

TRIALS & TRIP

BY CYNTHIA LEVINSON

A TRIAL RUN WAS OUT. IT WAS SINK OR SWIM!

Alexei Vranich, Paul Harmon, and 70 teammates slowly shoved their reed boat along tree-trunk rails down a slope of the Andes Mountains in Bolivia. When the 12-ton, 50-foot boat splashed into the deep, cold water of Lake Titicaca, the team members held their breath. Would it float? If so, would it survive winds, rocks, and whirlpools as Captain Harmon sailed it from Huatahata to Copacabana? Finally, would it be sturdy enough to support the nine-ton boulder they needed to ferry back? Even the Aymara Indians who had built the boat were not sure.

THE DOUBTERS

Between A.D. 500 and 950, hundreds of thousands of people lived, worked, and worshiped huge monuments at Tiwanaku, an area set 13,000 feet high in grassy plains, far from any river. Ponce, the best known monolith, is eight tons of green andesite stone. But, the closest quarry is 75 miles away, on a peninsula that juts into Lake Titicaca. How did Tiwanakans haul boulders down one mountain, across water, and over 15 miles of rough terrain without wheels, draft animals, or iron tools?

Archaeologist Vranich proposed that Tiwanakans floated the boulders on huge boats woven from totora reeds that grow around Lake Titicaca. Today, Aymara fishermen still build small reed boats, but many of them thought Vranich's idea was preposterous. Anchors, they said, could not hold in the lake's deep waters and high waves. And, according to legend, a race of giants had placed the boulders there.

But Vranich was determined to prove his theory. He just had to build a reed boat, sail it in the highest navigable lake in the world, dig up a nine-ton boulder, and ferry it back, using only materials and techniques that were available 1,500 years ago.

QALA YAMPU

To carry out the plan, Harmon organized Aymara boat builders and sailors. At first, all went well. In two-and-a-half months, the builders had gathered 1,800,000 totora and tied them, using ropes made of prairie grass, into 3,000 bundles. They then wove the tight bundles into a U-shaped boat, which Harmon called *Qala Yampu* ("stone totora boat" in Aymara). When the team then slid it into the

TERRORS

lake, it floated. All was going well.

Then, thrashing storms swept through the area and almost destroyed the boat. But the near catastrophe brought a fact to the team's attention: The builders had not followed instructions. *Qala Yampu's* sails were incomplete, and there was no centerboard to keep the boat straight.

"It is the maddest I have been in years," Harmon wrote in his journal. "They never believed the project could be done. I still believe."

Harmon and his crew tried for a week to sail the broken boat through the Straits of Tiquina toward the stone quarry's dock at Copacabana, but the wind blew in the right direction for only a few hours at night. During the day, it blew the other way, sending them back to where they started because, as the Aymara predicted, the anchor did not hold.

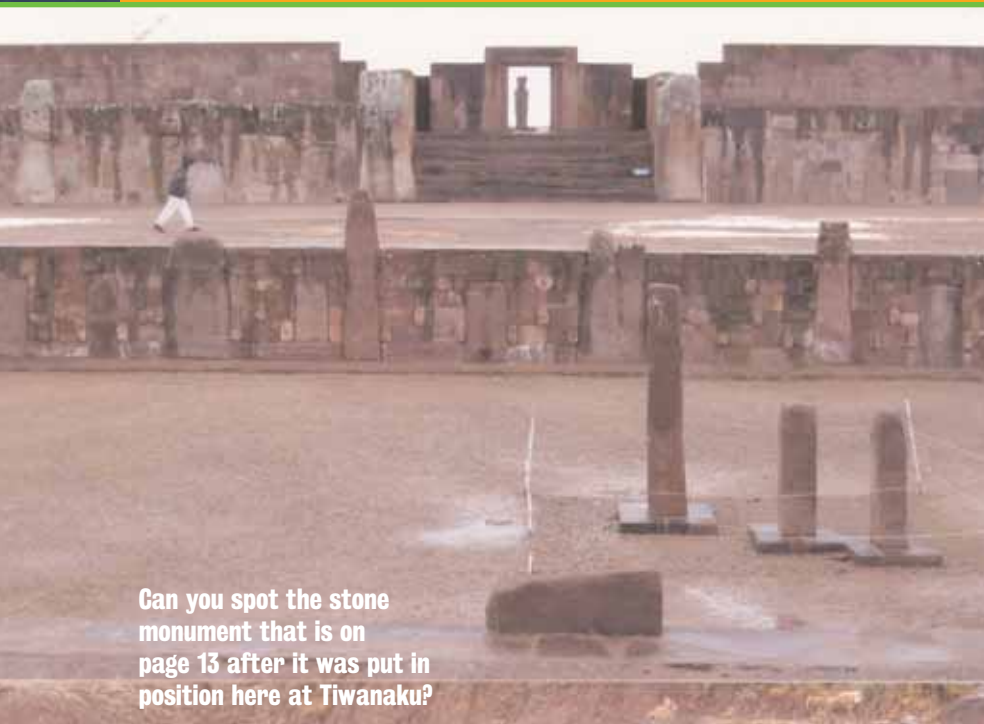
"We named the strait 'End of the Rainbow' because you can never reach it," Harmon wrote.

