THE ONLY WAY IS MONDAS
The Cybermen within

CATHAY SOCIETY
Is the Doctor a jellyfish?

Ashildr: How Me?

Peladon poetry

AI in SMILE

Fan studies: recognition

Ood
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Thanks to Georgia Harper, Sam Sheppard and to Ella Holden, who commissioned several articles included in this issue.

This issue was largely typeset in Alegreya and Alegreya Sans, designed by Juan Pablo del Peral, but with selective use of Minion Pro, Libre Baskerville, Junicide, Della Robbia, Twentieth Century, Futura Light Condensed Bold and Futura Extra Black Condensed. The majority of images have come from the collections of the contributors or from images licensed by Creative Commons. Attributions have been given where possible.

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We think that were Bill a real person she would be welcome to study at Oxford.
Welcome to The Tides of Time, number 39. Publishing a Doctor Who fanzine in the middle of a series is an odd move. Even though Tides is now an e-zine distributed as a pdf, I was loath to publish the issue at the end of the series when university term was over, most students would have gone home and the publisher – the Oxford (University) Doctor Who Society – would have dispersed.

This decision might be of more symbolic importance than real. Given the speed of communication and the increasing importance of social media, there’s a sense in which the society is in permanent session. Indeed, contributors to this issue include several people remote from Oxford, including Tides’s founding editor, my exact contemporary (give or take a few hours) Louise Dennis, taking a break from explaining artificial intelligence to the world with the help of her Lego robots. We also have articles from two friends of the society, Cambridge’s quizmaster extraordinary James Baillie, and one-time Cardiff student, tour guide and acafan supreme, Melissa Beattie. James and Mel are making their Tides debuts this issue, as are expert on alien life James Ashworth, treader of boards Tom Marshall and prolific (and good) Oxford writer William Shaw. Former editor John Salway and Katrin Thier return, while Sam Sheppard allowed me to borrow some artwork he had shared elsewhere for the cover.

Returning to the editorship of this publication after nearly twelve years was a decision based on sentiment rather than practicality. I’ve been very fond of Tides in all its incarnations and returned telling myself and everyone else that I’d be an editor-in-chief, ideally working with others. As it is, I’ve not delegated very much editing or design this issue, and into the bargain have produced a more labour-intensive one than planned. I am thinking of a standard template next time round which will help develop a more collaborative model, too, to justify my assurances to myself that I was returning to demonstrate to a new generation the worshipful and ancient art of fanzine-making.

I’d like to involve more people for a practical reason, which will not have escaped followers of publication schedules: namely, that I have a book to write in the near future. With the aforesaid The Black Archive: The Time Warrior in mind, on our recent trip to the Doctor Who Experience at Cardiff, I was struck by the wistful expression of its ‘classic series’ Sontaran (pictured left). While its head is based on the mask worn by Kevin Lindsay as Linx in The Time Warrior in 1973, it’s attached to the somewhat spangly uniform seen on a Sontaran in 1985’s The Two Doctors, a far less well-loved tale which didn’t greatly honour the Sontarans. Like a lot of us in everyday life, the story just had too much to do.

There’s not very much on series ten in this issue, but look out for the release of a collective review in the summer, which Ian Bayley is co-ordinating, before its later incorporation into issue 40. I already have received a few articles and further contributions are welcome at matthew.kilburn@gmail.com. Until next issue (or before!),

Happy times and places,

Matthew

Image: Matthew Kilburn
In 1996 BBC Books ended Virgin’s licence to publish *Doctor Who* novels, perhaps anticipating a new audience on the back of the 1996 TV Movie. Despite no series materialising, they carried on anyway with a series of books featuring the first seven Doctors, and another, generally known as the Eighth Doctor Adventures, presented as the official continuation of the Doctor’s travels. *The Eight Doctors* by former script editor and prolific novelizer Terrance Dicks was the first of these.

