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Research Supports Bible's Account of Red Sea Parting

Weather: Gulf of Suez's geography would make it possible, meteorologist and oceanographer say.

By THOMAS H. MAUGH II
TIMES SCIENCE WRITER

Sophisticated computer calculations indicate that the biblical parting of the Red Sea, said to have allowed Moses and the Israelites to escape from bondage in Egypt, could have occurred precisely as the Bible describes it.

Because of the peculiar geography of the northern end of the Red Sea, researchers report Sunday in the *Bulletin of the American Meteorological Society*, a moderate wind blowing constantly for about 10 hours could have caused the sea to recede about a mile and the water level to drop 10 feet, leaving dry land in the area where many biblical scholars believe the crossing occurred.

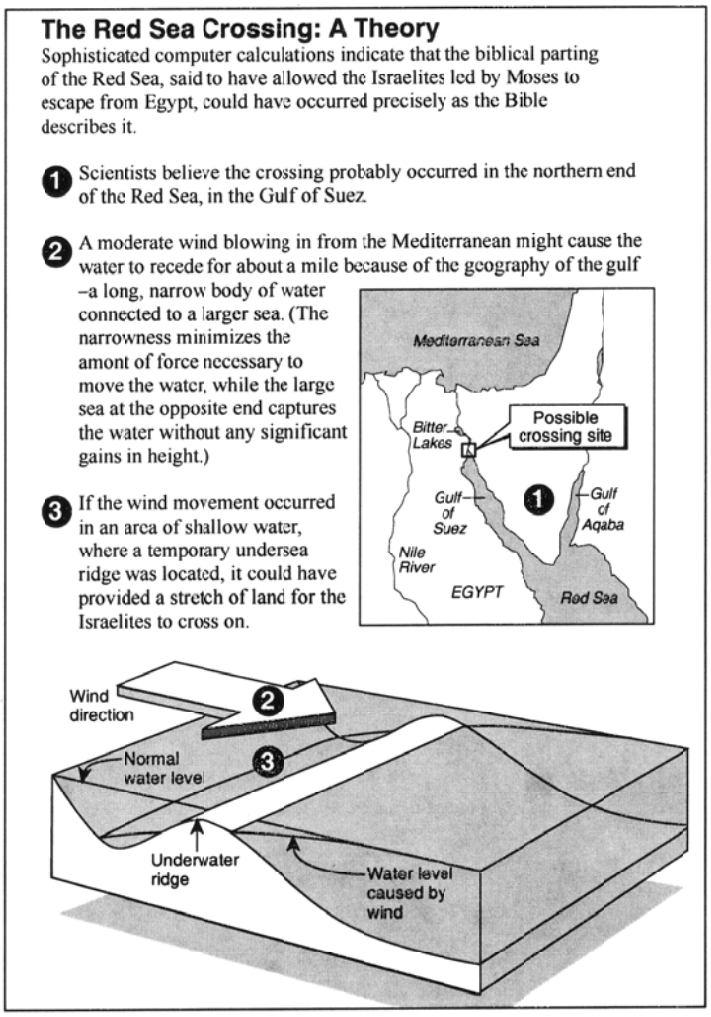
An abrupt change in the wind would have allowed the waters to come crashing back into the area in a few moments, a phenomenon that the Bible says inundated the Israelites' pursuers. This explanation "should not affect the religious aspects of the Exodus," wrote meteorologist Nathan Paldor of the University of Rhode Island and oceanographer Doron Nof of Florida State University. "Some may even find our proposed mechanism to be a supportive argument for the original biblical description of this event."

Although few religious scholars or scientists were familiar with the report, oceanographer Gabriel Csanady of Old Dominion University in Norfolk, Va., said the new scenario is "very plausible." Csanady was one of the reviewers who recommended publication of the report in the Bulletin.

The Israelites' flight is described in the 14th chapter of the book of Exodus: "The Lord caused the sea to go back by a strong east wind all of the night, and made the sea dry land, and the waters were divided. And the children of Israel went into the midst of the sea on the dry ground."

Most scholars agree that the Israelites did not cross the Red Sea, but the Gulf of Suez, which is a northern extension of the gulf, around the site of the modern town of Suez.

Paldor, who is on sabbatical in Rhode Island from the Hebrew University of Jerusalem, said he became interested in the problem because of his acquaintance with the biblical descriptions and because it is an



"interesting, unsolved problem in physical oceanography. The problem consists of simple physical laws–which are very well known–and a very complicated set of equations that describe what happens to the water when the wind acts on it."

His and Nof's contribution, he said, was to simplify the equations so that the calculations could be performed in a reasonable amount of time and without the need for an expensive supercomputer.

They found that the gulf's geographical configuration makes it possible for the waters to part. Because the gulf is so long and shallow, Nof said, "the wind can lift a lot of water. It's like blowing across the

top of a cup of coffee. The coffee blows from one end of the cup to the other."

Also important, they noted, is that the other end of the gulf is connected to a large body of water, the Red Sea. That sea can accommodate the water from the gulf without rising significantly. Their calculations show that a steady northeasterly wind of about 40 to 45 m.p.h. over a 10-hour period could push the water of the gulf back from the northern shore by as much as a mile, lowering its depth by 10 feet or more. Such wind-driven reductions in water level are frequently observed during winter storms in Lake Erie, Paldor said, but the bottom slope there is much steeper than in the Gulf of Suez, so the shoreline does not recede.

Such a phenomenon would not completely explain the biblical passage, which says that the Israelites had water on both sides of them when they made the crossing. Paldor and Nof speculate that the group actually crossed on an underwater ridge that was exposed by the receding water. In that case, there would have been water on both sides.

No such ridge apparently exists at the site now, but Csanady has previously shown that such ridges are formed and destroyed frequently.

One potential objection to the new theory is that the researchers postulate a northwesterly wind, while the Bible cites an east wind. But they note that in Hebrew texts, the wind prior to the crossing is described as *Ruach kadim*, which can mean northeasterly or southeasterly. Other researchers have previously suggested that the parting of the Red Sea might have been caused by a tsunami, a massive tidal wave resulting from an earthquake. Such an event could have caused the waters to recede briefly and then crash back upon the pursuers.

But the biblical account "specifically addresses a strong wind that blew for the entire night before the crossing," Paldor said, and indicated that the waters receded gradually.

Thus the tsunami explanation, he said, is simply not tenable.