A GOOD WIND

Finally, the wind blew them into Tiquina where Vranich and Harmon found a new team to re-build *Qala Yampu*. More than a week behind schedule, they launched the boat again and glided into Copacabana in two days. But, soon after, everyone became ill with food poisoning, and once again the journey was delayed.



A monument of green andesite stone
at Tiwanaku



Can you spot the stone monument that is on page 13 after it was put in position here at Tiwanaku?



Project director Alexei Vranich working onsite at Tiwanaku.

Once back on their feet, Harmon found the perfect andesite boulder to test Vranich's theory. Its dimensions and weight—as much as seven small cars—matched Ponce's. Over a period of three days, 20 people slid it 60 feet downhill to the shore. Using ropes tied around the boulder and around stakes they had

embedded in the lake, they hauled it up a wood plank laid over a pebble ramp until it was level with the boat.

"I watched people motion that the boat was going to flip," he wrote. "I have heard them say the stone will fall through the totora. We all pulled or pushed, and moved the stone an inch or two at a time. It fell with a mighty thud."

And, the *Qala Yampu* stayed afloat! But just when they were ready to sail, Harmon fell ill with food poisoning, and he had to watch his crew sail without him.

PREVAILING WINDS

Winds on Lake Titicaca generally revolve clockwise in a complete circle every 24 hours. But the speed is not steady, and the timing is unpredictable. In the summer, near Copacabana, the wind usually blows from west to east for about 15 hours and then calms for several hours. Between about 2:00 A.M. and 5:00 A.M., it blows from east to west.

One night during Harmon's and Vranich's outbound journey, westward winds started at 10:30 P.M., giving them extra sailing time. During the day, however, 40-knot eastward winds blew them backward. The prevailing eastward winds shortened their return trip.

A HERO'S WELCOME

When the boat reached Tiwanaku's dock at Santa Rosa, "40 children were waiting to greet us, singing and cheering." With the help of townspeople, the team rolled the stone uphill. The archaeological experiment had succeeded.

Experimental archaeology can be exasperating, exhausting—and exhilarating. Using only ancient materials and techniques, Vranich and his team proved that Tiwanakans could have hauled stones for