**What happens?**
Beginning shortly after the events of the movie, the Eighth Doctor manages a whole page before the Master springs a trap on him. From having a dodgy memory in the TV movie, the Doctor now goes the whole hog and gains severe amnesia, forgetting everything about his and his previous incarnations’ lives. With the aid of a familiar voice, he manages to land the TARDIS. Where else would a new Doctor start than at the very beginning, in the yard of one I.M Foreman, which for some reason still hasn’t been built on despite being left absent for thirty-four years? And what else does a new Doctor need? A companion! After a quick fight and a trip to the police station, the Doctor takes his new companion, Samantha (Sam) Jones, aboard, and begins travelling again. Or not.

Stumbling into the TARDIS, he disappears just as Sam is surrounded by a gang intent on silencing her…

The Doctor begins a journey to recover his memories, taking in some of the greatest hits of his previous seven lives. Taking in stories such as *100,000 BC*, *The War Games*, *The Sea Devils* and *The Five Doctors*, the Doctor ends up meeting his other selves, filling in his memories by linking minds with them, sadly without shouting ‘contact’. There are two distinct types of interaction with previous incarnations here. The stories involving the first two Doctors end up with the Doctor directly influencing the events of that story, which feel like a bit of an insult to Doctors One and Two. For example, *The War Games* changes so that the second Doctor gets the idea of contacting the Time Lords from the eighth Doctor. Now admittedly, the Doctor as an individual still came up with the idea, but surely the second Doctor is capable of thinking for himself, and it somewhat taints the idea that contacting the Time Lords was the Doctor’s last resort, giving his own
freedom up in return for the inhabitants of the games being transported home.

The other set of interactions are much better, featuring the eighth Doctor meeting himself offscreen. He goes full Buffy on some vampires after State of Decay, he finds the seventh Doctor captured on Metebelis III, and thwarts the Master along with the third Doctor after the events of The Sea Devils. These, as well as being a nostalgia fest, also allow some other fun moments. You wanted the backstory of the Raston Warrior Robot? You got it! You want the Master in Tartan? Have that too! You want Adric? Well too bad, he sleeps through his segment.

Meanwhile, in the background, some good old Time Lord political shenanigans play out. While it may not be The Deadly Assassin, it is still suitably entertaining and interesting. It sees the return of some familiar faces, with those from The Five Doctors featuring prominently. However, given that Terrance Dicks wrote that as well, it is not all that surprising. It also gives the opportunity to tie up some loose ends and plot holes from other linked stories, be they the Master's change into a worm in the Movie, or some (but only some) threads from The Trial of a Time Lord. It also throws up an interesting point, when one of the Time Lords makes a sexist remark about President Flavia. Admittedly, whether the novels exist in the main continuity of Who seems to be up to the reader, but it is interesting given recent revelations about regeneration, with characters such as the Corsair in The Doctor's Wife, the Master in Dark Water and the General in Hell Bent showing that regenerations can cause a change in gender. Surely such behaviour would not exist in a society where such changes are but a regeneration away, or is this unwitting commentary on some of the hypocrisy of the Time Lords? You decide.

Back, then, to the business of collecting a companion. The Doctor eventually finds the time to rescue Sam, vanquish the thugs and generally save the day, so the original ‘Smith and Jones’ (at least, in Doctor Who terms) begin their adventures together. Whereas a conventional companion, especially modern ones, normally get much more time in their first story, Sam barely features, this being much more the story of the Doctors. If you want to see Sam in action, you are going to have to read more of the books in the series.

**Conclusion**

If you are looking for a calm way to satisfy your Doctor Who cravings, look no further. There are no complex causal loops or paradoxes to get your head round, no complex story to get lost in, while still being perfectly entertaining. Admittedly, this may contribute to some of the low points, like most of the incarnations shown needing saving by the eighth, or the aforementioned meddling in the stories of other Doctors. While it may not hit the heights of what Doctor Who fiction can achieve, it easily misses the lows, so enjoy as Terrance Dicks weaves together a fun tale, with a healthy amount of nostalgia, action and intrigue thrown in for good measure, that serves as a perfect introduction to this series of books.
If there's one place where the universe shouldn't end, it's Doctor Who. This is the series that can go anywhere, with potential for an infinite number of stories, so the decision to impose such a deliberate end point feels counter-intuitive. Entropy is the one rule to which even the Doctor will bend; the moment can be prepared for, but it can't actually be avoided.

