a fortress as one could find anywhere, with moat and walls supplied by nature. The nearest level land, in the broad valley of the La Línea Syncline, is across the river and through a range of karst knobs.³ The nearest farmland, in terms of delivery effort, is upriver where valley and river intersect below Frontera. It is easier to float a load of corn down by canoe than to carry it overland.

In addition to a defensible position Yaxchilan is the last good stopping point for canoeists before plunging into the first of many canyons separating the city from the lowlands. Astronomical alignments also sanctified the site. Built on a narrow floodplain, the Main Plaza is aligned to the winter solstice, as is the Labyrinth entrance to the city. Carolyn Tate (1992) has suggested that the winter alignment commemorated things pertaining to the dead and the summer the doings of living kings.

Bankfull stage is 12.6 m above mean low water, and the plaza floor is 8 to 10 m higher. This is within the flood prone elevation, so the Main Plaza must have been underwater occasionally. Being on the inside of the meander, the city would not have been hit by the full force of the current. The buildings along the river edge of the plaza are all connected by walls. Together they form a floodwall that would have protected the Main Plaza from many floods and from major silt deposition. They also would have worked well as a defensive wall.

Hydrologist Fred Scatena of the University of Pennsylvania estimated (based on admittedly poor hydrological data) that the Main Plaza might have been flooded every 20 years or so. A dimensionless rating curve for stations in the eastern USA (Leopold 1997) applied to the Usumacinta gives a flood interval of 10 years for the Main Plaza. This can only be approximate since the curve is for a different physioclimatic region and time period. Tammy Ridenour (personal communication 2004) confirmed that the old airstrip, a grass-grown plaza, has been underwater within the last 10 years.

El Pilar

In the river a massive artificial pile of stone, El Pilar, marks the entrance to the ancient city opposite the upper end of the Main Plaza. Charnay considered El Pilar a royal grave or funerary monument. It is definitely not a grave.

In 2004 the author landed on El Pilar and sketched it. It is approximately 10 m in diameter, shaped like a rough letter "D" with the straight side downstream. Under a dome of double-head-sized boulders, rough-laid courses were just visible at the waterline. The curved upstream end forms a blunt cutwater like the bullet-shaped end of a Lacandon canoe. The design appears intentional, not to suggest a canoe but to part the current and minimize flood damage. The top of El Pilar stands about 4 m above low water. When sketched, the water level was 2.4 m above mean low water.

Research after the trip determined that El Pilar was built

³ Karst topography is a landscape characterized by features like sinkholes, caves, and disappearing streams, produced by groundwater activity, commonly in limestone. A syncline is a fold or bend in rock in which the sides, or limbs, dip toward the axis.

on leveled bedrock. It is not an island at extreme low water (Stephen Houston, personal communication 2004). James O'Kon (2003) recorded that the footing is laid directly on bedrock and confirmed the 10 m diameter. He also makes a reasonable case for a stone pile on the river bottom near the right shore being the remains of a similar structure. Its outline and debris field appear about right in an air photo. Being on the outside of the bend, it would have been hard-hit by floods.

El Pilar's function is not self-evident. The eddy behind it is small and useless to canoeists. The main city landing is much farther downriver. Whatever its main function, El Pilar probably also served as a river gauge, much like the Nilometer on Elephantine Island, Egypt.

Stephen Houston has theorized that it was a control point/guard post. This is a reasonable possibility. The deepest channel runs right past it, and just downstream a stairway ascended the left bank. A fine-tuned atlatl can be used to throw a dart 120 to 150 yards, with 90% accuracy at 30 to 40 yards (Elpel 2004). Two guard posts 60 m apart in the river at Yaxchilan would have effectively covered the main channel, each 30 m wide side channel, the stairway running between Structures 6 and 7, the far shore, and each other. Guard posts are a prosaic explanation for El Pilar and its counterpart that fits all the known facts.

El Pilar might have been involved in an astronomical alignment as well, though this is less certain. The approach from the river to Temple 33 winds back and forth across the summer solstice 54° bearing. Sighting from the carved stalactite stela in the sunken court before Temple 33, the solstice line runs about 15 m left of El Pilar.

James O'Kon (2003) has suggested that both El Pilar and the corresponding structure near the right shore were piers for a huge suspension bridge, with a center span of 61 m. The right corner of the Hieroglyphic Stairway (Structure 5) in the Main Plaza does line up horizontally with the stone piles, but the top is 22 m above low water. To connect, a bridge would have needed support towers at least 28 m high, on 10 m bases. No other example of a Classic Maya suspension bridge has yet been identified, though John Lloyd Stephens (1841) crossed a crude one in the Guatemalan highlands.

The waterfront

A silt and sand beach begins just above the stairs and stretches 200 m downstream. It is the logical modern landing, and if the Classic shoreline were not drastically different, it would have been then as well. When the river is 4 m above low water, i.e. at the top of El Pilar, the beach is nonexistent. As the river drops, the beach reappears and broadens to a wide strand. The modern way of mooring lanchas on the beach is to drive a post into the sand and tie off. This is so simple and logical it seems likely that the Maya did the same in the Classic.

In 2004 the Usumacinta Navigation Survey identified and mapped mooring stones along the shore. The Maya tied up their dugouts to the same natural bollards over a long time period, leaving the stones deeply grooved by rope wear (Figure 2). The grooves turned out to be excellent indicators of past use, or lack thereof. The waterfronts at Yaxchilan and El Porvenir had large concentrations of



Figure 2. Mooring stone at Yaxchilan. (Photo: David Pentecost.)

ancient moorings.

Stone bollards are most common near the modern landing beach for Yaxchilan and taper off gradually downstream. In a section of shoreline beginning 60 m above the modern stairs (560 m downstream of El Pilar) and stretching 240 m downstream, over 30 stone bollards have been identified and mapped (20 by the Usumacinta Navigation Survey in 2004, and another 10 by David Pentecost in 2005). One group of five, in a rough circle, was located about 30 m downstream of the stairs. Sitting in the middle of the beach, this group had the deepest rope grooves of all. A large number were in a cluster of rocks at the end of the beach. Others were noted, but not mapped, along the shoreline farther downriver.

From the concentration of bollards, the city's main landing appears to have been essentially the same as the modern one. It was part of a larger waterfront starting about 60 m above the modern stairs and extending for 3.2 km downstream along the inside of the meander. A good shore eddy begins about 100 m above the modern stairs and runs the entire 3.2 km, with only a weak countercurrent. The long shore eddy not only allowed canoes to be moored out of the main current, but also enabled paddlers to go upriver as easily as down along the inside of the Omega (the big bend in the river that surrounds Yaxchilan). Together with El Cayo's sandbar and El Porvenir's cove, Yaxchilan's shore eddy is one of the three best natural harbors on the river between the Río Lacantun and the Boca del Cerro.

From nearby, canoes would have hauled corn and other foodstuffs. Salt from Nueve Cerros and obsidian from distant El Chayal would have been common cargoes. Least in bulk but greatest in value were the elite trade goods, a catchall for items as diverse as Motagua jade, quetzal feathers, stingray spines, or live animals for sacrifice.

Though much of the basic economic activity of the city happened on the waterfront, the area is pointedly excluded from the ceremonial city. It is downstream of the Main Plaza so visitors had to enter through the dark passages of the Labyrinth, as they must today. Maya cities seem to have been elaborate stage sets as much as administrative and trade centers. With its deep entrance alley and narrow gateway, the Labyrinth appears designed for defense as

well as drama.

Being on the outside of the bend, the shore eddies on the Guatemalan shore are more discontinuous than on the Mexican shore. A reef on the Guatemalan side opposite the end of the landing beach forms a shore eddy, so ferrying back and forth is practical here. As Joel Skidmore (personal communication 2004) has suggested, the ferrying would have followed an X pattern. Paddlers work up one bank in the shore eddy before starting across. The current sweeps the canoe downriver before it finishes crossing. To return, the paddlers work up the eddy on the opposite shore and ferry back, ending up where they started.

Secondary landing

Just downstream of El Pilar on the left bank are remains of an ancient stairway found by Carolyn Tate (1992). Mounting it, a visitor would enter the Main Plaza between Structures 6 and 7 close to the summer solstice line from Temple 33. They would find a dramatic vista past Stelae 1 and 2 and up the stairway to Temple 33 (Tate 1992). The left bank here lacks a large shore eddy and would not have been the main waterfront, but the stairs may have been a special entrance for royalty.

On a constantly fluctuating river, broad stairs work rather well as a landing to fit all levels. Any stone bollards found here should show heavy wear from holding canoes against the current. James O'Kon (2003) found a block here with two deep rope grooves. He interpreted it as a cable support for a suspension bridge, but it may have been a bollard for the stairs landing.

If, as O'Kon has proposed, Yaxchilan had an elaborately terraformed waterfront with esplanades, terraces, and quays beside the Main Plaza, it would have been very different from other cities along the Usumacinta. Other harbor sites along the river show no signs of significant shoreline modifications. The frequent rise and fall of the river made quays pointless.

The Omega

The Usumacinta traces a huge circular loop about 3.5 km in diameter and 13 km around the rim. The apparent meander is actually defined by a fan of fault lines, which steer the river course (Alliphat 1994). The river has rounded off the jumps from one fault to the next. The first fault is easily traced NE by its surface expression in Guatemala along the ravine holding Laguna Santa Maria and then by the linear course of Arroyo Chotal.

By land, the city of Yaxchilan had only a single exit, southwest through the neck of the loop, either on the crest or along a terrace on the upstream side. The heights drop sharply to a saddle in the narrowest part of the neck. The saddle is formed by a fault block of less resistant Lower Boca del Cerro Formation, which contains tool-quality flint (Alliphat 1994). The ruins of Chikin Tikal are on the crest in the narrow neck. David Pentecost (personal communication 2005) has called them the "Toll Plaza." The crest overlooking the saddle is an excellent location for a wall and gate like that found in a pass leading to Chac Bolai on the upper Bladen Branch in Belize. Any defense would also need to cover the narrow terrace on the upstream side of the neck. The alluvial terrace is about 10 m above the river

and offers a low-level approach to the city. A modern trail currently follows it.

Per the Yaxchilan D57 1:50,000 MX topographical map, the crest of the saddle in the neck is approximately 70 m above the river, a significant climb with cargo and a real challenge to drag dugouts across. Personal observation suggests that the actual crest may be somewhat lower. Frans Blom's 1953 Selva Lacandona map shows a trail, labeled "Cruzadero 1.5 km," across the neck. Even though the neck is only 0.5 km at its narrowest, Blom indicates a longer path. This suggests that the trail began southwest of the neck, angled gradually up to the saddle, and then descended east to the river above Yaxchilan. Such a trail would have a 9% grade. A route straight up and down across the narrowest part would have a 28% grade.

Portaging across the neck might save time and effort going upriver but none downriver. Current speed varies from 3 to 4 kph, depending on the season. Traveling downriver at 8 kph (3 kph current, plus 5 kph paddling speed), the 13 km around the entire meander would take only 1.6 hours. Just drifting with the current would take 4.3 hours but be nearly effortless.

Canoeing upriver around the meander loop would take quite a bit longer. The effort needed to haul a dugout and cargo over the saddle is great, but so is the effort of paddling a loaded canoe 13 km against a frequently strong current. Even dragging a canoe at only 0.5 km per hour, a 1.5 km portage would take 1.5 hours and would save as much as 4.4 hours travel time. This is enough to make portaging the neck a viable option if extra manpower were locally available.

A portage across the neck in the Classic is currently just a theoretical consideration. It would not even be that if Blom had not recorded a trail across the neck on his map. Examining the sides of the neck for traces of a graded slipway would prove or disprove the possibility. If such a portage were used in the Classic, it would have completely bypassed Yaxchilan. The city could not have afforded to let travelers slip past, and would have needed to control any trail across the neck.

Route to the Lacanja/Bonampak valley

In the skyline 15 km southwest of Yaxchilan are two prominent passes through the Sierra de Cojolita. Starting at San Javier, the modern road east to Frontera and Benemérito squeezes for 5 km through a deep, narrow slot piercing the high mountain wall. The gash follows a transcurrent fault and is the lowest pass for 30 km in either direction. Five km south is a higher pass. Aside from these two, there are no other decent passes in the sierra. They are obvious routes between Yaxchilan and cities such as Lacanja and Bonampak in the upper valley of the Río Lacanja.

Possible trail from Ocultún to Yaxchilan

Because of its strong current, the Usumacinta is a great downriver run, but a grind going upriver. Alternate routes that bypassed part or all of the canyons would attract travelers trying to go from the Tabasco lowlands to the upper Usumacinta basin. By paddling up the San Pedro to Ocultún and then carrying southwest through passes in the Sierra del Lacandón, a traveler could bypass the Usu-

macinta canyons and 65 km of rapids and fast water. A trail from Ocultún to Yaxchilan would be 43 km long. Though the San Pedro has an extra 7 km carry past cascades at Reforma, the route is 20 km shorter overall and has little current between Reforma and Ocultún. On the minus side, a trail from Ocultún would cross the grain of the country and require several climbs and descents through passes.

