

“Bo: Rationalising the Miraculous Plagues”

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Among the questions frequently asked regarding The Ten Plagues are whether they were random or did they follow some ecological sequence, and, if the Torah's account is accepted literally, how it was that the Israelites, living in the same country, escaped the devastation when the Egyptians suffered and ultimately perished. Furthermore, if the plagues were indeed attributable to the laws of nature, how we might account for the fact it was just the firstborn of the Egyptians who died in the final plague and not their younger siblings, and how it came about that the Israelite firstborn remained unaffected?

Among those grappling with these problems was Colin Humphreys, a renowned Cambridge scientist, in his book, *The Miracles of Exodus*.¹ When dealing with the biblical description of the plagues – which the majority of scholars are inclined to discount as a gross exaggeration – he treats the text with the greatest respect, believing that it offers the objective and incisive scholar vital clues that will validate every aspect of the narrative when viewed from a scientific and agricultural perspective. This is especially exemplified in the account of Moses' threat to send the plague of locusts:

If you refuse to let My people go, I will bring locusts on your territory tomorrow. They shall cover the surface of the land so that no one will be able to see the land. They shall devour the surviving remnant that was left to you after the hail; and shall eat away all your trees that grow in the field. Moreover, they shall fill your palaces and the houses of all your courtiers and of all the Egyptians – something that neither your fathers nor fathers' fathers have seen from the day they appeared

on earth to this day”... (Ex. 10:4 – 6)

So, Moses held out his rod over the land of Egypt, and the Lord drove an east wind over the land all that day and all night; and when morning came, the east wind had brought the locusts ...Never before had there been so many, nor will there ever be so many again. They hid all the land from view, and the land was darkened; and they ate up all the grasses of the field and all the fruit of the trees which the hail had left so that nothing green remained of tree or grass of the field in all the land of Egypt (vv.13-15).

To Humphreys, this description of the locusts didn’t sound far-fetched, and, to support his view, he quoted a report from *The Times* newspaper of June 19th 2001:

Plagues of locusts are devastating crops from Central Asia to the American Mid-West, sending farmers to the Book of Exodus for salvation. Not since the Egyptians incurred the wrath of God have so many locusts had their day. A billion-strong army is on the move, stretching far beyond the more normal swarming grounds of Africa and the Middle East.

Humphreys was particularly struck by the scientific sequence of each of the plagues. Regarding the locusts, he writes that an invading swarm looks for damp sand to lay its eggs and settles there for three or four weeks. So, for him, it was no coincidence that the plague immediately preceding the locusts was *barad*, hail, which made the land extremely wet, and thus an ideal environment for locusts to lay their eggs. Furthermore, desert locusts usually fly in with the wind, so when the Torah states: ‘God made an east wind blow across the land all that day and night,’ adding, ‘the morning came and the east wind brought the locusts’ (10: 13), it was consistent with what we know of locust behaviour.

As regards the plague of darkness (*choshech afeilah*: 10:22), Humphreys recalls witnessing a khamsin sandstorm, common in Egypt in the Spring and lasting up to two or three days. He saw the sun shining brightly through his hotel room one minute, yet, seconds later, it was blotted out by a thick, dark cloud of sand, so dark that he had to turn his bedroom light on to see. When he eventually went out into the street, he found sand piled up against shop doorways like driven snow after a snowstorm. He immediately associated this protracted and fierce khamsin he had witnessed with the biblical reference to *choshech afeilah*, ‘darkness that could be felt.’

The first of the Egyptian khamsin storms occur each year in March, shortly before Pesach, and, again, in line with the Torah’s account. Their dense and dark dust clouds are created by the red earth, brought by the Nile from Abyssinia and deposited in Egypt, being whipped up into the air after being dried out. Humphreys assumes that in the year of the Exodus, there had been a particularly heavy Nile flooding six months earlier, in September, which was responsible for depositing an unusually large quantity of red earth there.