Stories where the end of the universe is threatened are fairly common. Ones where it is actively visited are rare. Three of those are Logopolis, Utopia, and Listen. Three very different stories from very different writers, with very different views on the end of all things. But in their mad, contradictory way, they can tell us about who the Doctor is within his world, and what it might look like the next time it ends.

The Master

Now, what's he doing here? All three of our stories involve, or at least invoke him. He shows up halfway through Logopolis and Utopia, and of course there's the strange knocking in Listen. What makes the Master, as a villain, so well-suited to the end of creation? Partly it's because he's an individual. The Daleks and the Cybermen are too big, and too impersonal a threat — if they're not causing the apocalypse, then there really isn't a place in the story for them. Scrabbling in the dirt as the stars go out isn't their style. But it's perfect for the Master. He's the Doctor's not-quite equal and opposite number, his villainy petty enough to make a nice contrast with the grandeur of the end of the universe. As the world collapses, we turn inwards and start fighting ourselves. The Master, in this scenario, becomes pretty much the only villain to pick.

It's important to note that the Master does not want the universe to end, and he is pointedly not in control of any of these stories. In Logopolis he seemingly causes the end of the universe by accident, killing the wrong man and destabilising everything. In
Utopia he’s explicitly in hiding, having fled to the end of the universe to escape the Time War. This partly extends from the power of the setting; the Master is not allowed mastery of anything, because the very concept of ‘anything is on the way out.

The Doctor

The Master, at least, gets to be renewed. Having emerged from a clock to claim the body of a kindly old man just before Logopolis, and having done the same in Utopia, the end of the universe is a regenerative experience, which is part of his perverse nature. The Doctor, on the other hand, does not have that comfort — he can only regenerate in Logopolis once the universe has been saved, and he comes out of Utopia scarred and regretful. Listen is trickier, but its timey-wimey aspect makes it less regenerative than simply generative. So, let’s look at the one thing that happens to the Doctor in all three stories: entrapment.

In his book Recursive Occlusion, Philip Sandifer argues that the nature of Doctor Who is to constantly confine things within a box - to occlude recursively, if you will, by creating fantastical worlds and containing them within the medium of television. Or, to put it another way, television is always bigger on the inside. But, crucially, the Doctor himself is in some sense immune to this occlusion, if only by his ability to constantly move between occluded settings. In Logopolis, this ceases to be the case. This is the real horror of the episode two cliffhanger, as the TARDIS starts to shrink with the Doctor still inside it. The Doctor has finally been contained by his box, and it shrinks as the universe shrivels around it. The Doctor is trapped again at the end of Utopia, and again the TARDIS is used against him, as the Master steals it and runs off. The TARDIS is not so much destroyed by the end of the universe as infected by it, the series’ storytelling engine turning against the hero as a natural consequence of entropic decay. Listen also has the Doctor trapped in a box, specifically the mysterious base at the end of the universe, and it’s a box that can’t be opened — we get only the vaguest hint of what happens when he does open the airlock, before Orson snatches him back from the brink.

Once the universe has shrunk into a box, it can’t be opened again. In the real world, the universe will probably end with what physicists call the Great Contraction. In the opposite of the Big Bang, the universe will implode with all matter condensed back into a single point. The universe collapses inwards, and it crushes the Doctor in doing so. Or rather, it should. But it doesn’t. Logopolis and Listen both involve the Doctor being haunted by a mysterious watcher, and both end with the realisation that it was the
Doctor all along. The Doctor is able to escape because he is being watched; and in point of fact, he is: by us, on a television screen. The viewer is the spectre haunting these stories, and the Doctor escapes death by folding our identities into his own. He survives because we, as viewers, want him to survive. The cost of survival is being watched; we become both Doctor and companion.