Teodoro Paschke's detailed map of Guatemala in 1889 shows just such a trail from Laguna de la Cruz to Paso Yalchilan, though modern maps do not. Armando Anaya (1999) indicated a trail NE from Yaxchilan to the vicinity of Ocultún. Charnay used a similar approach by land from Tenosique to Yaxchilan.

Yaxchilan to El Desempeño/El Cayo – 45 km

For the first time since Encajonado de Gonzales the river is pinched by narrow canyons carved into the shattered core of the Usumacinta Anticline (Aliphath 1994). Hemmed in by walls 200 to 250 m high, the Usumacinta has nowhere to go but up in wet season. There is really only one rapid of consequence. Paddling at a modest 5 kph, with a boost of 3 kph from the current, a run from Yaxchilan to El Cayo takes about 6 hours by canoe.

Encircling Yaxchilan with a watery moat, the river makes a long left-hand bend. Four km downstream from Yaxchilan the Usumacinta squirts through a short narrows. High wooded escarpments constrict the river for 1 kilometer. The river then slows and widens.

Stone pile

Eight km below the modern Yaxchilan landing, there is an anomalous stone pile on the left shore, at the outer corner of a horseshoe bend. Its shape is irregular but generally linear, and it forms a small, partly silted-up cove. It is made of double-head-sized boulders, strikingly unlike other rocky bars nearby. Whether it is simply a natural bar or not is unclear.

It is of interest because it is just downstream of the narrowest part of the meander neck and is the counterpart of a natural cove on the upstream side of the neck. The stone pile is in the right place for a landing to serve a portage road across the neck.

Downstream 1 km, where there is a small beach on the left shore, the river narrows. The hills rise, the current picks up, and the river slides into its second canyon. Just 4 km long, the suggested name is "Canyon Corto" because it is a Short Canyon, ending 1.5 km above Tower Station. There are no rapids, just strong current, rocky shores, and 120 m wooded escarpments on each side. Its Relative Difficulty is 0.13.⁴

On the right, 2.5 km into the canyon, is a notch leading to a karst depression 1 km north. The topographic maps insist that Laguna Gardunza and the adjoining bajo, which together fill the depression, are 40 m below river level. Given the leaky limestone bedrock, bad contouring seems more probable.

There is a minor riffle near the end of the canyon and then the hills recede a bit along the right shore. Ahead is a prominent landmark, a tall concrete tower on the Guatemalan side. Some years ago it was a gauging station, before the enclave was destroyed by guerillas. Now the refurbished buildings are Tower Station, a CONAP post

guarding the Parque Nacional Sierra del Lacandón.

In the next 2 km the river rushes through two sets of Class 1 rapids, ending just beyond San Jacinto and Arroyo Anaite. Several stone bollards were observed on the left above and below the mouth of the arroyo.

Twenty km downstream of Yaxchilan, after another set of small rapids, the Usumacinta turns sharp right. A trans-current fault has opened the anticline, leaving a large gap to the west and a broken scarp downstream to the east. The Anaite I site is on the Mexican shore. It is in a large break in the high escarpment walling off the river from valleys to the west. Arroyo Anaite partly drains that valley.

On the left 4.6 km below Tower Station is "Playa Robo," a muddy beach close to the village of Ojo de Agua. In the Spring of 2004 a rafting group camping here was robbed at gunpoint. One km downriver, on the Guatemalan shore, a ravine leads east up to a small plateau 80 m above the river. From there it is a relatively easy climb NE out of the river gorge. The 1966 Guatemalan Salvamento 1:50,000 topographic map shows the word "Otatal" at this spot.

"Chicozapote Canyon"

The river leaves the fault and swings 90° left to continue down the heart of the Usumacinta Anticline within the next canyon, tentatively called "Chicozapote Canyon" for its principal rapid (Relative Difficulty = 0.32). Wooded walls rise 200 m above both shores for the next 25 km. At the second minor rapid, there is a beach on the left, with *milpa* in a narrow valley behind it. Five km below Ojo de Agua, the river curves gently to the left. Visible on the curve are rapids, a cliff on the left, and a small beach on the right. This is Raudal La Pared, "The Wall," a Class 1 rapid. In the past it was called "Raudal Chico de Anaite," or just "Raudal Chico." From a distance it can be mistaken for Chicozapote Falls. The general appearance is the same.

At the first Guatemalan beach below La Pared is the trail to Chico and Tecolote, "The Owl." Both sites are off to the north in the karst. First reported by Ed Shook in 1937, Tecolote was relocated and mapped by Charles Golden in 2003. Among Maya sites, it is one of those rare birds having standing architecture. One range structure in Group A is beautifully preserved. Tecolote is too far from the river to have supplied trackers to line canoes up the rapids.

Less than 2 km later the river again curves to the left. Visible are rapids and a cliff on the left, with a beach on the right. This is not a Class 1 rapid. Twenty km below Yaxchilan, Maya boatmen faced ...

Chicozapote Falls

Chicozapote Falls are the only serious rapids (Class 2 to 2-3) in the 45 km between Yaxchilan and El Desempeño. The river swings first to the right and then to the left, so that the end of the rapids is just out of sight from the top. Halfway down there is a large eddy in a cove on the right, overshadowed by a high limestone cliff. The rapids are not

⁴ The relative difficulty of a canyon is expressed as the sum of the Classes of all the rapids as decimals (e.g., Class 2-3 is 2.5) divided by the length of the canyon in kilometers. It is a dimensionless number to make a somewhat objective comparison of risks possible.



Figure 3. A *remolino* on the Usumacinta. (Photo: Jorge Pérez de Lara.)

long, 0.6 km from top to tail. They are formed by a constriction of the river in a bedrock narrows. Depth is unknown but probably well over 15 m. The steep right (Guatemalan) shore is strewn with large blocks, which make walking a chore and portaging even a light boat challenging.

At dry season flows below 15,000 cubic feet per second, usually February through May, the rapids are hardest, Class 2-3. There is a large rock on the left to avoid, and steep waves up to 2 m high march down the main channel. At medium levels (50,000 cfs) the rapids become Class 2. The rock changes to a threatening hole (easily avoided), but there are some strong *remolinos* skulking in the runout to munch the careless (Figure 3). The large midrapids eddy on the right develops a powerful circulating current. At wet season levels, June through November, the rapids are straightforward Class 2 (Scott Davis, personal communication 2003). The river has exceeded 200,000 cfs, though not often.

Like so many localities in the region, the rapids (*raudales*) have acquired multiple names. “Chicozapote Falls” came into vogue in the late 20th century and is now the only name in common usage. “Raudal Grande de Anaite” was the name used by Maler, Blom, and local boatmen for nearly a century. “Los Raudales de Anaite” referred collectively to both Raudal La Pared and Chicozapote Falls. Five km west is Laguna Anaite (Laguna Santa Clara), and west of that is the large Anaite II site. A victory monument from Tonina identifies one captive as “Green Turtle,” lord of Anaay Te’ (Martin and Grube 2000:182). Of the modern name “Anaite,” Martin and Grube (ibid.) believe “the chances that it is ancient in origin are strong.” If so, it would be one of only a handful of Classic Period names to survive into the present, and a piece of the past that should not be lightly discarded.

Jutting from the right shore just above the rapids is a rocky point with a natural stone pillar on it. The pillar is deeply scored with the marks of ropes. Behind the point is a cove and Playa Mojados (“Wetback Beach”), a large high sandbar on the Guatemalan shore. It offers an easy landing at most water levels, and goes under only in the wet season. In spite of its broad expanse of level sand, these days Playa Mojados is not a good campsite. It is an overnight stop for *lancheros* carrying illegal immigrants headed for the United States. There are stone bollards on the shore at the head of the cove. All are found below the level of the crest of the beach.

According to 19th and 20th century accounts, timber companies discouraged their *vogas* (boatmen) from running Chicozapote Falls, but they usually did so anyway. Given the powerful whirlpools along shore, it was often actually safer to run the rapids than to line them (by using a rope to maneuver the empty craft downstream). Sometimes part of the cargo was carried past via a well-used informal trail along the rocky right shore (Halle 1941), then the lightened boat was run through.

An informal trail is still in use on the right shore. The author looked for any signs of a graded footway and found none, but a “herd path” was evident. The frequent changes of water level and annual flooding probably made a single improved footway as impractical in the past as it is now.

Lining downstream is slow, and dragging a heavy dugout overland out of the question. A 9 m dugout weighs a minimum of half a metric ton dry, and 10% more wet (John Thompson, personal communication 2003). Unlike lightweight birchbark canoes designed to be carried overhead, dugouts could not be carried by their own crew. They had to be dragged and twitched along skids laid across the path, and then only if the path was fairly level. The right

shore at Chicozapote is anything but level.

Chicozapote Falls is not especially hard to run, but you would not know it from historical accounts. When Louis Halle (1941) rode a cayuco through the rapids, the boat spun round and round, out of control. His *bogadors* let the boat get caught in *remolinos*, causing a series of involuntary eddy turns. Dimitar Krustev (1970) cautiously walked the shore while Romulo soloed their boat through, but Krustev also handled his folbot so poorly at Piedras Negras that they were swept past the landing (Halle 1941).

Barely noticed in these accounts of terror and disaster is that competent boatmen ran Chicozapote without any trouble. The rapid is just serious enough to punish incompetence, but forgiving to the skilled. As Chris Shaw (2000:37) remarked, "The rapid's reputation had been exaggerated." For years motor lanchas have routinely run up and down the rapids to service Stephen Houston's and Hector Escobedo's project at Piedras Negras—and to transport *mojados* down the river. It takes about 75 hp to buck the current.

Maler is the only early Mayanist who really knew what could be done with dugouts. His cool assessment of up-river possibilities was remarkable. Chicozapote's towering walls, broken shores, and leaping waves intimidated most travelers. Maler judged that his *vogas* from El Cayo, though not expert, could track their boat up the rapids. As he related, "the cayuco, gliding along at the foot of the sheer rock, remained invisible to those hauling the ropes." Maler's crew, even though unfamiliar with the rapids, succeeded in tracking all the way up the Mexican shore without a demicharge (unloading part of the goods from the boat) or décharge (unloading them all), but his *vogas* lost their nerve on the top drop.

At the top was the one tricky part, swinging a canoe through a strong chute between the shore and a big rock. Maler again correctly gauged the danger, and had the boat unloaded, a "décharge," before trying to haul it up the last drop. "It filled with water, the ropes broke, and, dashing to pieces against the rocks, it vanished in the whirling flood" (Maler 1903). He could see the ascent was possible, and probably would have succeeded with more luck or a more competent crew.

On a 1905 expedition down the river, "prudently mistrusting my irresponsible Tenosique simpleton," Maler bundled up his notes and hitched a ride in a passing cayuco manned by able *vogas*. However, his own "cayuco was dashed to pieces on the rocks and disappeared in the brawling waters." Again he lost a boat but correctly judged the safest action at Chicozapote Falls.

Warping stone

On the point at the head of Chicozapote Falls is a natural stone pillar. It is not an isolated block, but one of several large outcrops on the point. However, it is the only one deeply notched by rope grooves. The 2 m high limestone outcrop is elongated parallel to the current. Fourteen grooves were identified: ten on the upstream face, two on the downstream face, and two near the top that went completely around the rock. The two downstream grooves pair up with two of the upstream grooves. One short, near vertical groove even encircles one of the nubs left between

other grooves on the upstream face. Ropes tied along any of the grooves would have been securely anchored. Four grooves on the upstream face are worn approximately 20 cm deep. The deep grooves speak of long, hard use over a long span of time, probably hundreds of years.

There are several ways the stone might have been used in the past to account for the wear pattern. A line could have been tied across the river to signal that the rapids were at hand, much like warning buoys above dams today. A 20th century log boom conceivably might have been anchored to it. Canoes might have tied up while waiting their turn at the beach or to run the rapids. Or, it may have anchored a rope for warping canoes up the rapids.

By far the greatest wear is on the upstream face of the pillar, indicating the pull came from downstream. A rope across the river should wear the downstream notches more than observed. It would also block the approach to the best landing, in the cove behind the point. A log boom anchored on the pillar would have blocked both the beach landing and the entrance to the rapids, unacceptable dangers for a canoe planning to run the rapids. It seems unlikely that a rope or boom was ever strung across the river.

The point has no beach or eddy directly below it, and the shore rocks are jagged, so it seems unlikely that boats tied off to land at the pillar. They might have moored there while waiting a turn at Mojado Beach. This is a possibility, but the cove was not a port for any known settlement. Canoes would have landed only briefly, as boats do today, to scout the rapids and batten down cargo before a run. No modern lanchas tie off on the pillar even when staying overnight. It is possible that Maya canoes in convoy, waiting to run the rapids one at a time, may have tied off briefly.

The pillar is directly in line with the center of Chicozapote Falls, an ideal location to anchor a rope for warping. Warping is a simple, low-tech method requiring only a long rope, a good tree or stone for anchor, and a skilled crew. The tradeoff is the time it takes to set up the cable. Once in place, it can be used by all the remaining canoes in a convoy.

