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Moses

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Law-giver, liberator and spiritual leader – Moses is one of a small number of figures who have transformed the course of human history.

In *Moses*, the latest scientific evidence is combined with state-of-the-art computer graphics and dramatic reconstructions to reveal the sensational truths that lie at the heart of the Moses story.

Moses is a hugely influential prophet in Christianity, Judaism and Islam. And, in the Ten Commandments, he outlined a basis for morality which has lasted over 3,000 years and been embraced by two-thirds of the world's population.

However, some scholars claim that there is no firm evidence to prove that Moses ever existed and that the extraordinary stories of his life are mere fantasy. The Bible is frustratingly vague about crucial details of the story, such as where the Hebrews lived or when the story is set.

Presenter Jeremy Bowen says: "Moses leading his people to freedom: it's full of supernatural special effects – the burning bush, 10 plagues and, of course, the parting of the Red Sea. There are so many miracles that many people believe it's a great work of fiction."

Moses goes on a quest for evidence, looking beyond the narrow confines of Biblical studies to bring in research from other fields, such as archaeology, anthropology, climatology, oceanography and vulcanology. What emerges are some startling insights into natural phenomena that could have inspired tales such as the Parting of the Red Sea and and the Ten Plagues.

The team behind the award-winning *Son Of God* brings this fantastical tale to life using the same mix of computer imagery and live action.

Director Jean-Claude Bragard says: "Sifting through the latest historical research and utilising new archaeological tools, we have been able to find a surprising amount of circumstantial evidence for the Biblical tales. We use this evidence to rebuild Moses's world and explore the legacy of his remarkable story."

Moses is a BBC/TLC co-production in association with Jerusalem Productions.

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The Moses story

Moses was said to have been born in the Nile Delta in ancient Egypt. Hebrew refugees had fled from the drought in their homelands to settle in this area. However, when Egypt's Pharaoh heard that the Hebrews – or Israelites – were multiplying faster than his own people, he ordered midwives to kill all new-born Hebrew boys. Hence, one desperate mother tried to hide her baby son in a basket of reeds by the Nile: that baby was Moses.

Moses disputes suggestions that the story of Moses's early life was copied from an ancient Babylonian myth about a great King called Sargon, who was discovered as a baby in a basket in a river. If this was true, there would be echoes of Babylonian words in the original Hebrew story. However, the key words in the story – the words for Nile, bulrushes, riverbank and the very name Moses – are all authentic Egyptian words.

Egyptologist Jim Hoffmeier, from Trinity International University, Illinois, says: "Actually, there are many stories of babies being put in baskets and exposed or put in water … this was an ancient way of putting a child out to the fate of the gods."

Moses was said to have been rescued by the Pharaoh's daughter (or his wife, according to the Koran) and brought up in the Royal Palace.

Moses argues that it was common practice for sons of foreign kings and chieftains to be sent to Egypt and educated at the Palace's Royal Nursery.

However, until recently, there was a problem with the very basis of the story itself as there was no proof that the Hebrews were ever in Egypt at all. But, in the Seventies, a team of archaeologists unearthed the foundations of a vast city on the Nile Delta. Built around 1250 BC, and housing up to 20,000 Egyptians, this is believed to be the Biblical city of Ramses, said to have been built with bricks made by Hebrew slaves. Using new technology, archaeologists have been able to map out the foundations of this city deep underground and *Moses* uses computer-generated imagery to re-build it for the first time.

One day, Moses left the Palace to watch the Hebrew slaves making mud bricks. Outraged by their treatment, he lashed out at an official and killed him. Facing the death penalty, he fled Egypt for Midian on the edge of Arabia. According to the story, he married Zipporah and spent the next 60 years living quietly as a shepherd until he heard the voice of God in a burning bush, ordering him to return to Egypt and lead his people to freedom.

The Pharaoh refused to release the Hebrews so God, through Moses, unleashed 10 terrible plagues on the Egyptians.

The Moses story

Moses draws on evidence from scientists to suggest that the Ten Plagues could have a basis in truth. Travelling to the USA, Jeremy Bowen visits the site of an environmental disaster in North Carolina, where the rivers did actually turn to blood, and goes to Mount St Helens, where a volcanic eruption 20 years ago caused the cattle to die and humans to fall sick, and created darkness and hail storms.