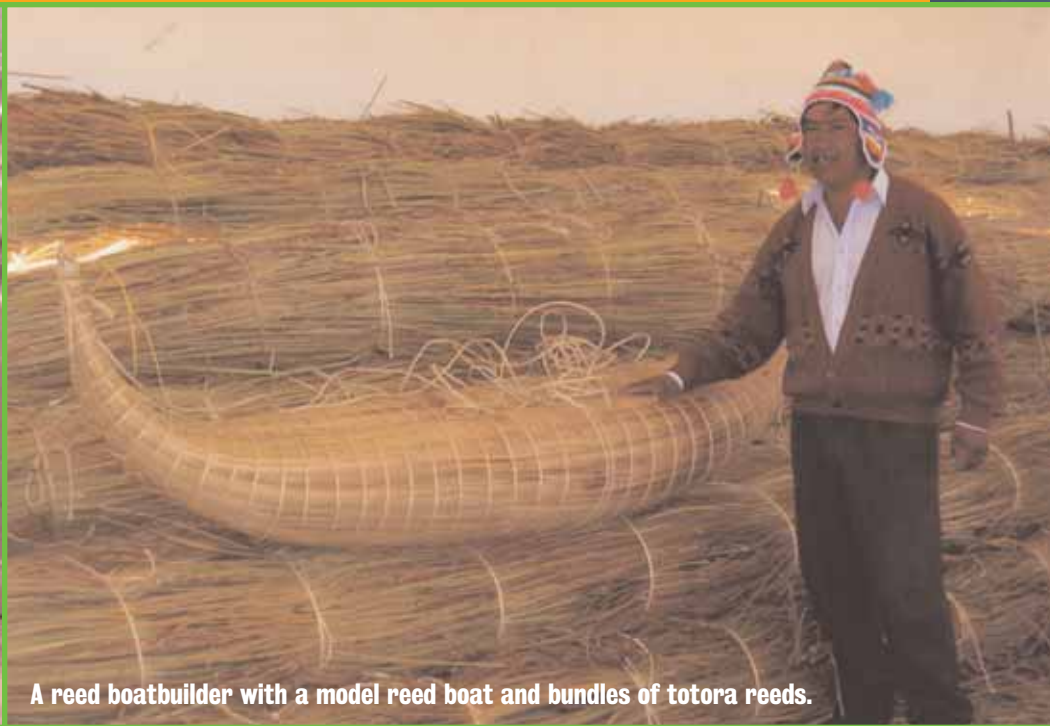
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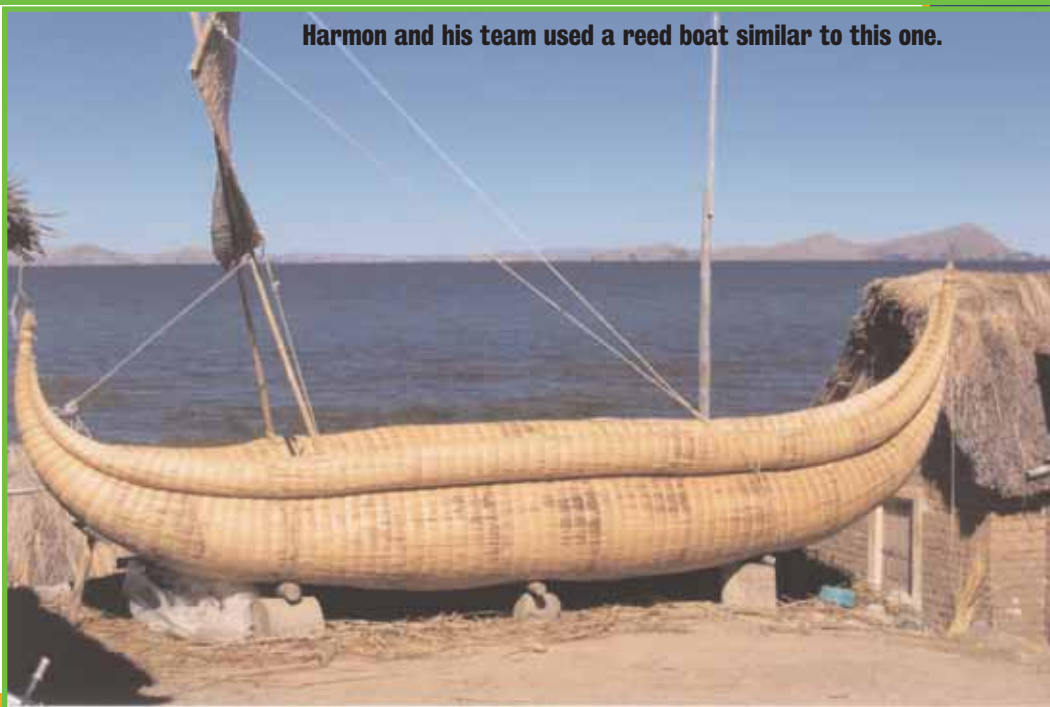


A reed boatbuilder with a model reed boat and bundles of totora reeds.

their monoliths across 75 miles of land and water.

Harmon wrote, "I have not heard many say that they thought it would work. I love it when that happens! Our team has pulled through." Even facing possible disaster, he concluded, "There was no way I wasn't going to make it."

Cynthia Levinson lives in Austin, Texas, and in Boston, Massachusetts. She writes fiction and non-fiction for young people and enjoys adventurous travel.



Harmon and his team used a reed boat similar to this one.



TOTORA REEDS

Totora reeds grow in the shallow, marshy areas around Lake Titicaca. In addition to weaving them into boats and sails, Aymara use them for roofing, toys, and cattle feed. During times of famine, people eat boiled reeds as well. The thick, hollow reeds range in length from 6 to 20 feet and are harvested by being cut several feet below the water surface with a scythe or knife tied to a long pole. They must be dried for 3 to 4 weeks before use. Once bundled, however, they re-absorb water, making the boats tight and buoyant.