As regards the final plague, the death of the firstborn, scholars like Nahum Sarna declared that it could only be explained in the context of the supernatural. Humphreys demurred and attributed it to the fact that each of the plagues occurred in a biological sequence, directly related to its predecessor.

This may be exemplified by the fact that the seventh plague of hail would have left whatever of the harvest that had survived in a very wet state. The eighth plague of locusts would have consumed most of what was left of the crops and would then

have proceeded to deposit locust feces over all the ground, contaminating thereby the remainder of the harvest. The Egyptians would have known from experience that they shouldn't store wet grain, but this was a time of crisis because most of their harvest had been destroyed. Hence, desperate to save whatever they could of their crops of barley and flax after its near destruction by the hail and the locusts, the Egyptians would have gathered what remained and taken the damp, contaminated harvest to their granary stores.

Even with good air circulation, damp grain can start to become mouldy within a few hours in warm weather, but, with poor air circulation, the situation worsens dramatically. The *khamsin* dust storm would have covered the entrance to the grain stores with sand and dust, preventing air circulation within and keeping the Egyptians indoors for three days (Ex.10:23). During that time, toxic spores and the deadly poisonous mycotoxin organisms from the feces of the locusts would have bred and multiplied in the damp and dark conditions. Sadly, the entry of mycotoxins into the food chains of some Third World countries accounts for many fatalities to the present day.²

Humphreys' hypothesis as to why the plague only attacked the Egyptian, and not the Israelite, firstborns, is truly perceptive. He reminds us that in many ancient societies, including Egypt, a firstborn son occupied a privileged position. He was fed first and often received a double portion. He also took over full responsibility for the family when the father died.³

Now, the Egyptians had just suffered six months of devastating plagues, which must have left them extremely short of food. In addition, the severe *khamsin* dust storm would have kept them indoors for three days. As soon as the dust storm stopped it would have been the firstborn who were fed the first meal of mycotoxin-contaminated grain from the almost empty grain store, and hence they were the ones to die the sudden death as described in our sidrah. The quantity of grain in the store may have been so low that, in many cases, there was none left for the rest of the family. And that is why the firstborn sons alone died.

As to why the firstborn animals also died, Humphreys again relates this to the sacred and specially privileged status of the firstborn. Thus, a vast number of sheep, goats, and cattle were sacrificed to a variety of gods in Egyptian temples and eaten by the priestly representatives of those gods. Sacrifices to their gods were also offered on domestic altars set up in private homes.

Emerging from the three days of the plague of darkness they would have discovered their crops and livestock decimated, with only a small amount of grain remaining. The top priority of the heads of households would then have been to feed their firstborn by allocating to them what precious little remained edible. Their next priority would have been to feed the latter to their firstborn male animals because the powerful priests would have demanded well-fed offerings, ostensibly to offer to their gods to appease them in this crisis, but in effect to keep themselves alive by feeding the leftovers to the rest of their family. So the firstborn sons and male animals ate the contaminated grain and died a speedy death. If

enough grain was left, then other members of the family would also have eaten the grain and died, for which reason the Torah doesn't state that *only* the firstborn died.

Now, and significantly, if wet grain is put on top of dry grain in a granary store the wet grain will contaminate first so that the top layers of grain will contain the mycotoxins, and it takes time for these to spread through all the grain below. Hence those who ate from the top layers were the most at risk; and it was because many Egyptian families probably had only a small amount of grain – all of which was damp and toxic and which was eaten by the firstborn of their males and their livestock – that the latter both died.

The Egyptians of the Nile Delta would soon have heard that the plagues had not affected the nearby region of Goshen where the Hebrews lived. Hence, the next day, those Egyptians whose firstborn had just succumbed and died would inevitably have rushed and demanded uncontaminated grain from the Israelite stores to feed the rest of their children who were thus saved from the plague.

The final problem to be resolved is why the Israelites were unaffected by the plague. To answer this, Humphreys points to the verse, “And I shall separate on that day the land of Goshen where my people live, that there be no swarms of flies there” (Ex. 8:18).