In "warping," part of the crew walks to the head of the rapids and ties a long rope to a rock or tree in line with the center of the river. They then return to the boat, paying out the rope cable as they go, and get on board. The crew on board hauls in the rope, and the canoe goes up the rapids. Alternatively, if local manpower is available, a crew upstream on shore can haul in the cable and draw a boat up the rapids in spite of the current. Sometimes the two efforts could be combined, with both the crew and a hauling gang upstream pulling. On rivers with regular traffic in other parts of the world, sometimes a cable was already anchored in place and the end was brought down by a small boat.

With a solid anchor to pull against, the crew can ascend rapids too deep or swift for other techniques. Instead of clinging to shore while pulling the canoe along with lines, they can angle back and forth to the best channels. They can avoid pour-overs or *remolinos* close to shore, which could be serious obstacles lining from the bank.

Invoking Occam's Razor, the simplest interpretation that fits all facts is that the stone pillar at the head of Chicozapote Falls was used to anchor a warping rope. Few rapids have a natural bollard so well sited. If the pillar were used to warp cargo canoes up the rapids, it would give

a rare glimpse of techniques employed by Classic Period Maya boatmen. Less likely, but still possible, is that it was used as a mooring for canoes waiting their turn to run the rapids. The two uses are not mutually exclusive.

Once past the rapids...

Less than 1 km below Chicozapote Falls, a ravine breaks the high escarpment on the right. There is a beach at its mouth. The ravine is a potential route between the river and La Pasadita 6 km to the northeast. A little farther downstream is a strong Class 1 rapid split by a large rock, Piedra de Nemequey. On the right is a flat-topped point, formerly sheltering the hamlet of Piedra de Nemequey, now uninhabited.

One km downstream is the El Chicozapote site, at a natural landing on the west shore. Probably controlled by Yaxchilan in the Late Classic, it may have been an outpost countering El Cayo, associated with Piedras Negras. The ruins of El Chicozapote, like Anaite I upstream, sit in a gap in the high escarpment overshadowing much of the left shore. Created by transverse faults, the gaps are natural access points between the river and a parallel valley west of the Sierra el Tornillo. Unlike at Anaite I, the gap is small and there is no corresponding break in the east wall of the river gorge. In 2004 it was not practical to check the El Chicozapote site for stone bollards due to safety concerns.

The river is swift with two Class 1 rapids in the next 2 kilometers. After another km, as the river curves left, a side valley comes in on the Guatemalan side. Charles Golden (personal communication 2004) reports that harvesters of *xate* palm use the valley to pass through the rugged karst between the river and the interior. The small Argueta site is at the river end and El Bayal guards the NE end of the valley, suggesting it was a valued route in the Classic as well. One mooring stone was found along the shore near Argueta. This was in spite of there being no decent landing, just a rock wall swept by the current. Bedrock is layered here and gently dipping southwest.

Four km below Piedra de Nemequey there used to be a hamlet called Orizaba, where there is a flat shelf on the right shore. Not far downstream a hanging valley in Guatemala joins the canyon. Its intermittent stream cascades down a travertine falls. Somewhere in this vicinity Blom's map showed "Playa de Metates Antigua," but the nearest beach is another 3 km downriver.

Next, on the left are huge blocks, waded with layers of travertine, where a spring trickles from a narrow ravine. Not far downstream is a Class 1 rapid. The left shore is a rock wall rising to a flat terrace. Stranded on the terrace in 2004 was the stern end of a broken lancha.

Below Piedra de Nemequey 7.5 km is the El Chile site, high above the left shore. There is no break in the escarpment and no easy path up to El Chile. In spite of a careful search, no stone bollards were found along shore. For .5 km below El Chile, the left shore leaks. From about bankfull level, rivulets trickle into the Usumacinta. At the downstream end, the flow swells to a stream and tumbles down travertine ledges into the river. The waters are the extended resurgence of a stream sinking to the west behind the escarpment.

On the right shore, 1.5 and 2 km below the last spring, there are pocket beaches at the mouths of two Guatemalan ravines. Five km upstream of Arroyo Macabilero there is a riffle. It would be easy to line a canoe up it from slabs on the left (Mexican) shore. Another 1.5 km downstream, and 3.7 km above Arroyo Macabilero, a valley enters the canyon from the right. At its mouth is Split Beach, separated into two parts by a broad dome of natural concrete pavement, cobbles cemented in travertine. Downstream of the beach there is one good example of a bollard and several partly smothered by travertine. Somewhere up the valley should be an associated site.

Two km above Arroyo Macabilero there is another large beach at the mouth of a narrow valley heading north. Approaching El Desempeño there are two high cliffs on the left. The narrow river gorge abruptly ends as the escarpments flare out to embrace the "El Cayo Pocket" (Anaya 1999). Faulting has brought the less resistant Lower Boca del Cerro Formation to the surface in a broad rectangular valley measuring about 2 by 4 km. Within the pocket valley are good farmland and flint suitable for toolmaking.

El Desempeño to El Porvenir - 19 km

At Desempeño, 47 km from Yaxchilan, a huge sandbar spreads out from the right shore. In the wet season it becomes an island, with a patch of forest on the topmost part. The sandbar is the creation of sediment from Arroyo Macabilero on the Guatemalan side. In the 19th century the sandbar was called El Cayo Venado, "Venison Island" (Maler 1901), now shortened to El Cayo. Ruins close to La Playona take their name from the island, as does the entire valley.

In the dry season, the mouth of Arroyo Macabilero and the sandbar form a placid cove with a beach big enough to haul out a fleet. It is one of the three best natural harbors on the Usumacinta between the Río Lacantun and the Boca del Cerro. A trail follows the tumbling Arroyo Macabilero down through the chain of low hills separating the El Cayo Pocket from the Intermontane Valley. El Cayo was probably a well used ferrying point in the Classic as well as a port.

Today the area is called El Desempeño, as it has been since the mid-20th century. Rancho el Desempeño stretches along the Mexican shore from opposite Arroyo Macabilero to Arroyo Jerusalem. *Desempeño* commonly means "redemption," but it can also mean "unburdening." After losing some men and boats in the canyons beyond, timber companies strictly forbade their *vogas* from running below Desempeño/El Cayo, and this became the general 19th century foot of navigation.

It is not clear whether any part of Arroyo Macabilero is passable by canoe. There is a small waterfall not far upstream. Part of the arroyo's flow comes from a large rising 2 km NE of its junction with the Usumacinta. The rising is the probable underground outlet of Laguneta Lacandón, 2 km east.

El Cayo/Macabilero sites

The modern hamlet of La Playona is on the Mexican shore, but there are ancient structures on both sides of the river. El Cayo is the largest ruin. It includes a two-story palace

located 0.4 km north of an isolated hilltop on the Mexican shore. In the Classic it was called Yax Niil (Zender 2002). Across the river its counterpart, the Macabilero site, caps a hill snuggled up against the arroyo of the same name on the Guatemalan side. The rim of the hill has been steepened and strengthened by walls, likely defensive.

El Cayo/Macabilero had an exceptional location. It had the largest beach on the river, fresh water, an easy route east through the karst, good farmland, and flint deposits. It also lay between two major Classic centers, Yaxchilan and Piedras Negras. From inscriptions, El Cayo appears to have been a satellite of Piedras Negras, though Sak Tz'i' seized it for a time. The rocks along shore at La Playona were not examined for stone bollards due to safety concerns.

In June of 1997, Dr. Peter Mathews attempted to remove an altar stone from El Cayo. He and his party were robbed, beaten, and nearly killed by villagers. They escaped by swimming across the river, and hiding until they could flag down a lancha bound for the dig at Piedras Negras.

Traveling to El Cayo/Macabilero from Yaxchilan and Piedras Negras by land and water

El Cayo is 45 km from Yaxchilan but only 16 km from Piedras Negras. Paradoxically, it takes less time to reach El Cayo from Yaxchilan by water than from nearby Piedras Negras. This is because travel down the swift Usumacinta is much faster than paddling and lining against the same current. Current speed varies from 3 to 5 kph, depending on season and section. Traveling at 8 kph (3 kph current, plus 5 kph paddling speed), the 45 km by water from Yaxchilan to El Cayo would take 5.6 hours. At 1.5 kph (average tracking speed) the 16 km upriver from Piedras Negras to El Cayo would take almost 11 hours.

El Cayo is about 40 km from Yaxchilan by trails along the "Intermontane Valley," but only 15 km from Piedras Negras. Quick-marching the 15 km of trail from Piedras Negras to El Cayo would take about 4 hours. Yaxchilan and Piedras Negras were always rivals and often enemies. Piedras Negras would have needed a strong outpost at El Cayo/Macabilero to blunt an attack by canoe and buy time to rush defenders overland from Piedras Negras.

Bringing a canoe up Chicozapote Canyon required a mix of hard paddling and lining to overcome the constant 3 kph current. We know it was possible in the past because Maler did it in 1899.

It would have taken about 15 hours to travel overland from El Cayo to Yaxchilan via La Pasadita, instead of approximately 25 hours by water. A likely scenario is for upriver travelers to have used different routes according to the type of traffic and urgency of travel. As Mario Aliphath (1994) observed, visitors to El Cayo or Piedras Negras may have often elected to walk back via the parallel "Intermontane Valley" along the La Línea Syncline to the northeast. Unencumbered travelers and perishables would have gone by land; heavy nonperishable loads by boat. During floods and unusually high water, bulk cargos could have been stockpiled for later.

Three km NW of Laguna La Pasadita, a belt of tower karst crosses the "Intermontane Valley," interrupting an otherwise broad flat swale. The hills are not high but they are rugged. They form a natural dividing line about equi-

distant between Yaxchilan and Piedras Negras.

The 19th century/modern valley trail southeast from El Porvenir/Piedras Negras slips through a pass in the karst and then heads for the only water nearby, Laguna La Pasadita, "Lake of the Little Passage." Formidable limestone crags rise 1 km southeast of the lake. Buildings of the Main Group of La Pasadita cap the pinnacles like medieval castles. A redoubt of Yaxchilan, the fortress city of La Pasadita controlled the pass and the lake during the Classic. Low defensive walls have been traced east along an escarpment for 3 km to El Túnel (Golden et al. 2005). Only 1 m high, the walls probably supported a wooden palisade. Recognizing its strategic location, Guatemalan guerrillas occupied and mined La Pasadita in the late 20th century. Unfortunately, the land mines are still there and further research is tentative.

Charles Golden (personal communication 2005) suspects that Yaxchilan made the belt of tower karst its kingdom's actual boundary line. In 2004 Golden found defensive walls at El Bayal, 2 km NE of the river. They appear to extend the line of a narrow valley cutting through the karst. It is not clear whether the works jogged southeast from El Bayal to La Pasadita, or whether the latter site was a separate line of defense. In spite of good fences, Piedras Negras and Yaxchilan were not good neighbors.

Continuing down the river...

Three km below Arroyo Macabilero there is a single small rapid. One km downstream, the 19th century trail to Tenoisique touched the river and then swung inland. This trail is still in use. On several older maps the spot is mislabeled "Desempeño," apparently copying an error on Blom's 1953 map.

Farther downstream 6.5 km is Arroyo Jerusalem, a landing at a large shingle beach on the Mexican side. A rough road climbs west into the hills to join the Carretera Frontera near Vallescondido. The sizeable ruin of La Mar—anciently T'uhl Tuun or Pe' Tuun (Zender 2002)—is somewhere west of Arroyo Jerusalem. It was found once by Maler, but has since stubbornly remained lost.

"Piedras Negras Canyon"

At Arroyo Jerusalem the Usumacinta enters "Piedras Negras Canyon." The gorge has several minor rapids, and a sizeable one (Relative Difficulty = 0.44). For the next 9 km, scarps climbing to 300 m constrict the river. In the first 2 km below Arroyo Jerusalem there are two Class 1 rapids. The second has a beach on the right, a large black rock on the left, and some strong *remolinos*. Its name appears to be Raudal el Desempeño (Bananafish Tours n.d.). Less than half a km below "Raudal el Desempeño" is a large beach on the left, called by some "Playa de Zarahuatos." Opposite the playa, the Guatemalan canyon wall rises 300 meters. Behind the crest is a sinkhole 500 m across and perhaps 120 m deep. One of the largest in Guatemala, it is 4.2 km south of the Acropolis at Piedras Negras.

The next 3 km have no real rapids but are very swift, with *remolinos* on the eddy lines against rocky banks. The power of the compressed river is obvious, like riding a sleepy dragon. To quote Chris Shaw (2000:37), "I found the rapids routine, but the flat water unnerving." Upriver travel here would have been mostly by lining, and only rarely



Figure 4. La Roca de los Sacrificios, on the waterfront at Piedras Negras. (Photo: Jorge Pérez de Lara.)

by paddling. The left (Mexican) shore generally has better footing for lining and fewer *remolinos*.