**The People**

Where's there's life, there's... Actually, there's a thought. Continuing our theme of *Logopolis* and *Utopia* as secret cousins, both of them involve a rather populous vision of the end times, as well as a bunch of structural similarities. Both of them have one-word titles referring to an idealised setting. This is standard practice for Christopher H. Bidmead, who later writes *Castrovalva* and *Frontios*, but decidedly less so for Russell T. Davies — the only other example, *New Earth*, still contextualises the setting to some degree. Moreover, Utopia is a place our main characters never see. The promised diamond-skies give way to nothing, nothing but the dark and the cold, so horrifically empty we only hear about it second-hand, from the monsters it creates. It's tempting to put this down to pure cynicism, and Davies is undoubtedly a more pessimistic writer than Bidmead — in *Logopolis* the Platonic Ideal city is a crucial setting, while in *Utopia* it's pure fantasy.

*Utopia* acts as a dark mirror for *Logopolis*, and not just by introducing the Master halfway through. The Conglomeration looks like an abandoned, half-decayed version of Logopolis itself, and the reveal of the Futurekind within the Silo is almost identical to the reveal of the Master hiding in the Logopolitan's cell. Both stories contain lots of corridors lined with people, but while in *Logopolis* those people are binary monks maintaining the integrity of the universe, in *Utopia* they're refugees; the end of the universe has gone from being a maths problem to a social one. Davies's pessimism flares up mightily here, with the implication that humanity's future is tribal cannibalism, but it only gets worse in the following story, with the introduction of the Toclafane. The Futurekind kill because they are hungry. The Toclafane, by their own admission, kill because it's fun. Even worse, we're told this by the creature that used to be Creet, the kid who won a *Blue Peter* competition and got to go to the end of the universe. It's a piece of cynicism worthy of Robert Holmes. The quiet, almost religious ideal of Logopolis has decayed into a visceral human cruelty.
The Companions

A single conversation, on the surface of Logopolis. A tearful, bereaved young woman. Two hurt, betrayed accusations. A reference to ‘the creature that killed my father’, and a declaration that ‘the man’s a murderer!’ Thus end the attempts of Doctor Who to demonstrate that the Master killing Nyssa’s father and wearing him as a skin suit has any emotional effect on her whatsoever. The end of the universe is no place for emotion. Or so goes the logic. The trouble is, there doesn’t seem to be any other place for it either.

A chamber flooded with red light. A single, guarded conversation. Some awkward, laboured banter. An admission of the Doctor’s prejudice. He tells Jack that he is a Fact, and his instinct is to flee from Facts. Cold, remorseless logic is still present, but it is now a thing to be feared rather than embraced. The universe has ended — this is exactly the place for emotion. But in our stunted, charismatic, post-traumatic hero, that emotion has yet to fully emerge.

A voice in the dark. A nervous first kiss. A word, underlined: Listen. We shall not cease from exploration, and the end of all our exploring will be to return where we started, and know the place for the first time. The universe has ended again, but, for the first time, that end is less important than Clara’s response to it. It’s a response which acknowledges the facts, and the fear attached to them, but refuses
to be controlled by either. Fear makes companions of us all. This, at last, is progress.

**The Consequences**

In *Logopolis*, the Doctor escapes, and then dies. In *Utopia*, the Doctor is trapped, then escapes, and the Master dies. In *Listen*, the Doctor almost dies, before Clara goes back and gives him the lesson that will make him the Doctor, and, ultimately, lead him to this moment. Where *Logopolis* and *Utopia* form a straight line, *Listen* is a circle, one which connects the previous two stories, and addresses the flaws of both.

*Logopolis* is emotionless: a slow draining of colour and warmth, leaving only cold, hard symbolism. The universe operates on an explicitly computational logic; its ending is baffling and violent, yet oddly sterile. *Utopia*, on the other hand, is full of emotion, from the visceral horror of the Futurekind to the mounting dread of the Master's revelation. It's emotional, but the emotion it offers is entirely negative, the one sliver of hope cruelly dashed in the following episode. *Listen*, meanwhile, offers a synthesis of the two: its vision of the end is as sterile as *Logopolis*, but by centring itself on Orson's fear it avoids succumbing to that sterility itself.