New computer simulations and evidence from climatologists, oceanographers and vulcanologists suggest that the eruption of the Greek island of Santorini in the 16th century BC could well have triggered a series of plague-like catastrophes in Egypt.

In the story, it is the 10th plague – the killing of the first-born – that finally persuaded the Pharaoh to allow the Hebrews to leave Egypt. That was the start of one of the most famous movements of people in history – the Exodus.

The Bible says that 600,000 men fled – together with their families, that would mean almost two million people. If the story of Moses is placed around 1200 BC, when the city of Ramses was at its height, it seems unlikely that such a large number of people could ever have been kept captive when the Egyptian army numbered only 25-30,000.

Moses looks at two alternative scenarios: first, that the number could have been a lot smaller and that the word *Aleph* in the Bible has been mistranslated to mean thousand, instead of a military unit. Six hundred military units would have totalled about 20-25,000 people, not two million.

However, *Moses* also uncovers evidence of an older city called Avaris, next to the site of Ramses. Archaeologists have found the remains of burial pits belonging to Semitic people in Avaris and ancient Egyptian historians claim that the Pharaoh expelled as many as 240,000 Semitic families from the city in the 16th century BC. If these Semites were the Hebrews of the Biblical Exodus, it may also provide a rational explanation for the pillars of fire and cloud that were said to have guided Moses and his people out of Egypt. The column of ash from Santorini would have towered at least 40 miles above sea level and been clearly visible from Egypt.

With evidence for the story of Moses scattered over 300 years, *Moses* concludes that the Exodus may not have been one single dramatic event. There may have been many exoduses over the years, with perhaps the most prominent group led by Moses.

As the Hebrews left Egypt, the Pharaoh is said to have changed his mind and sent 600 chariots after his runaway slaves.

Until 1997, there was no archaeological evidence that Pharaohs, let alone Ramses, had 600-strong chariot forces. Reliefs of the time show Ramses with only a few chariots. However, *Moses* presents the most recent archaeological evidence from the city of Ramses, which reveals a huge stable compound that could have housed 500 horses and chariots.

Moses and his people reached the Red Sea and God parted the waters, allowing the Hebrews to cross. The Sea then closed behind them, drowning the Pharaoh and his army.

This is perhaps the most fantastical element of the Moses story but there may be a rational explanation. The *Red* Sea is a mistranslation – the original text in the Bible says that Moses crossed the *Reed* Sea. *Moses* uses satellite

photography to suggest the location of this Sea and shows how it would have been physically possible to cross a shallow reed swamp.

The computer simulations of the Santorini eruption also provide a possible explanation for the famous image of a canyon of water created when the Sea parted. Tsunami experts discuss the huge waves that would have been generated by the explosion and suggest that they could easily have reached Egypt. *Moses* features a remarkable case from the Philippines, where a volcanic eruption on Mindoro generated similar effects in 1994.

The Bible says that, after crossing the Red Sea, Moses led the Hebrews into the Sinai desert where they spent 40 years wandering in the wilderness. While camped at the foot of the Mountain of God, God appeared to Moses and revealed the Ten Commandments to him.

The Ten Commandments is Moses's most significant contribution to world history and yet there is little evidence to indicate who wrote them or even where and when. They may have been written once the Hebrews had settled in the Promised Land and could have enforced them. Then again, perhaps it was Moses – as a student of the Royal Nursery, he himself would have been able to record the laws. Or perhaps the tablets were handed down to Moses by God himself. It is appropriate that Moses's most enduring legacy should still be shrouded in mystery.

Moses never reached the Promised Land. He is said to have died within sight of it, on Mount Nebo in Jordan. However, he told the Hebrews to go on – to make the land their own. Out of that struggle, the Jewish nation was born.

How science can unlock the door to the past

In the Bible, the 10 plagues and the parting of the Red Sea are miracles – acts of God working through nature. *Moses* brings together the latest scientific research to see if there is any evidence for such spectacular *natural* events.