Raudal de Piedras Negras (Raudal El Porvenir)

The Class 2-3 Raudal de Piedras Negras is 1.5 km upstream of the ruins of Piedras Negras. With rapids thundering beneath a soaring cliff on the left and huge rocks guarding the right, it is one of the wildest and most romantic scenes on the Usumacinta. The defile forms a dramatic gateway to the ruined city not far downstream.

Raudal de Piedras Negras is much like Chicozapote Falls, a single challenging rapid in an otherwise swift but navigable canyon. Both rapids are similar in difficulty. Both are formed where narrows constrict the river. There are large hydraulics in Raudal de Piedras Negras at low levels (Scott Davis, personal communication 2001). At medium levels there are breaking waves in midchannel and large *remolinos* below. At low water the best course is right down the center, between lines of strong whirlpools (David Pentecost, personal communication 2004). The rapid is short, about 0.3 km long.

In 1937 archaeologists Ed Shook, Harry Pollock, and Ledyard Smith came down the river by dugout to Piedras Negras. The rapid has been run by the author in a 5.2 m open canoe at a medium level. With more freeboard and momentum, larger canoes would have had an easier time. Motorized lanchas routinely run up and down the rapids.

Unless both shores are sheer cliffs, most Class 2 rapids can usually be lined. The right shore at Raudal de Piedras Negras is all big boulders, but the left (Mexican) shore has

broken rock piled along the foot of a high cliff. The left shore would not be easy walking, but lining a boat upstream is possible. Only at high levels, when the river reaches the base of the cliff on the left, does lining appear impractical.

An obvious concern is whether the river seen today is essentially that of the Classic. Rapids are remarkably obstinate creatures. They come and go in geologic time, but rarely within human history. Luna Leopold (1997) noted that gravel bars, which appear ephemeral, are actually long-lived features. Cobbles are continually passing through a bar, but the bar stays in place. Remove a cobble and another of exactly the same size migrates into the hole. Rock rapids are even more resistant to change.

The author has personally witnessed the aftermath of two major floods, one from Hurricane Agnes in 1972 and another in 1985 affecting northern West Virginia. On the Patapsco River in Maryland, Agnes blew out dams, destroyed 20 miles of railroad, and virtually erased the town of Daniels. The only effect on the rapids was to open a straighter chute in Doughnut Bend Rapids, reducing its difficulty by half a class. On the Little Patuxent River, a new cobble bar drowned the lower half of Savage Falls. Within a few years the bar washed away, and the falls returned to their original layout and difficulty.

In West Virginia the 1985 flood was cataclysmic, a 500 year flood. The upper valley of the South Branch Potomac River overflowed a pass to exit down North Mill Creek, something never seen before. In the canyon of the Cheat River, one rapid, Big Nasty, became half a class harder (Even Nastier), but gradually reverted to its old difficulty, if not its precise configuration. In each case, no major rapids

were created; none were erased. There is nothing at Raudal Piedras Negras to suggest it has been other than long at its location.

Piedras Negras

From a high bluff the Preclassic-Late Classic ruins of Piedras Negras overlook a shore of tilted boulders and a steep sandy cove, the city landing at La Roca de los Sacrificios (Figure 4). At low water the approach can be tricky because of rock reefs and strong currents. In the rocks framing the landing there are a few natural holes, which show a little rope wear (Stephen Houston, personal communication 2005). The landing is too narrow to have accommodated a large fleet of dugouts. Visitors to Piedras Negras must now stop at El Porvenir to check in with the CONAP guards, instead of at the Roca de los Sacrificios landing.

One Classic name of Piedras Negras was Yokib, and David Stuart (2004) has recently identified another, "Paw Stone." As Stuart notes, in the main plaza is a rectangular altar shaped like a huge jaguar paw. It once was supported by four carved heads, each the glyph for "stone." Together they formed a toponym, which Stuart thinks referred to part or all of Piedras Negras.

Deposits of black chert for tool-making are found along the river at Piedras Negras, and are the source of its modern name. They were one of the items traded up and down the river, and another reason for the city's location. Over time the city's toolmaking expanded to include obsidian imported from El Chayal (Nelson 2003), 450 km to the south by land and water.

Named by Maler, the Roca de los Sacrificios is a bus-sized black slab of limestone with seated figures in a circle carved on it. It thrusts out from shore on the downstream side of the steep, sandy cove at Piedras Negras. Tilted at about a 30° angle, the rock has a reptilian snout. Maler speculated that it was a sacrificial altar, but city boundary marker seems a more likely use. It is too high above the shoreline in the dry season to have served as a river gauge, but the river does rise over it in the wet season. The cove at Roca de los Sacrificios is a logical landing for the city but too small to accommodate much commerce. Perhaps it functioned like the Water Gate in the Tower of London, river access for the select—royalty and prisoners.

At Piedras Negras every structure is at least 20 m above dry season river level. Even small platforms and terraces carved into the bluff facing the river all stop at the 20 m line. This is well above bankfull stage, but not completely above the flood-prone elevation. Very similar is Yaxchilan, whose Main Plaza is 23 to 25 m above mean low water.

In high water or flood, canoes would not be safe in a cove scoured by strong currents. Stephen Houston (personal communication 2005) has suggested that the arroyo leading to the Northwest Plaza of Piedras Negras, and the plaza itself during high flood, would have been the nearest calm pool to stash canoes until the river receded.

One inscription at Piedras Negras records a royal visit by Yopaat B'alam II, a Yaxchilan king whose name glyphs include a canoe. Others show a protracted war from AD 795 to 808 between Piedras Negras and Yaxchilan, with Piedras Negras the eventual loser (Houston et al. 2000). The Piedras Negras Project, conducted by Houston and Hector Escobedo from 1997 to 2000, added a great deal to

the understanding of Piedras Negras and its uneasy relationship with regional city-states.

By its position, Piedras Negras controlled several trade routes. The Intermontane Valley following the La Línea Syncline is pinched against the river by a belt of hills. The most logical route goes right past the NE corner of the Acropolis. Several high passes notch the mountain ridge north of El Porvenir. As Anaya's (2001) projected "line of least cost" from Piedras Negras to Pomona suggests, a Classic Period trail may have run through one of the passes to El Porvenir. Northeast of the city a lower pass aims into the heart of the Sierra del Lacandón. In sum, Piedras Negras appears to be a natural nexus of river and land routes.

It has been said that Piedras Negras turns its back on the river, but a look at detailed maps (e.g., Nelson 2003) shows this is not true. Over fifty platforms and terraces are cut into the escarpment overlooking the river. Without the modern forest, Temple J-4 (Temple of the Stelae) and the adjacent palace would have a view diagonally up the river nearly to Raudal de Piedras Negras. The Acropolis of Piedras Negras had a view straight up and down the river for several kilometers. Zachary Nelson (2003) identified a hilltop 1540 m NNW of the Acropolis as a lookout. Surrounded by cliffs and walls, the hill was probably also a fort. No canoes could have passed the city unobserved.

Continuing down the river...

The 3 km from the Roca de los Sacrificios to El Porvenir are swift but have no rapids. The Guatemalan shore is a ragged jumble of tilted bedrock slabs and boulders. Several powerful *remolinos* churn along the edge. In contrast the left shore is rocky but not difficult walking. Any crew lining a canoe upstream would have chosen the left (Mexican) shore.

Near the *remolinos* on the right shore several swirly carvings have been found on slabs facing inland. The general location of the carvings is shown on the 1939 map of Piedras Negras. They are 430 m downstream of the Roca de los Sacrificios, in an area of shoreline 50 to 100 m past a cut stone block. The spirals are about 5 m above average dry season levels. Stephen Houston (personal communication 2005) thinks they may have marked the most dangerous *remolinos* along the right shore.

El Porvenir

At El Porvenir ("The Future") the river suddenly opens into a wide calm bay, in striking contrast to most of the river. On the bluff is a Guatemalan ranger station for Parque Nacional Sierra del Lacandón. At low to medium levels, there is a broad sandy beach along the midsection of the bay. Large enough for a fleet, it has none of the disadvantages of the steep, narrow landing at Roca de los Sacrificios. The bay is without question the best natural harbor on the river above Boca del Cerro.

Over 30 stone bollards were found, including one with a groove worn 12 cm deep. The number of bollards and depth of wear at El Porvenir suggest that the bay was one of the great ports of the Maya.

The modern CONAP ranger station is only slightly above bankfull level and well within the flood prone elevation. Tammy Ridenour (personal communication 2004) reports that the bay stays calm in high water, so the Maya did

not need to move a canoe fleet elsewhere. They could just keep retying canoes higher up along the backshore during a rising flood.

Less than 1 km NW is the El Porvenir site, with one plaza and several outlying mounds. Though modest, it spans the Preclassic to Late Classic Periods. The modern valley trail north to Francisco Madero runs right through the ancient plaza and likely reflects a far more ancient trail. The site is the first spot on the trail above flood prone elevation. House mounds extend unbroken between El Porvenir and Piedras Negras, showing that El Porvenir was an outlier of Piedras Negras in the Classic.

As the last good stopping place for travelers headed to the lowlands, El Porvenir is the most likely start for a portage past the hardest canyons on the Usumacinta. Continuing downstream would have committed a boat to running the canyons.

THE USUMACINTA PORTAGES

The basic challenge of portaging the Usumacinta canyons was to carry no farther than absolutely necessary, yet avoid all the most difficult rapids. The hardest sections of the river were—and still are—“Cola del Diablo Canyon,” with 9 rapids in 9 km; Iguanas Canyon, with 7 rapids and an unlineable slot in a 7 km stretch; and finally the two short but powerful Class 3 drops of Raudal de San José pinched between soaring walls. There are several different ways to pass these obstacles. All may have been used in the past. Every portage discussed here was far too long to haul dug-outs across. The cargo would have been carried from one set of canoes to another.

Portages are potential flash points. Any polity that wishes to control traffic over a key portage must eventually control the entire portage or relinquish it completely. A portage jointly controlled by allies is an unstable equilibrium. If rival states control opposite ends, conflict is guaranteed. Either can arbitrarily shut off the flow of traffic and hence of wealth. To prevent this they will struggle until one prevails by force or duplicity, and the other must pay or use an alternative, less desirable route.

Most past portage routes can only be tentatively reconstructed by extrapolating from ends of navigation, controlling terrain features, and distribution of Maya sites. When this approach is applied to finding the most likely carry past the two least navigable canyons—“Cola del Diablo” and Iguanas Canyons—the most logical route is along a linear karst valley in Guatemala and Mexico running from El Porvenir to Corrigedora Ortiz, then over a low divide to the small site of Francisco Madero.

Portage Option 1: Desempeño to Tenosique

In the 19th and early 20th centuries, travelers riding the Usumacinta normally beached their boats at Desempeño/El Cayo and trugged overland to Tenosique de Pino Suárez. Beginning at Desempeño, the historical trail at first followed the river. Five km from El Cayo, it angled north, inland, to avoid the high karst hills framing the next river canyon. The trail followed a valley for 9 km northwest to the arroyo on the southern edge of Piedras Negras. The city caps hills formed by a transverse arch crossing the La Línea

Syncline. Pinched between hills and river, the 19th century trail passed right through the ruins. Three km later it returned to the river at the cove and beach of El Porvenir.

From El Porvenir the trail followed a broad karst valley, the “Corrigedora Ortiz” valley, northwest for 15.5 km along a branch of the La Línea Syncline. It avoided climbing over the high, dry, and rugged karst mountains to either side. The valley floor rises gradually up to a point. Three km beyond the hamlet of Niños Heroes de Chapultepec, the valley ends in a precipitous 150 m drop into the heart of Iguanas Canyon. To avoid the dead end, the 19th century trail turned north through a pass 3 km NW of Corrigedora Ortiz (Tres Champas). Coming from the south, the ascent to the crest was only 30 m, followed by a winding 150 m descent in 3 km to Francisco Madero on the river below Iguanas Canyon.

Francisco Madero (El Retiro) is on a nice calm pool, one of several places between Iguanas and San José Canyons where a ferry crossing by canoe is practical, but it was not the end of the 19th century portage. The trail continued north for another 26 km, first following the river, then staying a few km east of the rugged rim of San José Canyon. It passed the next ridge by slipping through gaps between karst knobs. From Los Rieles the trail used the valley of Arroyo Tepesquintla to drop down to the coastal plain, passing Adolfo Lopez Mateos on the way. From the edge of the hills, the old trail beelined through Rancho Grande, crossed Arroyo Poleva (subject to flooding) and ended at the waterfront in Tenosique (Postclassic Tanoche) 46 km from El Porvenir and 59 km from Desempeño.

The route of the 19th century portage is a very conservative route avoiding, with the exception of Chicozapote Falls, every rapid on the Usumacinta over Class 1 difficulty. A good compromise between a reasonable grade and directness, the path probably mirrored a Late Postclassic trail ending at Tanoche. Though long, the portage would have been useful in any period, from Preclassic to Postclassic. Because the route was so practical, it is still in use today, as trail in Guatemala and road in Mexico. Its major disadvantage is that is somewhat inefficient, laboring overland where the river is navigable above El Porvenir and below Raudal San José.

