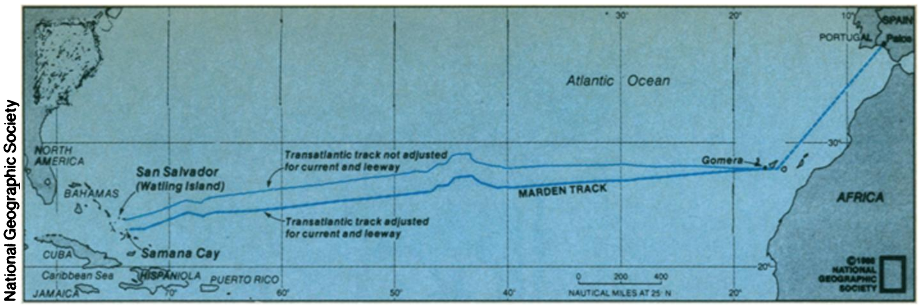
Goodbye Columbus, hello Samana Cay



National Geographic Society

New (bottom) and previous (top) calculations of the Columbus voyage.

Nearly 500 years after his historic voyage to the New World, Christopher Columbus's accepted point of arrival has shifted. The explorer first landed on the narrow, 9-mile-long island of Samana Cay in the Bahamas, according to a report presented at the National Geographic Society in Washington, D.C., last week. The island is 65 miles southeast of San Salvador, known as Watling Island prior to 1926, which many history books peg as the place where Columbus first dropped anchor.

The five-year study was directed by Joseph Judge, senior associate editor of NATIONAL GEOGRAPHIC magazine. He commissioned a new translation of a summary of Columbus's lost log written by a 16th-century priest. The voyage was then replotted by Luis Marden, a former NATIONAL GEOGRAPHIC editor and transatlantic sailor, and his wife, mathematician Ethel Marden, taking into account the effects of currents and leeway, a ship's sideways slip due to wind. Other investigators have not used these crucial factors in their calculations, says Judge. The Mardens also based their work, which included a computerized retracing of the Atlantic crossing, on the recently discovered length of the sea league used to chart nautical distance in Columbus's time. The course plotted with these data ends up at a point about 10 miles east-northeast of Samana Cay.

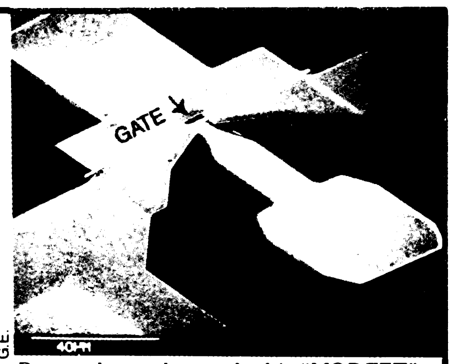
Further analysis bolstered the Mardens' estimate. The 16th-century abstract of Columbus's log gives the general directions and distances he traveled after the initial landing to four other islands before going on to Cuba. One location in these Bahamian travels was pinned down with certainty; a computer program ran the course backward from that point, ending up at Samana Cay.

Earlier this year, Judge and several co-workers, including archaeologists Charles Hoffman and Nancy Hoffman of Northern Arizona University in Flagstaff, confirmed that Samana Cay was inhabited, at least seasonally, at the time of Columbus's arrival. The group uncovered 10 archaeological sites, along with pottery and other artifacts.

At least eight other islands in the Bahamas have been proposed as the site of Columbus's initial landing. Samana Cay was first proposed in 1882 by Gustavus Fox, who had been Abraham Lincoln's assistant secretary of the Navy. Other scholars, however, dismissed his argument. In 1942, Harvard University historian Samuel Eliot Morison asserted that Columbus arrived at Watling Island, or San Salvador, a view that researchers began to challenge several years ago.

The argument over where Columbus landed has not been conclusively settled, but Judge says he is "98 percent sure" that Samana Cay is the answer. "Perhaps infallible proof will come only with discovery of the original Columbus log and chart," he adds. *— B. Bower*

The fastest transistors in the world



G.E.

Researchers who made this "MODFET" say it is the world's fastest transistor. Its gate, which controls electron flow, is 0.25 micron long; scientists are working on a device with a 0.1-micron gate, which should be even faster.

In the race to make computers compute faster and communication systems convey more information, the speed at which electronic components operate is of paramount importance. Last week, scientists at the University of Illinois at Urbana-Champaign, along with researchers at General Electric Laboratory in Syracuse, N.Y., pulled ahead of the pack by announcing that they had developed the world's fastest transistor. Depending on whom one speaks to, however, the Illinois-G.E. team may be running neck and neck with a research group working on a different kind of transistor at Lincoln Laboratory in Lexington, Mass.

Illinois team leader Hadis Morkoç estimates that his group's transistor, a type of semiconductor device called a modulation-doped field-effect transistor (MODFET), has a maximum operating frequency of 230 billion hertz (GHz) — about one and a half times higher than the previous MODFET record. Phillip Smith at G.E. says he expects that the device, with refinement, could achieve 400 GHz or more. The higher the maximum operating frequency, the more information a device can receive or transmit when it's used in analog circuits. And a high maximum operating frequency means that the device, when used digitally in computers, has a fast switching speed.

Gerald L. Witt of the Air Force Office of Scientific Research in Washington, D.C., calls the 230-GHz number "astounding." Smith thinks the new device will have a "significant impact" in communications and he anticipates that "most people now working on conventional MODFETs will drop them in favor of this new device." He says the new MODFET also has a lower noise level than any other transistor in the making.

Morkoç's group has improved upon conventional MODFETs by sandwiching a 100-angstrom-thick layer of indium gallium arsenide (InGaAs) between the layers of aluminum gallium arsenide (AlGaAs) and gallium arsenide (GaAs) found in conventional devices. The velocity of electrons is much greater in InGaAs than in GaAs or AlGaAs. The disadvantage of trying to grow InGaAs atop GaAs is that the spacing between atoms in the InGaAs lattice differs from that in GaAs; this mismatch strains the crystal, causing lattice defects that impede electron motion. But Morkoç's group made the layer thin enough to minimize the number of defects.

Researchers at Lincoln Laboratory, however, say the new MODFET's maximum operating frequency is comparable to what they have achieved with a device called the permeable base transistor (PBT), which consists of metallic, comb-like teeth embedded in a gallium arsenide layer. But Morkoç says he thinks the calculations of his MODFET's maximum operating frequency are much more accurate than the estimates of the PBT's. Moreover, he and others note that PBTs, unlike conventional MODFETs, have yet to be produced outside of a laboratory, so chances are that Morkoç's new MODFET will reach the commercial winner's circle much sooner. *— S. Weisburd*