The programme goes beyond the narrow confines of Biblical studies to bring in research from climatologists, oceanographers and vulcanologists. Their research suggests that there is evidence that a string of natural events triggered phenomena that could explain the story of the plagues and the parting of the sea.

All the evidence points in the direction of one catastrophic event – a huge volcanic eruption, not in Egypt itself, but 500 miles away on the Greek island of Santorini.

In the 16th century BC, Santorini was blown apart by a gigantic volcanic eruption that was thousands of times more powerful than a nuclear weapon. It was one of the biggest explosions of the last 10,000 years.

The ash cloud from the Santorini blast would have been huge and far-reaching. We only have to go back 20 years, to look at the lethal effects of the comparatively small cloud generated by the explosion of Mount St Helens, to imagine the devastating consequences.

When Santorini erupted, the wind was blowing in a south-easterly direction, towards Egypt. Samples of Santorini ash have been collected from the sea bed, the heaviest concentrations being in the direction of the Nile Delta.

Oceanographer Dr Daniel Stanley went to the Delta to drill for samples of mud and silt to see if the ash could have reached Egypt. He found volcanic shards that can be firmly related to the explosion. He says: "I think it would have been a frightening experience. It would have been heard, the event. The blast ash fall would have been felt."

If we conclude that a huge ash cloud did cover the Delta in the 16th century BC, could this have been the trigger for the plagues?

The Ten Plagues

Mike Rampino, a climate modeller from New York University, has run a new computer simulation to look at the climatic effects of the Santorini blast. The ash cloud passing overhead would have completely cut out the sun and plunged the Delta into darkness. This would have been accompanied by the kind of unusual weather seen after volcanic eruptions – lightening and perhaps hail. This would explain two of the 10 plagues – darkness and hail.

The new results suggest that the ash cloud would have caused temperatures to drop by up to 2°C, which would have reduced rainfall in the Delta and could have led to a drought. With river levels dropping, the water would have begun to stagnate. Combined with the poisonous minerals that were raining down from the ash cloud, the Nile would have become a deadly cocktail and conditions would have been ripe for an outbreak of further plagues.

An environmental disaster on the River Neuse in North Carolina, USA, in 1991 shows how one calamity can trigger another. Pollutants in the river poisoned the fish and over a billion died, turning the river the colour of blood and causing people living or working nearby to develop strange sores and boils.

If the Nile was poisoned after Santorini, the fish would also have been killed and the river may well have turned red. The same pollution could have driven millions of frogs on to land – the second plague. On land, the frogs would die, removing the only obstacle to an explosion of flies and lice – the third and fourth plagues. The flies could have transmitted viral diseases to the equine and cattle populations, killing

them – dead cattle was the fifth plague. And, finally, insects such as the stable fly could have bitten humans, causing the sixth plague – the boils and blisters.

Clearly, this theory doesn't explain everything – the volcano cannot explain the killing of all of Egypt's first-born children. However, the research does suggest that, underlying these stories, are real events that may well have become part of the collective memory.

The Parting of the Red Sea

The parting of the Red Sea, on the face of it, seems like pure fantasy. But, again, science may be able to go some way towards explaining the origins of this remarkable story.

If the Bible is read in its original Hebrew, it does not say that Moses and his people crossed the *Red* Sea – the word Red is a mistranslation. In the Hebrew Bible, they cross the Yam Suph – which translates as the *Sea of Reeds*. While crossing an area as vast as the Red Sea would have been a near impossibility, crossing a shallow reed swamp would have been a realistic option.

Today, there is no longer a place called the Sea of Reeds but ancient Egyptian texts mention an area called Pa-Zufy – it means The Reeds. Satellite photographs reveal a vast area of swampland in the eastern Delta which has long since dried up – Pa-Zufy lies to the south of this area and it is here that Moses must have crossed.

However, the Bible also includes a famous image of a great canyon of water as the Hebrews crossed the Sea … "the waters were a wall unto them on their right hand and on their left". It may be that the eruption of Santorini again provided the inspiration for this story.

Computer simulations of the Santorini eruption show that the collapse of the island would have triggered a mega-tsunami – a 600ft-high wave travelling at about 400 miles an hour. Tsunami expert Floyd McCoy has found evidence in the sediments on the ocean floor of the Mediterranean that the wave would have been one of the largest in history and that it must have reached Egypt.