There are more than a few ancient sites along the route. Starting at the ruins of El Cayo/Macabilerio, the 19th century trail wound right through the center of Piedras Negras, through the main plaza at El Porvenir, and past sites at Francisco Madero and Santo Tomás I.

The portion between El Porvenir and Francisco Madero may be a surviving Classic Period trail. Going from south to north, the only alternate route would have been via the next valley north, through El Progreso and El Cortino Nuevo, as discussed in Option 4 below.

Portage Option 2: El Porvenir to San José los Rieles II

The river is flat and easy for 6 km below Francisco Madero, but rapids in San José Canyon wait downstream. Though only 0.5 km long, the double drops of Class 3 Raudal de San José would have blocked canoe traffic through the canyon. If there were a way to line or carry them at river level, it would have been the shortest and simplest option, but the shoreline is all high cliff or huge boulders. Climbing the

200 m walls of the canyon was not an option.

Without a way to pass the rapids inside the canyon, travelers would have been forced to portage (sans canoes) past not only the rapids, but also 4 km of sheer-walled canyon. From Francisco Madero, porters would have continued along the riverbank another 2 km to Santo Tomás I, following the same line as the 19th century trail. The trail then turned northeast to pass through the next karst ridge where it breaks into limestone knobs.

Passing Maler's El Hollo, the trail curves west into a linear valley. The most direct route to navigable water is to leave the 19th century trail and continue west down the narrow valley for 3 km to the San José los Rieles sites on the river below Raudal de San José. The valley is one of only a few places where the river is accessible through a break in the walls of San José Canyon. The river is normally navigable below San José los Rieles II (Satterthwaite et al. 1939).

To haul stelae from the ruins, the 1931-39 Piedras Negras expeditions improved and maintained this same route as a wagon road from Piedras Negras to San José Los Rieles II (Satterthwaite et al. 1939). The famed tractor in the jungle at Piedras Negras came in by this road.

Option 2 is the core of the longer 19th century trail, described in Option 1, shorn of the portions paralleling navigable river sections. At 29 km, the portage road from El Porvenir to San José Los Rieles II is the shortest practical carry known to have been used historically. The 1939 Satterthwaite Expedition to Piedras Negras specifically identified San José Los Rieles II as the head of navigation for the lowland Usumacinta.

Portage Option 3: A double portage

If the Maya could not get canoes past the Raudal de San José inside the canyon, a shorter alternative portage may have been on the south side of the river. Three km could have been shaved off the distance from El Porvenir to San José los Rieles II by breaking the trek into two carries: a long one past both "Cola del Diablo" and Iguanas Canyons (18.5 km), and a short one past the upper part of San José Canyon (6.5 km).

By ferrying the river at Francisco Madero or at San José Usumacinta 2 km downstream, Maya porters could have followed a broad valley (the northern extension of the "Intermontane Valley" along the La Línea Syncline) west from the river for 5 km. A modern trail (on Tenosique E15D35 MX 1:50,000) runs west in this valley. If porters then turned north, they could thread a narrow 1.5 km long ravine through the karst, returning to the river 2 km downstream of Raudal de San José. The rest of the canyon is navigable. Whether the ravine is passable on foot is uncertain, so this is currently only a theoretical portage option.

Portage Option 4: El Porvenir to Panhale via a theoretical line of least cost

Using a digital terrain model, Armando Anaya (2001:Fig. 25) calculated a "line of least cost" between Piedras Negras and Pomona. From El Porvenir to Santo Tomás, the resulting line parallels the previous portage options, but in the next linear valley to the northeast, dubbed the "El Progreso valley" for convenience. From El Porvenir, the line of least cost veers north to cross the sierra through a high, steep

pass into the El Progreso valley.⁵ The line then turns northwest to follow the long, straight El Progreso valley. Two km southeast of El Progreso a bumpy chain of hills runs diagonally across the valley. Near the eastern edge of the El Progreso valley, there is a short climb of approximately 20 m through the lowest gap in the hills. From there, the line continues northwest, crossing the international border at El Progreso, to join an existing Mexican road through El Cortino Nuevo. Between the hamlets of Santo Tomás and Adolfo Lopez Mateos, the line of least cost and the 19th century portage are only 2 to 3 km apart. The line follows the modern road.

The line of least cost converges with the 19th century portage at Adolfo Lopez Mateos and leaves the mountains through the same pass. Where the 19th century trail headed north to Tenosique, Anaya's trace veers WNW past the Rojo Gomez site along the foot of the mountain to the Usumacinta near Panhale, 47 km from El Porvenir. It is 1 km longer than the 19th century portage.

Aconagua and the chain of Santo Tomás sites are strung along the last 5 km of the long valley, and suggest at least some travel during the Classic. It would be interesting to see if small sites continue sporadically east from Aconagua along the valley bottom past El Cortino Nuevo and El Progreso. Being hard to reach, the Guatemalan portion of the linear valley has not seen a preliminary site survey.

The computer-generated trace seems a logical compromise between effort and directness, and is a good candidate for a Classic Period portage—with caveats. Traveling from north to south (upvalley) along the line of least cost, the ridge between the two linear valleys ("El Progreso" and "Corrigedora Ortiz" valleys) requires a climb of only 100 m approaching El Porvenir versus a 150 m climb along Options 1, 2, or 3 near Francisco Madero. The valley floors rise in opposite directions, causing climbs through passes to be much higher one way than the other.

The line of least cost has limitations. Following it from south to north requires a steep 200 m climb immediately after leaving El Porvenir, versus only 30 m via the pass in Options 1, 2, or 3. The Line also does not approach the river near Francisco Madero for drinking water or for ferrying across to alternate routes. The navigability of the river through the last half of San José Canyon and Boca del Cerro Canyon is not factored in. This is a significant oversight, but understandable considering that only inaccurate or conflicting data was available on the river until recently.

The author considers the portion of the line of least cost from near San José los Rieles II to El Porvenir to very likely trace a Classic Period trail for travel from north to south, but not south to north. All in all, it seems possible that there were two portage routes here in the Classic, each preferred in one direction.

Portage Option 5: Río Chacamax to El Porvenir

As suggested in the previous portage option, routes need to be evaluated in both directions. They also should be

⁵ From El Porvenir, using the next pass to the west avoids the bumpy trans-valley hills entirely. The climb north-to-south is also about 20 m less since there is no descent before the ascent of the main ridge.

viewed in the context of a regional system of water routes, valley trails, and destinations. A long but logical 65 km portage from the lowlands to the upper Usumacinta may have started on the Río Chacamax near La Reforma and ended at El Porvenir. Travelers headed upstream from the coast would have found a route up the Chacamax and overland to El Porvenir more direct and less work than other routes. The key was to ferry across the Usumacinta near San José Usumacinta to continue along valleys to El Porvenir.

The Chacamax has less current and is 140 km shorter than the comparable section of the Usumacinta. The Usumacinta sluices through immense convoluted meanders. In the wet season, when the Usumacinta's current is greatest, the Chacamax broadens into a series of lakes with slight current. An upriver trip to Pomona would have been short via the Chacamax, but a tedious grind via the Usumacinta. The Chacamax may have been a key part of long distance trade networks in the region, and its shores merit more attention.

The Chacamax gradually changes its direction 90° from east to north in the vicinity of La Reforma. Along this bend between La Reforma and Arroyo Negro is the river's closest approach to distant El Porvenir and the logical start for a trail up the Usumacinta valley. Maler's La Reforma site is on the river here "about 8 km north of the Chinikiha site" (Satterthwaite et al. 1939). The directness and ease of upriver travel on the Chacamax would more than offset a longer portage to El Porvenir.

Pomona is only 9 km east, close enough to control this route. Southeast about 9 km is a wide, low pass at La Estrella opening to the broad valley of the Río Chiniquija. Sitting right in the gap at La Estrella is the largest structure in a loose string of mounds, collectively termed the Arena de Hidalgo site. The structure's function may possibly have been to monitor a trail through the pass.

Strung for 8 km down the valley is a regularly spaced chain of Maya sites. First are the two eastern mounds of Arena de Hidalgo, then El Brillante, and last the Lindavista site, covering about 1 square km, located 2 km west of the modern community of the same name. La Urania is not far off the route either.

Continuing from Lindavista across the Usumacinta to Francisco Madero is a chain of Maya sites that nicely fits the most likely route, and supports the likelihood of an actual Classic period trail. On the modern road connecting Lindavista and Las Delicias there are three Maya sites: Camino a Las Delicias I, Ojo de Agua, and Camino a Las Delicias II. Two sites nearby, Paso el Naranjito and Santa Margarita, are along the river nearby and hence possible ports. Beyond the medium-sized Las Delicias site (and modern village) a trail runs east along a valley to San José Usumacinta, a Maya site and modern village on the shore of the Usumacinta. Right across the river is the cluster of Santo Tomás sites. From there, one could (and still can) easily follow a trail southeast through pass and valley to El Porvenir, as described in the opposite direction in Portage Option 1.

The large Ojo de Agua Usumacinta site is close to the route described between Las Delicias and San José Usumacinta. How it might have fit in is uncertain, but it is possible a branch trail led ESE from Victorico Grajales to Ojo de Agua Usumacinta, and then down a ravine to the river not far below Raudal El Tumbador. The river is gentle for

2.5 k from there to El Retiro, and might have offered a short break between carries.

Portage Option 6: A long walk past all the canyons

For those too timid to risk the rapids, or traveling light in a great hurry and heading up the Usumacinta valley, it would have been possible to avoid all the canyons by following either Option 1, 4, or 5 to El Porvenir, and then continuing southeast by valley trail through Piedras Negras, Esmeralda, La Pasadita, and Tixan to Yaxchilan. This trail is still in use today. A 20th-century variant of the route crossed at El Cayo and continued along the south shore.

To summarize the portage options

In the 19th century the Usumacinta Portage ran north from Desempeño/El Cayo for 59 km to Tenosique on the Usumacinta below the canyons. A Classic Period portage probably started at El Porvenir and ran at least to San José Rieles II. This is Option 2, the shortest portage of all. It was used by the Satterthwaite expedition to Piedras Negras. An alternate may have continued as far as Panhale, as Anaya (2001) has suggested with a computer-generated line of least effort. Option 1, the 19th Century portage, probably reflects an earlier trail from the Late Postclassic. Options 1 and 4 are essentially the same, just using different parallel valleys. The line of least effort seems likely to have been used in the Classic, at least in one direction.

Options 3 and 5 involved ferrying across the Usumacinta between canyons, either traveling east from the valley of the Chiniquija, or to continue downriver by boat. Coming up the Chacamax, and then carrying 65 km south to El Porvenir, would have avoided 140 km of current and meanders on the Usumacinta. Chains of Maya sites support all the options. Option 5, following the valley of the Chiniquija from the Chacamax to cross the river and continue to El Porvenir, has the largest number of Classic sites ranged along it. Since the region was not at all wild in the Classic, it is possible that most portage options were used, as occasion demanded.

UPPER USUMACINTA (cont.)

El Porvenir to the Río Chocolha - 25 km

Leaving the bay at El Porvenir a boater slides past a rocky Mexican peak and into "Canyon Cola del Diablo," with forested walls 200 to 300 m high. Two km below El Porvenir is a straightforward Class 2 rapid. Half a km beyond is the canyon's namesake, Raudal Cola del Diablo, "The Devil's Tail," long, powerful Class 2-3 rapids with waves 1 m high (Relative Difficulty = 1.08). Though there is a big boulder lurking on the left, the easiest route is to start left of center and then run down the middle through the waves. It is possible to walk the right shore. Cola de Diablo is regularly ascended by *lancheros* returning from *mojado* runs. The rapids can flip a badly handled lancha.

A Peten map from the John Geddings Gray Memorial Expedition in 1928 titled the rapids from Cola to beyond the Río Busilja the "Salto Grande," the Great Falls of the Usumacinta. The mapmaker was Frans Blom. The next two rapids below Cola are Class 1. At the second, a rock pinna-



Figure 5. Busilja Falls. (Photo: Joel Skidmore.)

cle rises above the left shore. The third rapid below Cola is Class 2 Raudal de Colalito, a large drop with 0.5 m waves. It ends 3 km above the Busilja. Next is a Class 1-2 with large roaming *remolinos*. One last Class 1 rapid ends within sight of Busilja Falls.

Canyon Cola del Diablo would have been one of the two most challenging river sections prior to motorized boats. No single rapid is unrunnable, but the cumulative risk from so many rapids in a short distance is great. Lining a loaded dugout back upriver is possible, but would have been slow, grueling, and dangerous work. Much of the shoreline is jumbled boulders and steep bedrock. A slip while hauling could have brought serious injury or death. In sum, skilled and determined Maya canoeists could have traveled up or down the canyon, but for many, perhaps most, the risks may not have been worth it.