*Listen*’s response to *Utopia* is similarly clever. Yes, the end of the universe is scary, but rather than giving into that fear, we can embrace and control it. By doing so, we escape its crushing emotional weight. Moffat's vision is undoubtedly more optimistic than Davies’s, but it’s no less open about the facts; the end of the universe is an object of fear. But that fear doesn’t have to make us cruel or cowardly. Instead, we can use the knowledge of that end as a motivation to act while the universe still stands, turning the end from a depressing fact to a motivational one. The moment is coming, so we’d better start preparing for it.

This, then, is how the Doctor escapes the end of the universe; by accepting it. Once accepted, the event has no power over him, and can even be revisited. In *Hell Bent*, the Doctor pops to the end of the universe for a quick chat with Ashildr, and it plays out almost casually — he no longer views the end as a threat, and so it loses its ability to threaten. To deny the end its emotional power is also to deny its symbolic power, but it's a denial that requires emotional awareness rather than repression. Face the end openly, honestly, and bravely, and you can walk away, changed, but indomitable. This is the way the world ends: not with a bang, but with a wheezing, groaning sound.
SERIES TEN OF DOCTOR WHO PLACES THE DOCTOR as a tutor at St Luke's University, Bristol. He's in an enviable position. He seems to be able to teach anything and anyone he wants. He doesn’t seem to be complaining about teaching loads or the Research Excellence Framework. His lectures are blisteringly interdisciplinary, and probably to some onlookers have no discipline (in any sense) at all. It’s just accepted that he’s been a fixture for fifty, seventy or perhaps even more years. Perhaps he’s been there for as long as St Luke’s has existed.

As seen in The Pilot, from Bill’s point of view, the Doctor’s history is entwined with the university. In Knock Knock he’s regarded as a living legend in the most literal sense by Bill’s flat-mates. In the university’s vault is a ‘quantum fold chamber’, wherein is imprisoned Missy, whom we learn in Extremis the Doctor has promised to guard for no less than a thousand years.

Steven Moffat likes to suggest that the Doctor lives apart from companions and viewers for centuries. Matt Smith’s Doctor had two hundred years of adventuring between leaving the Ponds at the end of The God Complex, and visiting their younger selves at Lake Silencio in The Impossible Astronaut. He lived on Trenzalore for nine hundred years during The Time of the Doctor.

One might speculate that the Doctor has been living on the site of St Luke’s for centuries, with the university growing around him. However, the Doctor has repeated this series that he is two thousand years old. One might easily quibble with such an argument. Steven Moffat has said in several interviews that the Doctor doesn’t know how old he is.

Another source of inference is that the Doctor shares attributes with St Luke himself. Luke is the patron of doctors and surgeons. The Doctor is a patron saint of healers too. Steven Moffat has promoted the idea that the Doctor is the foundational healer and wise man of the universe. ‘We get that word (doctor) from you, you know,’ River Song tells him in A Good Man Goes to War. The Oxford Dictionary of Saints reports the tradition that Luke painted an icon of the Virgin Mary, justifying Luke becoming the patron saint of artists too. Moffat’s Doctor has been a painter of icons. The eleventh Doctor painted a portrait of Clara in The Bells of Saint John, when in religious retreat. The painting of Clara seen in Heaven Sent was also meant to have been painted by the Doctor. Wikipedia claims Luke as the patron saint of students, too, which complements the twelfth Doctor’s preferred alias, ‘Doctor Disco’, based on the first person singular of the Latin verb discere, to learn.

