

he could well have been referred to as a magician.

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Sesostris III

David Down replies:

I congratulate Samuel Hanna at such a young age to have such a keen interest in biblical chronology. He has a good foundation by accepting that the Bible is the infallible Word of God and using that as our basis for understanding ancient chronology. As Samuel says, we need to determine biblical chronology straight from the Bible, and then determine where we need to change our current understanding of the chronologies of ancient Assyria, Egypt, Babylon, Greece and the like to harmonise with the biblical standard. In practice, however, there are a number of choices that need to be made and the outcomes of those, while reasonably small in absolute terms, do lead to differences.

The fundamental issue with Samuel's letter is the 430 years, which he assumes is the probable length of the sojourn of the children of Israel in Egypt. The record of the 430 years, of course, is specifically quoted in Exodus 12:40–41, which chapter describes the events on the day that the Israelites left Egypt. It says:

⁴⁰Now the sojourn of the children of Israel who lived in Egypt was four hundred and thirty years.
⁴¹And it came to pass at the end of the four hundred and thirty years—on that very same day—it

came to pass that all the armies of the LORD went out from the land of Egypt' (NKJV).

It can be seen that Genesis 12:40 above can be interpreted two ways—either 430 years that the Israelites were in Egypt, or 430 years for their whole sojourn which started from the time Abraham came to Canaan. In the NKJV above it is left open and depends on where the commas go. It could be 'the sojourn of the children of Israel, who lived in Egypt, was four hundred and thirty years.' Indeed, the KJV places the commas at those places. Furthermore, the Samaritan Pentateuch and Septuagint speak not of 'lived in Egypt' but 'lived in Egypt and Canaan'.

Galatians 3 makes it clear that the 430 years is from when the promise was given to Abraham until the law was given at Sinai. We read in Gal. 3:17 (NKJV):

'And this I say, that the law which was four hundred and thirty years later, cannot annul the covenant that was confirmed before by God in Christ, that it should make the promise of no effect.'

The law was introduced 'in the third month after the children of Israel had gone out of the land of Egypt' (Ex. 19:1, NKJV). And the covenant referred to in Gal 3:17 was to Abraham when he 'believed God, and it was accounted to him for righteousness.' (Gal 3:6, NKJV). This event is described in Genesis 15, with 15:6 being quoted in Galatians 3:6. Thus it is clear that the 430 years was not the length of time in Egypt but the time from when the covenant was given to Abraham until the Israelites left Egypt.

By linking the wrong events to the 430 years means that the other details of Samuel's chronology are not correct. Thus there is no point in discussing the other points he raises. I would encourage Samuel in his pursuit of biblical chronology with the advice to always check and cross check different chronological schemes with all the relevant biblical passages and a number of different English translations.

David Down

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References

1. Down, D., Searching for Moses, *TJ* 15(1):53–58, 2001.

Dwarf galaxies

I read the recent article 'Cosmologists can't agree and are still in doubt', by Dr Hartnett in which the problem that CDM theory predicts hundreds of dwarf galaxies that are not observed was discussed.¹

However, two recent articles in *Sky & Telescope* magazine claim that this problem may have been solved.^{2,3} Gravitational-lens observations of seven galaxies indicate that their dark matter haloes are not smooth, but contain lumps about the mass of a typical dwarf galaxy. It is thus believed that the dwarf galaxies are not missing, just invisible, since they contain only dark matter. So it is claimed that the particles mentioned in Hartnett's paper have actually been observed, just not optically. I would appreciate Dr Hartnett's thoughts on whether this solves the problem, or is there more to the story than that?

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References

1. Hartnett, J. G., Cosmologists can't agree and are still in doubt, *TJ* 16(3):21–24, 2002.
2. Lucentini, J., A handle on dark matter? *Sky & Telescope* 103(1):13, 2002.
3. MacRobert, A., Invisible dwarf galaxies, *Sky & Telescope* 104(4):26, 2002.



John Hartnett replies

I have looked at the two references cited in *Sky and Telescope* (S&T).^{1,2} The whole analysis of the evidence, from which they concluded the existence of invisible dark-matter dwarf galaxies around other galaxies, depends on assumptions about gravitational lensing of quasars.