Río and Salto Busilja

Nine km below El Porvenir, the Río Busilja—also commonly written Busilha, Budsilja, and Butzijah, all corruptions of *Buutz'ilha* “Smoking Water”—emerges from underground in time to come tumbling in on the left over a two-step travertine falls 24 m high (Figure 5). The lower step is regularly drowned in the wet season by the river rise. The upper step sometimes is as well. There are large beaches both up and downstream of the falls and across the river as well. The ruins of Busilja, possibly a western outpost of Piedras Negras, are on a ridge about 4 km south of the Usumacinta. A truck road has been opened along the river valley to within 1 km of the falls.

Busilja Falls appear to be caused by the interaction of the wet season rise of the Río Usumacinta and the carbonate load of the Río Busilja. The Santo Domingo E15D45 MX 1:50,000 topo shows an intermittent segment 2 km south, where the Busilja runs underground at low levels. When

the Busilja resurges, it is saturated with calcium carbonate and cannot dissolve its limestone bed. Mechanical erosion is also minimal at dry season levels. Instead, the falls grow as the falling water evaporates, depositing travertine.

When the Río Busilja is up in the wet season, it is not fully saturated and is capable of both chemical and mechanical erosion. However, the Usumacinta is then near its wet season maximum. Bankfull stage was measured at 27.6 m on the right shore. The river would be expected to reach this level on average once every 5 years, but would approach it every year. Local base level is the Usumacinta’s surface. Most or all of the falls are underwater at the height of the wet season, and the Busilja cannot downcut at all. The only erosion is by the Usumacinta in the dry season. The Usumacinta trims back the bulge of travertine and keeps it from encroaching too far into the main river.

One km below the falls is a minor rapid below a bluff on the left, with a house perched atop it. The last of “Los Saltos” is 2.5 km downstream of Busilja Falls. Raudal de Pepito is a Class 2 rapid best run to the left to avoid a large rock/hole on the right. The next 5 km are swift but flat to a beach on the right shore. The current slows here. A 1942 map of Tabasco shows a trail heading southeast from the trail between El Porvenir and Tenosique and ending at the beach. The trail might have occasionally been used to walk 13 km past Canyon Cola del Diablo, which ends here.

The next 10 km are a wide and slow respite with only one riffle. Northeast of the river is a karst plateau pierced by several ravines. Two km below the beach, where the 1942 trail ended, are two high cliffs on the left. Another km downstream on the left is the mouth of a narrow ravine. The ravine extends 1 km south from the river to a valley that widens to the southwest. It may have been a past route between river and valley.

Three km below the two cliffs a series of beaches be-

gins. Most are on the right shore, with the largest 2.5 km above the Río Chocolha. If a 30 m dam were built at Boca del Cerro, the head of the slackwater pool would be somewhere between the two high cliffs and the Río Chocolha.

Twenty-five km from El Porvenir, the Río Chocolha (Xocol-ha, "Shark River," Chancala) bursts from a side canyon after stepping down 4 km of Class 2 and 3 ledges. It marks the end of easy travel where the Usumacinta swings ENE to slice through the mountains.

Coasting down the Usumacinta, the mouth of the Chocolha is easy to miss. The left shore is an outcrop of bedrock rising 3 to 7 m. The entrance, hidden by limestone walls, is not visible until nearly into a Class 1 rapid. The limestone has weathered into a waste of jagged spikes up to 0.3 m high.

At the brush line on the hillside just downstream of the Chocolha is a fragment of graded roadbed. It dates from the mid-20th century. An untitled 1985 map of the Usumacinta rapids by Roberto Arimany shows a dirt-track road paralleling the north side of the Chocolha from the Teno-sique Road to La Línea at the mouth of the Chocolha. A more recent truck road from the southwest comes to within a couple of km of the Usumacinta. A trail connects the truck road to the Usumacinta at the large beach just upstream of the mouth of the Chocolha.

There are two good beaches bracketing the Chocolha. Both are on the left (Mexican) shore. A large one, on a cove about 0.3 km upstream of the river mouth, is easy to overshoot. The other is just upstream of a prominent landmark, "The Balanced Rock," about 0.4 km below the Chocolha.

From El Porvenir to the Río Chocolha there are no reported Maya sites on the river. This may reflect lack of use in the Classic, or it may be there are sites still to discover. The almost complete lack of stone bollards favors lack of use.

Downstream of the Río Busilja, there are no low gaps in the towering eastern ridge for a traveler to slip through. The way to the lowlands is down the river through the gorges. A Spanish entrada under Alonso Davila faced this quandary in 1530. After struggling overland NNE across ridges and swamps from Laguna Miramar to the banks of the Usumacinta, they headed downriver in dugouts toward the lowlands. They came to a major rapid. Seeing no other choice, they continued down the canyons. After a harrowing trip they emerged at Boca del Cerro, the first Europeans to run the Usumacinta gorges.

Alonso de Luján, a member of Davila's force, reported to Gonzalo Fernández de Oviedo y Valdés that the first rapids were about 3 leagues from the last major one, now called San José Rapids. Upstream of San José 3.8 leagues (16 km) is Raudal La Línea. Since there are no major rapids upstream for another 3.6 leagues (15 km), La Línea is likely Davila's first bad rapid, and his entrada took to the river somewhere below Busilja Falls.

Río Chocolha to Boca del Cerro Bridge: Iguanas and San José Canyons – 36 km

Things change at the Río Chocolha. Just 0.4 km downstream on the left shore are a beach and a conglomerate limestone pinnacle behind the balanced rock. They mark the start of Iguanas Canyon, the Usumacinta's most spectacular.

Iguanas Canyon (Relative Difficulty = 1.54)

Between walls rising 600 m, the river worms through the Sierra del Lacandón. Seen from the Camino de Frontera 10 km south, the range appears split top to bottom as if with a machete. Before the trouble in 1996, the canyon was regularly run by modern whitewater rats in rafts and kayaks. It is still normally avoided by lanchas.

Once into Iguanas Canyon the Usumacinta slices through an anticlinal ridge. As is common for rivers crossing an anticline, the hardest rapids are at the entrance and exit of the canyon. The resistant cap rock layer forming the mountain rises to the surface and descends underground at the ends of the canyon. The softer rock in between is too easily eroded to form major rapids, and no major rockfalls have obstructed Iguanas Canyon.

One km below the Río Chocolha, and still within sight of the balanced rock, is a strong Class 1-2 rapid. Downstream another .5 km is the first big rapid, Raudal La Línea (Raudal Baluarte), a Class 2-3 chute with 1 m waves and strong *remolinos*. The river drops 2 m in La Línea.

One km below Raudal La Línea is a Class 1-2 rapid. Next, At Poste Rock (Postol), the entire river squeezes through a narrow sheer-walled slot, with Class 1 rapids in the dry season. The slot is about 60 m wide at river level. Cliffs rise 600 m to the very top of the mountain. Though the slot is not hard going downstream, it appears improbable that the Maya could get a canoe up it in the past. The rapids are too strong to paddle against and much too deep to pole. There is no ledge, natural or otherwise, across the face of the sheer cliffs for trackers to scramble along.

Class 1-2 rapids follow quickly below the slot. After 1.5 km of turbulent flatwater comes the last rapid in the canyon, a simple Class 1. As the river leaves the canyon it turns sharp right. On the turn is Class 3 Raudal El Tumbador ("Knockdown Rapids" is about as close as one can get in English). The river drops 1.3 m, bounces off a low cliff on the left, and then spins through some of the biggest *remolinos* anywhere on the river. The rapid is powerful but very short. It looks easy to haul a boat over the rocky point on the right shore and bypass the drop.

Immediately after El Tumbador the river widens. The La Línea Syncline and the valley following it cross the river. For the next 10 km the river is quite navigable. The current is sluggish even in the wet season. Ferrying across the river is simple and safe. How this navigable segment fit into canyon portages and long distance routes is not clear.

Half a km below El Tumbador there is a small beach on the right shore, and 1.5 km below the river widens and turns right. On the left a ravine leads up through hills. The large Maya site of Ojo de Agua is 2 km WNW. There is a small Maya site on the east shore at Francisco Madero. Set in the corner of a left-hand 90° bend, the landing beach is small. There were no obvious bollards noted.

Boats observed at Francisco Madero were skiff-style, about 4 m long by 1 m wide, and made of planks. The bow and stern were both square ended. The bows narrowed and rose 0.5 m, with rope holes on each side. The two seats were just planks, one across the stern and the other across the middle. The paddle was 2.7 m in length, pole-handled, with a long narrow blade. They are *palancas* like those seen upriver and among the Lacandon. Francisco Madero is a

Hispanic, not Maya, community.

On the opposite shore 0.5 km downriver from Francisco Madero is a much larger beach, called by some “Playa de los Cochinos,” “Pig Beach.” 1.3 km below Francisco Madero, on the right shore, is the Santo Tomás I Nuevo site, which has no beach.

At San José Usumacinta, a Maya community located on the left shore 3.5 km above Raudal San José, there is a narrow beach 200 m long backed by a dirt slope. The beach can accommodate a fleet of canoes. At the downstream end of the beach are rocks with some well worn stone bollards. Directly across the river on the right shore is a smaller beach. With a slow current and a landing beach on each shore, this is an excellent ferrying place. Classic Period travelers could have crossed the river and continued NW up-valley past Ojo de Agua either to Lindavista or to Chinikiha, or even to the Río Chacamax.

There is a small Maya site near San José Usumacinta, and more on the east shore. Starting by the river at Santo Tomás I, a chain of seven Maya sites runs east for 5 km to Aconcagua. The sizeable Santo Tomás I site may have been the farthest outpost of Piedras Negras (Anaya 1999).

San José Canyon (Relative Difficulty = 0.54)

Soon canyon resumes, but the water remains flat with only a moderate current. “Canyon” means a tube, or gun barrel, and this canyon looks the part. On each side are even-topped, unbroken cliffs, which seem to bulge overhead (Figure 6). After 3.5 remarkably easy km, the river funnels into ...

Class 3 Raudal San José

The left shore is a rock wall and the right complicated by house-sized boulders, where a huge chunk of the cliff crashed into the river and blocked it. The rapids (Blom’s Raudal Grande de San José, “Big San José Rapids”) consist of two steps within 0.5 km. The first is a Class 3 plunge, with a prominent horizon line and strong *remolinos* in the runout. The best route is straight down the center, followed by a curve off the left wall. After a short pool the river tumbles through another Class 3, now sometimes called San Joselito. There is a big rock to avoid on the right and then on the left there is a jagged outcrop barely awash. “Little” San José is misleading. At some water levels, the second is the harder drop. The first rapid drops 2 m and the second 3 m, totaling 5 m overall. In the past both drops were considered a single rapid, with a large eddy in the middle. The actual character of the rapids was captured well in “Road to the Edge of the World,” a video by Tom Rodgers.

San José is the most enigmatic of Usumacinta rapids. Except for this one set of rapids, the canyon is all navigable. The rockfall looks relatively recent, and just might be Post-classic. Elsewhere on the river the rapids are pretty much as they have been since the Preclassic. Without part or all of San José Rapids, the 5 m descent may have been spread through several lesser rapids in the canyon—or not. There is no simple way to determine this. If Classic Period paddlers had to deal with different rapids at San José, then the present would not illuminate past strategies to pass the canyon rapids.

Within the canyon, there is no obvious way to portage or line past Raudal San José. Both shores are very rugged.

The canyon walls are high and unbroken for 1.2 km upstream and 1 km downstream of the rapids. If the Maya could not get canoes past the rapids inside the canyon, the shortest portage (sans canoes) around that part of the canyon appears to be a 4 km carry on the south side (see Portage Option 3 above).

Four km is a long carry just to avoid 0.5 km of rapids. There was real incentive to find a way past the rapids within the canyon. The San José rapids need a thorough inspection and mapping, something that will be impossible once the Boca del Cerro dam is built.

From the foot of Raudal San José, the Usumacinta is navigable all the way to the Gulf of Mexico. The cliffs in the second half of the canyon are more irregular, with pinnacles and several breaks in the walls. Downstream of the rapids 0.8 km, the previously mentioned ravine breaks the left wall of the canyon. It is also a potential access point from Ojo de Agua Usumacinta to the south. The current slows. Two km farther downstream, a narrow linear valley (WNW to ESE) intersects the north-flowing river. On the right shore are a small beach and a small Maya settlement. This is Blom’s Finca San José. Chris Shaw (personal communication 2003) observed a “canoe factory” on the pool here several years ago.

Close by the river is a Maya site designated San José los Rieles II. One km ESE is the San José los Rieles I site. The modern village of Los Rieles de San José is up in the hills 3.5 km from the river. A trail climbs ESE up the valley to intercept the 19th Century trail past all the canyons. For the lowland Usumacinta, San José los Rieles II may have been the head of navigation in the Classic. Since the narrow valley offers good access to the river below the last hard rapids, there is no compelling reason to travel any farther.

Below the San José los Rieles II site 1.7 km is the final rapid of the canyon, a minor one barely rating a Class 1. Blom called it “Raudal Chico” on one map and “Raudal San José” on another. Some older maps label it “Raudal San Joselito.” It is definitely a “little” rapid, so San Joselito or Chico would be a sensible name for it. Lanchas routinely ascend to here in the dry season. Modern paddlers hardly notice the rapid.