The name St Luke’s University suggests a ‘new’ university, a former college of higher education which has only in recent years begun awarding degrees on its own account. Perhaps St Luke’s has sprung up only in the last couple of centuries to harbour the Doctor and his prisoner. Whenever it was founded, I imagine St Luke’s grew up in medieval fashion, with scholars and students gathering around the Doctor as they did in a settlement associated with the church or court, only afterwards seeking formal recognition from civil authorities. It’s a pity, but typical of the rich loam of associations from which Doctor Who grows, that we don’t get to see more of St Luke’s and how it relates to the Doctor, but that might infringe the prerogatives of Class where aliens-in-classroom drama is concerned. So instead it’s left to the viewers to fill in the gaps – but for many that’s what Doctor Who has always been about.
1. TIME LORDS

The TIME LORDS appeared in Doctor Who at the very beginning. The Doctor is a Time Lord, as (unless we are given evidence to the contrary) we presume was his granddaughter Susan. At the end of the second season the TARDIS occupants met another member of the Doctor’s race in the form of the Meddling Monk. However, the Doctor’s people were not explicitly called Time Lords until The War Games in 1969. They are, of course, the most prevalent aliens to appear in Doctor Who, appearing in every episode except Mission to the Unknown in the form of the Doctor. Despite their outward physical similarity to humans, they have some radically different attributes.

I’ve only got one heart working. How do you people cope?
— The Shakespeare Code

One of these attributes is the Time Lords’ binary vascular system, or having two hearts. Certain animals, such as octopuses, have multiple hearts, though not as we know them. Whereas in humans the heart has four chambers, an octopus has two branchial, or gill, hearts, that are single chambered and pump blood to the gills and back to the main heart from the vena cava (the main vein), and a main heart, with two external atria attached to one large ventricle, that pumps blood to the body. In essence, these hearts all do the same job as one human heart, but an octopus distributes the same roles across multiple smaller hearts. Except in conjoined twins, humans and other mammals don’t naturally have two hearts, which presumably is an evolutionary advantage, as it takes more energy to operate two hearts and one heart is sufficient. But there are some people with two hearts. In cardiomyopathy, the left side of the heart is weakened, and blood pressure builds up in the lungs as it enters faster than it leaves. In this case, a heterotopic heart transplant may be performed, where a second donor heart is grafted onto the first, to aid in pumping. The original heart mainly pumps to the lungs whereas the stronger donor heart pumps blood around the whole body. Circulatory system diagram: E. Connolly. Phyllum Mollusca (2013). sunny.moorparkcollege.edu/~econnolly/Cephalopoda.htm
body. Another similarity between the use of hearts in octopuses and Time Lords is that one pump can function on its own for a short amount of time. This is similar to an octopus, in the fact that its main heart undergoes cardiac arrest when startled or mating, but its two branchial hearts are sufficient to continue to circulate the whole system.

**Life depends on change and renewal.**

*— The Power of the Daleks*

Another, and probably one of the most well-known abilities of the Time Lords, is regeneration. The programme and the texts surrounding it have offered many explanations for this, from exposure to the time vortex, genetic experimentation by Rassilon and finally, triple helix DNA. This last theory comes from *The Crystal Bucephalus*, a Missing Adventures novel, so while it’s not part of any television canon, let’s run with it.

Triple helix DNA is actually possible, as is quadruple strand DNA. It is formed by Hoogsteen base pairing, where rotation around a glycosidic bond (the bond between a carbohydrate and another substance), as well as flipping the purine base of DNA, allows for an alternative set of hydrogen bonds to form, in addition to the normal set. A third strand can then lie in the major groove of DNA, where the sugar phosphate backbone is at its furthest distance away from the next part of the helix. This happens as long as the third strand has a high amount of cytosine or thymine when adjacent to the purine strand (guanine and adenine) or a high amount of guanine or adenine when in the opposite direction to the pyrimidine strand (cytosine and thymine).

Triple helix DNA is either short, in H-DNA polymers, with only one DNA molecule involved, or much longer if two are present. At present, their roles are thought to be that of regulating gene expression, by either preventing the binding of a transcription factor, that stimulates RNA polymerase to form a complementary strand to the DNA, or by blocking its path once it has started by binding downstream of DNA. However, it is not at present thought to code for anything.
I was dying. To save my own life I changed my body. Every single cell, but... it's still me.