As with any wave, before it breaks, a tsunami withdraws water from the shore. In the case of a mega-tsunami of this scale, it would have syphoned billions of gallons of water – not just from the shore, but also from connecting rivers and lakes – creating dry land for as long as two hours. It would have been long enough for the Hebrews to cross, although anyone in pursuit may not have been so lucky.

By the time the mega-tsunami hit the Delta, the wave would have dropped to 6ft in height, but it would have been about 100 miles long. As it travelled inland, down rivers and canals, it would have gained power and its sheer destructive strength could easily have drowned an army.

Such a devastating and dramatic event would have been remembered in the Delta for generations and may well have provided the inspiration for this incredible story.

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A web-site accompanying the programme at **www.bbc.co.uk/moses** allows viewers to:

• Participate in a live chat after the programme with Egyptologist David Rohl

• Revisit the theories proposed by the scientists and experts involved in the production

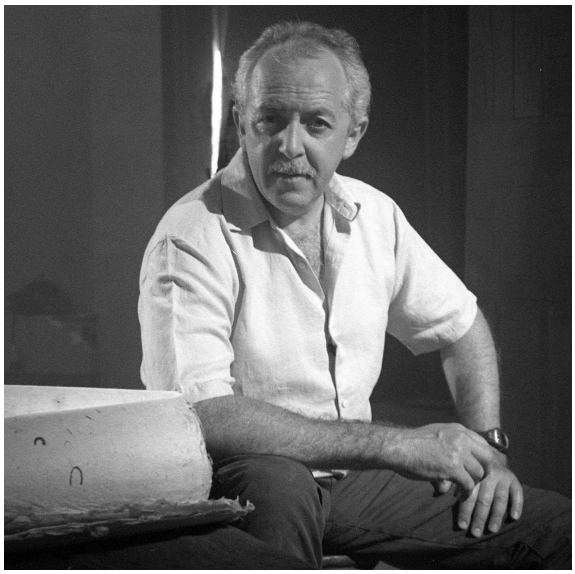
• View the computer-generated images in various stages of construction as well as the finished product

• See new graphics and evidence from the experts supporting their theories

• Hear behind-the-scenes stories and view pictures from the shoot.

Biographies

Jeremy Bowen, Presenter



Jeremy Bowen is no stranger to religious programmes, having presented the acclaimed series *Son Of God* in Easter 2001.

For *Moses*, he is re-united with director Jean-Claude Bragard and returns to the Middle East, where he was the BBC's Correspondent for five years.

Jeremy has just finished presenting BBC One's *Breakfast* after two years of early mornings. A seasoned war correspondent, he has reported for BBC News from more than 70 countries, and has covered conflicts in the Gulf, El Salvador, Afghanistan, Croatia, Bosnia, Chechnya, Somalia and Rwanda.

In 1995, Jeremy won the Best News Correspondent award at the New York Television Festival. He repeated this success the following year, when he won the Best Breaking News Report for his coverage of Israeli Prime Minister Yitzhak Rabin's assassination. He has also been shortlisted for a number of war reporting accolades, including the Bayeux award.

Jeremy joined the BBC in 1984, working as news trainee. He then spent time in the radio newsroom and as a television news correspondent before becoming Geneva Correspondent for Radio News in 1987.

Born in Cardiff on 6 February 1960, Jeremy was educated at Cardiff High School. He attended University College London before going on to Johns Hopkins University in both Italy and the USA.

Jean-Claude Bragard, Director/Producer

Jean-Claude Bragard has been at the BBC for almost 10 years and his recent credits include *Son Of God* (2001) and *Arthur – King Of The Britons* (2002).

He began his career at LWT in 1980, working on current affairs and religious programmes. In 1993, he joined the BBC to make *Kicking & Screaming – A History Of Football* and later worked on *Panorama*. Other career highlights include *Trouble With Boys*, *Canterbury* (with Nigel Hawthorne) and *Secrets Of The Pyramids*.

Jean-Claude studied Politics at Warwick University and Balliol College, Oxford.