Still hemmed between high walls, the river makes a long horseshoe bend to the left and again intersects the linear valley crossed earlier at San José los Rieles II. The river turns sharp right along the valley, and the canyon suddenly ends.

On his map Blom showed a settlement on the right shore called Chuncheje, where there is none now. He also marked this as the head of lancha navigation. In high water it is reported that a large whirlpool sometimes forms on the turn. On the left are a small beach and a finca backed by a high bald hill. Behind the hill, the valley runs 4 km ESE back to San José los Rieles II.

The river flows straight WNW, wide and slow, for the remaining 14 km to Lindavista. Even at medium levels the current is still mild compared to above. Prior to Lindavista, the Paso el Naranjito site overlooks the river from hills along the south shore. A good beach spreads along the left shore 0.5 km above Santa Margarita. The concrete obelisk of an abandoned gauge tower juts from the shoreline at Santa Margarita. Bedrock coves along the left shore yield to a long eddy and beach on the edge of modern Lindavista. It is a good natural port, though the road ends at a steep



Figure 6. San José Canyon. (Photo: David Pentecost.)

rocky landing.

Two km west of modern Lindavista, up the valley of the Río Chiniquija, is the sizeable Lindavista site. It is too far from the river to have been a port, but it will not be spared if the river is dammed. Lake waters would spread far west along the flat valley of the Chiniquija. How far would depend on the pool elevation. A 70 m dam would flood the large site of Chinikiha 14 km west of Lindavista and several sites between.

Boca del Cerro Canyon (Relative Difficulty = 0)

The Usumacinta sweeps around a right angle turn to enter its last canyon. The river glides smoothly through the narrows. Only at low water is Class 1 Boca del Cerro Ledge visible. Lines of cliff high on the mountainsides descend to the water's edge by the end of the canyon. A round cave mouth gapes in one cliff, and a corresponding cave opens in the other cliff across the river. Once both were a single continuous tunnel, before the river downcut through Boca

del Cerro Ridge and split the passage in two.

Above the right shore where the river widens into a cove, on terraces and on the highest peak, are the large ruins of the fortress of Panhale. It overlooks the cove, which has a good landing enclosed by spurs of the mountain. In their heyday, the buildings of Panhale had a panoramic view across the lowlands.

Just downriver from the cove is an abandoned concrete platform, once a loading dock for barges in the wet season. At Boca del Cerro, "Mouth of the Hills," the Usumacinta leaves the mountains for good under the yellow arch of the road bridge. In the past the bridge carried both road and railroad over the river, but the railroad has been abandoned.

On the left is the village of San Carlos, with a muddy beach and steep trail up to the road. There is a small Maya site in the village. There is also a CFE office and a river gauging station, with its trolley cable hung above the river. The Boca del Cerro gauge has not reported since 1983 but the trolley looks refurbished. On the east shore, at the foot of the mountains, a cement plant nibbles away the limestone ridge. From distant hills to the NW, the ruins of Pomona view the Usumacinta.

Panhale, Pomona, and the River Trade

In the late Classic, Pomona (Pakbul, or Pakbuul, and perhaps Pipa) controlled a fortress at Panhale, directly in the Boca Del Cerro gap, where the Usumacinta breaks out of the mountains south of Tenosique (Figure 7). Recent assessments suggest that Panhale predates Pomona. Rounded apron moldings indicate a connection to Piedras Negras, at least initially.

Panhale controlled river traffic through the Boca del Cerro. The hilltop ruins are well protected by steep slopes and "massive platforms and observation points" (Anaya 2001). Capping the highest peak overlooking the north shore of the Usumacinta, Acropolis 2 is an eyrie perched 320 m above the coastal plain. Most of Panhale would be torn apart by construction of a dam in the mountain gap. In fact, Group B has already been badly damaged by the CFE's exploratory work and by quarrying.

A major function of castles along the Rhine River in Germany was to "control" traffic, i.e., extort tolls to enrich local barons. As described in the 1911 *Encyclopedia Britannica* (www.1911encyclopedia.org/Rhine), "Many of the riparian potentates derived the bulk of their revenue from this source, and it is calculated that in the 18th century the Rhine yielded a total revenue of 200,000 (deutchmarks) in spite of the comparatively insignificant amount of the shipping." Tolls were cumulatively so high that some overland routes, though arduous, were competitive with upriver Rhine traffic, and not radically more expensive than downriver.

Riverside castle/tollbooths are a common feature worldwide. Mandan villages at the Great Bend of the Missouri River near Bismarck, North Dakota, likewise demanded tolls, mandatory presents to their chiefs, from all river traffic. The recently excavated Mandan hilltop site of Double Ditch in North Dakota had four sets of walls, with the river bluff completing the ring of defenses. Panhale is much the Maya equivalent of a Rhine castle and seems likely to have also collected tolls from passing traders.

Pomona and its outliers were well sited to dominate the

best land and water routes between the lowlands and the upper Usumacinta basin. Only 7 km south of Pomona is a broad pass at La Estrella between the lowlands and the valley of the Río Chiniquija. The city's location controlled traffic on and between two rivers: the Usumacinta and the Chacamax. The upper valley of the Chacamax is also a natural approach to Palenque from the east. The major cities of Palenque and Yaxchilan lurk in the background to the west and southeast respectively.

Together Pomona and Panhale appear to have controlled every reasonable route from the vicinity of Piedras Negras into the coastal plain. "Pomona was the natural enemy of Piedras Negras: it controlled a different ecological zone to the north and formed a bottleneck through which Piedras Negras would naturally choke" (Houston et al. 2000).

Pomona's one weakness was a lack of natural defenses, which Panhale may have partly alleviated, very like Helm's Deep, the fictional fortress of refuge in Tolkien's *The Lord of the Rings: The Two Towers*. Piedras Negras launched two "star wars" against Pomona, first in 792 and then in 794. The wars ended in a crushing defeat for Pomona.

There are three possible scenarios for Panhale's involvement. It may have turned a blind eye to the attack, i.e., double-crossed Pomona, since no army could pass without notice. It may have been thinly garrisoned and overrun before Pomona could send reinforcements. Or, the nobility and forces of Pomona may have taken refuge in Panhale and eventually fallen to a determined siege, the "Helm's Deep" scenario played out in real life. Anaya's continued research could solve the riddle, but dam construction on the site will forever close the book.

A proposed 30 to 46 m dam at Boca del Cerro threatens to destroy at least 17 known Maya sites, and possibly others not yet located. Of those, Panhale, Chinikiha, Lindavista, and Ojo de Agua Usumacinta appear to be key pieces in the puzzle of past trade and conquest routes.

In particular, the destruction of Panhale, a Maya mountain fortress in the Boca del Cerro gap, could prevent fully understanding the long running feud between the major cities of Piedras Negras and Pomona. Panhale was in the thick of the moves and countermoves of several great Maya cities throughout the Classic. It may be a key to understanding the regional conflicts and trade routes of the Classic period. Its destruction would be an irreplaceable loss.

Did the Maya run the Usumacinta canyons?

Did Maya boatmen have the boats, skill, and nerve to run the gorges in the Classic Period? There were economic incentives to make the run. Haggling first for porters and then a new set of boats at the far end of a portage always consumes time and costs more. Any big canoes brought down the river would find a ready market as replacements for worn out craft in the lowlands.

On the minus side the risk was real, the canyons were given a wide berth by 19th century *vogas*, and there are no significant riverside sites reported between El Porvenir and Francisco Madero. There are many stone bollards at El Porvenir, but almost none at natural landings between there and San José Usumacinta. Conversely, the most likely portage routes have important sites exactly on their start



Figure 7. Panhale is located on top of the hill in the middle of this photograph of the Boca del Cerro. (Photo: Joel Skidmore.)

and end points.

In the northwestern USA and Canada, Native Americans ran large (+10 m) dugouts through strong but straightforward Class 3 rapids like those in the Usumacinta canyons. Lewis and Clark's Corps of Discovery ran the massive Dalles and Cascade Rapids of the Columbia, Class 3-4, in dugouts. In the Guyana Highlands of South America, both Native Americans and Bush Negroes routinely shot Class 3 rapids in corials, medium sized dugouts designed for serious whitewater. Skilled Maya boatmen should also have been able to take large Lacandon style canoes through the heavy but uncomplicated Class 2 and 3 rapids of San José Canyon.

For comparison, the Chinese shot down the Yangtze Gorges in junks, but then tracked their ships back up at a mere 11 km per day. Han dynasty poet Du Fu described the Kuimen "Dragon Gate," at the end of Qutang Gorge, as the "most dangerous pass on earth." For thousands of years junks were hauled against the current by the *quiaofu*, an army of trackers crawling along the Zhandao, a ledge hewn across the cliff face. As Simon Winchester (2004:265) noted, "one junk in ten was badly damaged by the rocks, one in twenty was totally wrecked," a toll still preferable to overland travel.

The first recorded run of the Usumacinta canyons was by a Spanish entrada under Davila in 1530. In the late 20th century they were often run in specialized whitewater rafts and kayaks. "Canyon Cola del Diablo" is still run today in motorized lanchas, often in the wet season when currents are fierce but waves smaller. Of the known canyon runs, Davila's is most suggestive that the Maya might have done the same, but none are proof.

Piedras Negras is below Raudal Piedras Negras, a strong Class 2-3 rapid. *Vogas* were forbidden to run below

Desempeño / El Cayo in the 19th century. From the evidence of heavy traffic at El Porvenir, the Maya appear to have run the rapids, suggesting that they were bolder rivermen than most of their historical successors.

Running downstream, "Canyon Cola del Diablo" holds one of the two hardest stretches of Usumacinta whitewater, and it is no better going upstream. Its shores are steep, jagged, and poor for lining. It is possible to haul a canoe up each of the rapids in turn, but only Iguanas Canyon is harder overall.

A return trip up Iguanas Canyon appears to have been nearly impossible. Eight km upstream of Francisco Madero, sheer walls bracket a Class 2 rapid. There are no signs of a trackers' path cut into either cliff face in this narrows. Without a ledge, natural or artificial, lining large canoes upstream through the defile appears impossible. A long and arduous portage around or over the mountain barrier sans canoes would have been the only alternative.

It might be possible to end speculation and determine whether the Maya ran down the canyons by diving at low water in eddies at the foot of major rapids. The cargo of any boat lost in the rapids would end up in the cracks and crevices between boulders on the bottom. Salt, corn, textiles, feathers, and such would leave no trace, but granite metates from the highlands, obsidian from El Chayal, Motagua jade, and smaller elite goods should still be there. On the other hand, diving conditions are far from ideal. The river is deep, and just below most rapids the compressed volume of the Usumacinta causes tremendous turbulence and whirlpools. Diving at the head of rapids might turn up artifacts, but they could just as easily be offerings made for a safe run. Throughout the Americas, native peoples have made pleas to their river gods before a run, not after. The impressive whirlpools in major rapids were probably re-

garded by the Maya as portals to Xibalba. Anyone who has been forced to swim a big rapid would agree that the membrane between life and death is thin in a keeper hydraulic.

LOWER USUMACINTA

The lower river is all of a piece: wide, broadly meandering, and slow in the dry season, and a big swift river spilling across the Chontalpa lowlands in the wet season. It was navigable for any kind of canoe, though back channels were often used to avoid the main current and work up-river in the wet season.

The Usumacinta is part of an immense riverine system stretching from Cardenas (Cimatan) in the west to the Laguna De Terminos in the east. Prior to Spanish contact there were few trails but many, many winding channels lacing this grand compound delta, Los Patanos de Centla. Travelers heading east or west played a kind of game of snakes and ladders by riding down a big river, then working up smaller streams, against lesser currents, to the next big river, and so on.

Boca Del Cerro to the mouth of Río Chacamax – 181 km

The first 17 km to Tenosique are a long, slow loop. It is the first of several huge meanders. The 181 km of the Usumacinta from Boca del Cerro to the Río Chacamax is so round-about that one travels 4 km to advance only one. Upriver travel must have been tedious and, fighting current in the wet season, intolerable. For those headed into the highlands, a detour using the Río Chacamax would have been much faster and far less work. The Chacamax is more direct, and with less current.

Seven km downriver from Panhale is Rancho de Herradura at Arroyo Tacalate. There are three building groups on a tongue of higher ground between marshy ponds. The ruins of Pomona are only 6 km northwest. Remains of a gravel causeway heading west from Rancho de Herradura have been reported but not confirmed (Anaya 2001).

Rancho de Herradura may have been Pomona's port on the Usumacinta. It would be interesting to see if there is a corresponding site on the Río Chacamax somewhere near Arroyo Negro 8 km west of Pomona. If so, then Pomona would have sat on the height of land near the midpoint of a 14 km portage between rivers.

Downstream 1.5 km from Arroyo Tacalate is a dry season ford on the outskirts of the village of Pomona Primera Sección, which includes a small Maya site. Another 1.5 km downstream is La Isla, a long island and a village on the left bank. Three km southeast, away from the river, is the third order Maya site of El Faisan. It is bisected by Highway 203 between Boca del Cerro and Tenosique.