— **Born Again**

But can creatures actually regenerate? Yes. One of the only, and certainly the largest creature that can do this is the immortal jellyfish. It can fully regenerate by using the process of transdifferentiation, where its cells may spontaneously change to another type of cell. As a medusa, the typical adult Jellyfish, the tentacles and bell contract and die, while some of the tissues of the exumbrella, the upper surface of the jellyfish, transdifferentiate into those that can secrete the perisarc, made of chitin and protein, which protects it as a polyp while the radial canals (part of its digestive system) aid the transformation. It sinks to the ocean floor where its life cycle then begins again.

Stem cells, which can differentiate into any other cell type, are also thought to be involved. Mammal cells cannot be regenerated naturally, but can be artificially. Placing an adult cell nucleus into an unfertilised egg allows for it to become pluripotent again, by removing factors and markers, and this forms the basis of most modern cloning, like in Dolly the sheep. However, this doesn't change all of the cells in the body at once, like in regeneration.

Another method involves directly removing epigenetic markers and factors. Epigenetics cover environmental factors, like the way DNA is wrapped around histone protein, as DNA between proteins can't be ‘read’ by the cell. Other ways include repressor proteins, that bind to DNA and prevent transcription, and methylation of DNA, which, when binding, can activate and repress genes. It is important to note that no change occurs in the DNA sequence, just in how it is read. It has been shown that lifestyle can affect epigenetic markers. A study of fat and thin men showed that there were thousands...
of differences between epigenetic markers in the sperm of the different types of men, and this change was reversed after weight loss. However, finding and removing these factors artificially is incredibly difficult, and the changes they cause may be permanent in most cells, so more research is needed to find if it could be possible.

Overall, the use of regeneration in the programme is actually reasonably realistic. While the Time Lords do not revert to babyhood, their cells do transdifferentiate directly to another state, even if they do not change cell type. The regeneration of the immortal jellyfish wasn’t even discovered until the 1990s, decades after the concept entered the show. The explanation of triple helix DNA is also plausible, and it could be possible that this triple helix DNA is responsible for regeneration by allowing the expression of genes responsible for regeneration when dying, and keeping them suppressed for the rest of the time. Even the statement that a Time Lord can only regenerate twelve times could be explained by degradation of this DNA, as errors accumulate when cells change. However, the realism is hampered somewhat by features like the changing of eye and hair colour, which are solely genetic factors. This would suggest DNA is changed during regeneration, which it certainly is not in transdifferentiation or by epigenetic markers. Also, a Time Lord can actively resist regenerating by thought, like the Master did in Last of the Time Lords, which would not be possible, at least on Earth. The immortal jellyfish begins transdifferentiating in response to stress, including ageing and attack, and cell metabolism cannot, as far as we are aware, be altered by willpower. Regeneration in Doctor Who is used intelligently, albeit with some large caveats when it comes to credibility.
The basic premise behind the threat posed by the Emojibots in *Smile* is that they have been programmed to maximize the happiness of the colonists. When faced with a situation (grief) where their normal mechanisms for increasing happiness proved ineffective they realised that an alternative solution was to eliminate unhappy colonists.

There is (understandably) relatively little dialogue in the episode about how the Emojibots (actually the micro Vardy bots) work. I’ve taken the following words of the Doctor from the episode.*

*The Vardies. Well, their job was to maintain happiness. At first, that meant making sure there was enough oxygen and water. That's what the badges are meant to communicate. Satisfaction, a positive mental state. But the Vardy are smart. They learn, try to be good servants, so they expand the definition of happiness until...*

This strongly implies that we are looking at a machine learning process. Broadly speaking machine learning can be applied to do one of two things. Firstly it can classify things. Image recognition is a classic example of the application of machine learning as a classification process. The algorithm is trained on a set of images and adjusts its classification process based on information provided by the user about what each image shows, thereafter it can identify new images correctly (usually).
The second application of machine learning is as an optimisation process and that appears to be the version in use here. In optimisation problems a machine learning algorithm works with a **reward function** and it seeks to maximize the return of the reward function. Most algorithms work by trying various actions (initially all actions have the same chance of being chosen) observing the reward returned, and then tweaking some internal probabilities. If the algorithm received a good reward then it is more likely to try that action again in a situation it recognises as similar. Over time the algorithm is less likely to adjust the probabilities much even when actions do not perform as expected and so is more likely to stick to some set of actions it has previously learned are the most effective in a given situation. There are a wide variety of such algorithms which vary in the mechanisms used for representing situations (where machine learning as a classification process may also come into play), representing actions and tweaking probabilities.