Goshen was a region in or close to the east Nile Delta and would not have been in the area of the prime property next to the highly desirable waters of

the Nile which the Egyptians would have kept for themselves. Thus, the ancient Israelites were probably living a few miles away from the Nile and its main branches so that they were close enough to where the Egyptians lived, to enable them to walk to work, but far enough away to be a distinct community.

The meaning of the fourth plague of *arov* (lit. 'a mixture') is vague. It is popularly rendered 'a swarm of wild beasts,' following early Jewish sources,⁴ although there is also support for the view of R. Nechemiah in the Midrash that it refers to 'a swarm of insects,' a rendering followed by the Bible translators of *The Jewish Publication Society*. This is also the identification employed here by Colin Humphreys as the basis for his thesis. The insect he identifies is the midge *Culicoides*, several species of which are known to be vectors of diseases and parasites that also affect animals. They would have been concentrated around the Nile since their larvae would have fed on the decaying fish and frogs that had resulted from the first and second plagues.

Both the midge and the stable fly are weak flyers with a range of less than a mile, and hence the cattle of the Israelites, located in the land of Goshen, would not have been bitten by the midges and the Israelites themselves would have escaped the boils caused by the infection spread by stable fly bites.

Humphreys points out that hailstorms and sandstorms are frequently very localized, so it is easy to see that the geographically separate region of Goshen

could have been spared both of these which had been responsible for the three days of darkness. Given that the crops of the Israelites would not have been stored damp in sand-covered stores and thus would not have developed mycotoxins, the Israelites and their livestock would have remained immune.

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I believe that Humphreys has offered us a coherent and integrated scientific explanation of why the Egyptians succumbed to, and the Israelites escaped, the plagues, of the significance of the order in which they appeared, and why it was only, or mainly, the firstborn of the Egyptians who succumbed, and not their younger siblings.

However, the real miracle is that they occurred just when the Hebrews needed them. That they appeared as natural phenomena suggests that that is God's preferred way of coaxing a person or a nation's special destiny along. Believers don't need to rationalise the biblical miracles; but if it helps to make the rationalists among us more comfortable, then that is also a worthwhile endeavour.

In the *Modim* blessing of our Amidah, we thank God for - *nisecha sheb'chol yom immanu* – 'Your miracles that are with us every day.' "Lord, we beg You to keep them coming. We sure need them in these troubled times."

NOTES

1. Colin J. Humphreys, *The Miracles of Exodus* (London & New York: Continuum International Publishing Group), 2003.
2. That the entry of mycotoxins into the food chain, via damp animal feeds or direct consumption by man, remains a major threat to the present day is widely reported. See Awuchi CG, Ondari EN, Nwozo S, Odongo GA, Eseoghene IJ, Twinomuhwezi H, Ogbonna CU, Upadhyay AK, Adeleye AO, Okpala COR. “Mycotoxins' Toxicological Mechanisms Involving Humans, Livestock and Their Associated Health Concerns: A Review,” *Toxins* (Basel). 2022 Feb 24;14(3):167.
3. The immediate assumption by the firstborn son of decision-making responsibility for the family on the death of the father is how the sages explain the sudden absence of Rebekah’s father, Betuel, from the protracted family discussion with Eliezer, the servant-steward of Abraham, on the matter of permitting her to accompany him back to Abraham’s home to become the wife of Isaac. Betuel is referred to in Gen. 24:15, 47 and 50, whereas, from vv. 55 onwards, it is ‘her brother and her mother’ who figure alone in the deliberations. The Midrash speculates that her father, Betuel, attempted to poison Eliezer in a bid to thwart his mission but an angel switched the dishes and Betuel died, leaving his son, Laban, with ultimate responsibility (Mid. *Ber. Rabb.* ch.12 and Rashi on v. 55).

4. See Mid. *Shem. Rabb.* 11:3, Targ. J. on the occurrences of *arov* in Ex.8:17, 18, 20, 25, 27; Josephus, *Antiquities* 2:14, and M. Jastrow, *Dictionary of the Targumim* (N.Y. 1967), p.1114a.