Tenosique shares about the same location with Tanoche, its Postclassic namesake. The 19th century portage past the canyons ended here. It seems likely that the portage followed a Late Postclassic trail also ending at Tanoche.

Continuing downriver, there are Maya sites at Estapilla, Canizan, Multe, Santa Ana, Balancan, Pobilcuc, and Tierra Blanca. After much research and map analysis, Scholes and Roys (1968:442-448) concluded that Cortez crossed the Usumacinta at or very near Canizan, then called Cuatopan.

Between Canizan and Multe the Río San Pedro Mártir

(Río Tachis) joins the Usumacinta 81 km below Tenosique. The San Pedro is a major tributary and past canoe route east to the central Peten.

The enormous bend at Balancan is 20 km around but only 1.5 km across. It is one place where a portage across a meander neck might have been worth hauling boats as well as cargo across. It would be a good site to check for traces of an ancient canal.

Balancan is only 40 km from the head of navigation on the Río Chumpan. A portage south from El Aguacatal on the Chumpan to Balancan in the Classic would have shortened a trip from Laguna de Terminos to Balancan by 100 km, all of it upriver on the Ríos Palizada and Usumacinta. A modern ship canal has been proposed from the Usumacinta at Balancan north to the Chumpan and then to Laguna de Terminos. The canal seems unlikely to ever be built, but its consideration highlights the advantage of this possible shortcut.

The Preclassic Tierra Blanca site shares a type of ceramic, uniquely identified by daubed volcanic-glass bead-ing, with Chinkihá 35 km south, and with no other sites, suggesting long and direct contact between the two via the Río Chacamax (Rands 1998).⁶ Tierra Blanca is only a few km from the mouth of the Chacamax, the obvious route between it and Chinkihá. The Chacamax may have been a key part of long distance trade networks in the region, and its shores merit more attention.

Mouth of Río Chacamax to Río Palizada – 106 km

The Usumacinta still winds about but not so drastically as upstream. Two km of river nets about 1 km of forward progress. The river splits first around Isla del Monserrate and then Isla del Chinal. Ríos Chico and San Antonio are the left-hand branches at the respective islands. Smaller and with less current, the Río Chico was an upstream alternate to the Usumacinta. The Las Playas/Laguna Catazaja seasonal lakes are the water route between Palenque and Río Chico, and hence to the Usumacinta.

There are Maya sites at Trinidad (Preclassic), Monte Cristo, Zapatillo, Chable, and Tecolpan.

Río Palizada to Frontera on the Río Grijalva – 120 km

The river becomes less winding and more direct as it heads for the Gulf. Instead of meandering, it breaks into multiple channels enfolding large islands. Most habitations are perched on present and past natural levees rising marginally above the vast marshes and swamps of Los Patanos de Centla.

The principal distributaries of the Usumacinta are the Río Palizada and the Río San Pedro y San Pablo. Ten km downstream of the Palizada is the town and sizeable Late Preclassic-Late Classic Maya site of Jonuta, where the Río San Antonio rejoins the Usumacinta.

Twenty-eight km farther on, the Río San Pedro y San Pablo breaks off to the north. Nearing the Río Grijalva, the Usumacinta breaks into three channels. The westernmost is Arroyo de los Idolos. The largest is Río de las Islas, which joins the eastern channel and the Río Grijalva at Tres Bocas ("Three

⁶ According to Rands (1998) there are also suggestions of Olmec-Chinikihá contacts.

Mouths"). The Usumacinta officially ends at Tres Bocas.

The last 16 km from Tres Bocas to Frontera (Postclassic Potonchan, "Putun Snake") are on the Grijalva. At the mouth is the Barra de Tabasco, which, in spite of the volume, is not particularly rough. The Río Grijalva is navigable for almost 300 km west to Malpasito, a Postclassic Zoque site at the foot of the mountains of Chiapas.

Conclusion

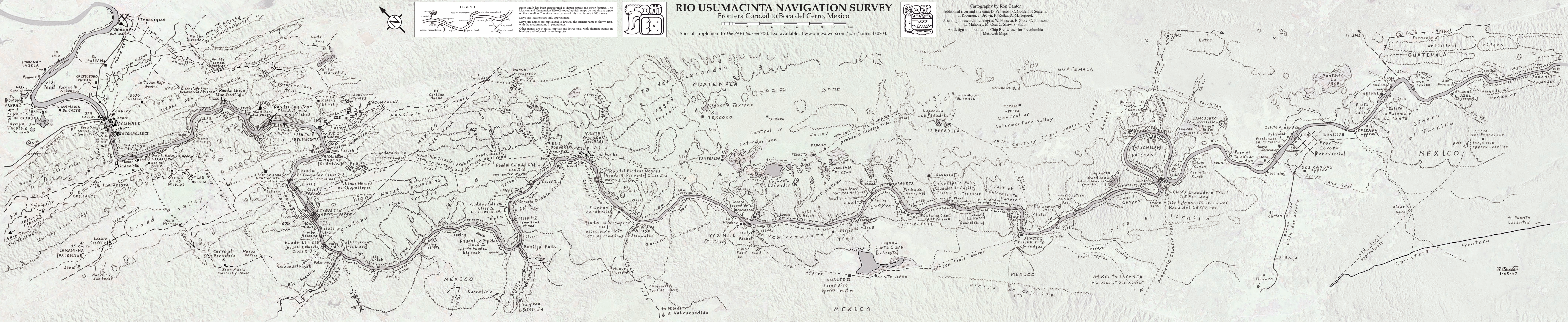
The Usumacinta was one of the great water highways of the ancient world, but it was not an easy one. The Maya of river cities such as Yaxchilan and Piedras Negras faced problems of fluctuating water levels, strong currents, and challenging rapids within a series of canyons. Like other civilizations around the world, they charted a course through or past most of the obstacles. Canyons that were too difficult, they bypassed on trails threading the mountain valleys.

Trails, sketched by ancient sites and modern use, appear to have paralleled the river to form a transportation corridor linking the coastal lowlands and the upper basin of the Usumacinta. Control of this corridor was the impetus for political maneuvering by the river cities throughout the Classic Period, and occasionally the spark for war.

By researching and documenting the river in some detail, the author has hoped to better understand how the river road worked in the past. More needs to be done while still possible. The shadow of a high dam at Boca del Cerro still looms over much of the Usumacinta below Piedras Negras.

References

- Aliphath, Mario M.
1994 Classic Maya Landscape in the Upper Usumacinta River Valley. Ph.d. dissertation, University of Calgary.
- Anaya Hernandez, Armando
1999 Site Interaction and Political Geography in the Upper Usumacinta Region During the Late Classic: A GIS Approach. Ph.d. dissertation, University of Calgary.
- 2001 The Pomona Kingdom and its Hinterland. Report submitted to FAMSI: www.famsi.org/reports/00082.
- Andrews, Anthony P.
1983 *Maya Salt Production and Trade*. University of Arizona Press, Tucson.
1991 America's Ancient Mariners. *Natural History* 100(10):72-75.
- Blom, Frans
1936 *Conquest of Yucatan*. Houghton Mifflin, New York.
- Bullard, William R.
1968 Maya Settlement Patterns in Northeastern Peten, Guatemala. *American Antiquity* 25(3):355-372.
- Cordan, Wolfgang
1963 *Secret of the Forest*. Victor Gollancz, London.
- Elpel, Thomas J.
n.d The Atlatl and Dart: An Ancient Hunting Weapon. www.hollowtop.com/atlatlbbob.htm.
- Golden, Charles
2003 Sierra del Lacandón Regional Archaeology Project, First Field Season. Report submitted to FAMSI: www.famsi.org/reports/02020.
- Golden, Charles, Edwin Román, A. Rene Muñoz, Andrew Scherer, and Luis A. Romero
2005 Reconocimiento y Patrones de Asentamiento en La Sierra del Lacandón. In *XVIII Simposio de Investigaciones Arqueológicas en Guatemala*, edited by J. P. Laporte, B. Arroyo, and H. Mejía, pp. 293-303. Museo Nacional de Arqueología y Etnología, Guatemala City.
- Golden, Charles, and Andrew Scherer
2006 Border Problems: Recent Archaeological Research along the Usumacinta River. *The PARI Journal* 7(2):1-16.
- Halle, Louis
1941 *River of Ruins*. Henry Holt, New York.
- Herrera, Fermín
2004 Nahuatl-English, English-Nahuatl (Aztec). Hippocrene Books, New York.
- Houston, Stephen, Héctor Escobedo, Mark Child, Charles Golden, Richard Terry, and David Webster.
2000 In the Land of the Turtle Lords: Archaeological Investigations at Piedras Negras, Guatemala. Report submitted to FAMSI: www.famsi.org/reports/99028.
- Karttunen, Frances
1983 *An Analytical Dictionary of Nahuatl*. University of Oklahoma Press, Norman.
- Krustev, Dimitar
1970 *River of the Sacred Monkey*. Wilderness Holidays, Charleston, South Carolina.
- Leopold, Luna
1997 *Water, Rivers, and Creeks*. University Science Books, Sausalito, CA.
- Maler, Teobert
1901 *Researches in the Central Portion of the Usumacinta Valley: Report of Explorations for the Museum 1898-1900*. Memoirs of the Peabody Museum of Archaeology and Ethnology, Harvard University 2(1). Cambridge, Mass.: Peabody Museum of Archaeology and Ethnology.
1903 *Researches in the Central Portion of the Usumacinta Valley: Report of Explorations for the Museum. —Part Second*. Memoirs of the Peabody Museum of Archaeology and Ethnology, Harvard University 2(2). Cambridge, Mass.: Peabody Museum of Archaeology and Ethnology.
- Martin, Simon
2004 A Broken Sky: The Ancient Name of Yaxchilan as *Pa' Chan*. *The PARI Journal* 5(1):1-7.
- Martin, Simon, and Nikolai Grube
2000 *Chronicle of the Maya Kings and Queens*. Thames and Hudson, New York.
- Mathews, Peter
1988 The Sculpture of Yaxchilan. Ph.D. dissertation, Yale University.
- Nelson, Zachary
2003 The Growth of Piedras Negras, Guatemala. Report submitted to FAMSI: www.famsi.org/reports/01044.
- O'Kon, James
2003 The Maya Suspension Bridge at Yaxchilan. Paper presented at the Second International Conference on Structural Engineering and Construction. Rome.
- Rands, Robert L.
1998 Palenque and Selected Survey Sites in Chiapas and Tabasco. Report submitted to FAMSI: www.famsi.org/reports/97032.
- Satterthwaite, Linton, Jr., Mary Butler, and J. Alden Mason
1939 Piedras Negras Archaeology, 1931-1939. Edited by John M. Weeks, Jane Hill, and Charles Golden. University of Pennsylvania Museum of Archaeology and Anthropology. FAMSI: www.famsi.org/research/piedras_negras/u_penn.
- Scholes, France V., and Ralph L. Roys
1968 The Maya Chontal Indians of Acalan-Tixchel. 2nd ed. University of Oklahoma Press, Norman.
- Shaw, Christopher
2000 Sacred Monkey River. W.W. Norton, New York.
- Stephens, John Lloyd
1841 Incidents of Travel in Central America, Chiapas and Yucatan. 2 vols. Harper & Brothers, New York.
- Tate, Carolyn
1992 Yaxchilan: The Design of a Maya Ceremonial City. University of Texas Press, Austin.
- Winchester, Simon
2004 The River at the Center of the World: A Journey up the Yangtze, and Back in Chinese Time. 2nd ed. Picador, New York.
- Zender, Marc
2002 The Toponyms of El Cayo, Piedras Negras and La Mar. In *Heart of Creation: The Mesoamerican World and the Legacy of Linda Schele*, edited by Andrea Stone, pp. 166-184. University of Alabama Press, London.
2005 The Dos Caobas Stelae. Mesoweb: www.mesoweb.com/reports/frontera2.html.



RIO USUMACINTA NAVIGATION SURVEY

Frontera Corozal to Boca del Cerro, Mexico

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Cartography by Ron Canter
 Additional river and site data: D. Pentecost, C. Golden, F. Seaton,
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 L. Mahoney, M. Oca, C. Shaw, S. Shaw
 Art design and production: Chip Breitwieser for Precolumbia
 Mesoweb Maps

LEGEND

- possible ancient trail
- modern plan, generalized
- Maya site
- modern place
- rapids
- raudal
- trail
- rough road
- all weather road
- edge of rugged terrain
- waterfall
- meander
- rocky beach
- pothole

River width has been exaggerated to depict rapids and other features. The Mexican and Guatemalan 1:50,000 topographical maps do not always agree on the shoreline. Therefore the accuracy of this map is only ± 100 meters. Maya site locations are only approximate. Maya site names are capitalized. If known, the ancient name is shown first, with the modern name in parentheses. Other names are in initial capitals and lower case, with alternate names in brackets and informal names in quotes.

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