Firstly, there is a lot of evidence that quasars are not so distant as the establishment claims. In the case of the first S&T reference,¹ the quasar is allegedly 10 billion light-years and the lensing galaxy 3 billion light-years distant. Halton Arp, Geoffrey Burbidge and others have published many excellent papers challenging this paradigm. If they are correct then the lensing may not be occurring at all, instead the multiple images may, in fact, be separate quasars near a parent galaxy. If so, how can one apply a computer model to simulate the galaxies gravitational field with the wrong assumptions?

It seems they desperately want to find the dwarf galaxies in question so any little perturbation in some simulation will make it so. But let us be sure the model is correctly applied. In this case, I think not. Even so, they have a solution and it means that the dwarf galaxies comprise only dark-matter, which they can't see with any form of light (or electromagnetic radiation). How convenient! They need normal dwarf galaxies but invisible ones will do.

Secondly, looking at the figures in the second S&T article,² it is claimed these are five images of the same background quasar. If the quasar is at such a greater distance than the foreground galaxy, why does at least one of the images indicate that the quasar is connected (by filaments) to the parent galaxy? They look more like evidence that Arp has in his book for quasars physically connected to but ejected from the parent galaxy.³

I don't think the problem is any more solved than the big bang is solved by the latest data from the Wilkinson Microwave Anisotropy Probe (WMAP). In that case, they claimed with big fanfare all is revealed, but only

after carefully filling their model with dozens of parameters. They assume the model to prove the model. Smoke and mirrors, it is all in the initial assumptions.

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1. Lucentini, J., A handle on dark matter? *Sky & Telescope* **103**(1):13, 2002.
2. MacRobert, A., Invisible dwarf galaxies, *Sky & Telescope* **104**(4):26, 2002.
3. Arp, H.C., *Seeing Red: Redshifts, Cosmology and Academic Science*, Apeiron, Montreal, 1998.

Gravitational lensing over MOND?

Readers of Bill Worraker's perspectives article 'MOND over dark matter?'¹ should know about recent gravitational lensing work.² Apparently analysis of X-ray data should have taken into account thermodynamic disequilibrium in the radiating clouds inside their respective galaxies and clusters of galaxies. Where the galaxy or cluster shows evidence of thermal equilibrium, X-ray data and lensing data analyses agreed on its mass. On the other hand, where disequilibrium should be expected from observational data, they tended to disagree, usually by a factor of 2 to 4. I am of the tentative opinion that MOND is now not worthwhile.

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References

1. Worraker, B., MOND over dark matter, *TJ* **16**(3):11-14, 2002.
2. <www.lanl.gov/PS_cache/astro-ph/pdf/9710/9710217.pdf>, 7 May 2003.



The Delta 2 rocket carrying Rosat into orbit.

Bill Worraker Replies:

Dr Campbell's letter refers to a preprint of a paper by S.W. Allen which was published in peer-reviewed form in 1998.¹ Allen reports on masses within galaxy clusters inferred from (i) measurements of the X-ray emission profiles of hot intracluster gas observed with instruments on the ASCA and ROSAT satellites, and (ii) literature-based gravitational lensing studies. His results, in line with several similar investigations,^{2,3} imply the presence of more mass in the cores of large clusters of galaxies than can be accounted for by the observable gas and stars *even if a MOND analysis is used*. Allen himself does not comment on MOND.

Note first that MOND is not ruled out by Allen's results. If a MOND analysis implied *less* mass than was directly observable we would consider it definitely falsified, but there are no such cases on record. The real issue, however, is that MOND was initially developed to explain the mass discrepancy problem for spiral galaxies without invoking 'dark matter',⁴ yet in the case of these cluster cores it appears to require at least some additional mass. According to Sanders² and Sanders and McGaugh³ the virial discrepancy (the ratio of inferred mass to observable mass) is typically reduced from a factor of 4 in a Newtonian analysis to a factor of 2 in a MOND analysis.

In a recent popular article on MOND, Milgrom⁵ plots mass discrepancy against typical acceleration (see illustration above) for a series of galactic systems spanning 2-3 orders of magnitude in