One of the big challenges for machine learning is the construction of good reward functions. In particular when the desired outcome has several competing components, constructing the function to balance out the various factors can be difficult, particularly since it often isn't obvious how that balancing should occur. So, for instance, it is relatively easy to construct a machine learning algorithm to figure out how to move a robot as quickly as possible, but it is much harder to construct one to move a robot as quickly as possible while showing consideration to humans and other entities in its environment.

From a machine learning perspective, what went wrong on Gliese 581d** was that someone attempted to construct a reward function that was supposed to achieve a harmonious balance between basic human needs (oxygen, water, etc.) and less tangible considerations such as (presumably) a pleasant living environment, sufficient leisure time, etc. Whoever it was apparently settled on a reward function based on maximizing smileness on the badges in use and failed to realize that if it only accounts for badges in use then one solution to a frowny badge was simply to eliminate the badge.***
This points to an additional challenge in current research on machine learning, that of **safe learning**. Really you wouldn't want the option to eliminate a human to be in the range of actions considered as part of Vardy learning, any more than you want a driverless car to experimentally crash into something to see what sort of reward that brings.

In short, whoever designed the Vardy and the Emojibots failed in two respects: firstly they supplied a reward function that could be maximized by reducing the number of emoji badges in existence and secondly they failed to place sufficient constraints on the machine learning process to prevent it taking unsafe actions as part of its experimentation process. There are a variety of solutions to this problem. I should note however, that in my opinion none of them involve paying the Vardy rent.

**Endnotes**

* Chrissie’s Transcripts Site, www.chakoteya.net

** Wikipedia says this is the name of the planet in *Smile*, though it is never mentioned on screen.

*** A Watsonian (in-universe) explanation for this might be that if the reward function was based on total smiliness then lots of slightly grumpy colonists might score more highly than a small number of happy ones and so one solution would be to wake everyone in the colony ship up before the colony was ready for them.

*The City of Arts and Sciences, Valencia, Spain, which portrayed the colony city in Smile.*

*Image: Maybelline71, (CC BY 2.0)*
The Problem of Ashildr/Me

The Dromeian Archive, Part the First

James Baillie

This is essentially a ‘fan theories to make sense of plot holes’ article, possibly even the first in a series, where I try and post-rationalise some slightly confusing decisions made by scriptwriters and showrunners in Doctor Who. In this first article, I’m going to look at Me/Ashildr, and how on earth (or on Gallifrey or any other planet) she actually lives as long as she does.

The central problem of Me is her exceptional longevity – she is a being who appears to be able to outlive practically every other species in the universe, appearing towards the close of Hell Bent on Gallifrey at the end of time having originated on Earth in a vaguely Viking-era northern Europe. How and why could she have ended up, alive and well, on Gallifrey even after the loss or demise of, among other things, the Time Lords, a race with access to stores of regenerative energy that can multiply their already exceptional lifespans?

There are two obvious parts to the story. One is that there’s no reason to assume she got there by the straight road: in a universe with time travel (and numerous sources and possibilities thereof), it’s entirely plausible that at some point she hopped from earth to late-universe Gallifrey without having to last the billions of years between the two. However, that’s certainly not the whole story; why does she end up on Gallifrey, and why
is she there after all the Time Lords have gone? What, indeed, makes her variant of
immortality special?

There is, I think, a plausible answer to these questions. The Doctor had ‘sonicked’ the
mire med-patch. The med-patch, whilst high tech, should not be assumed in itself to be
the key here; the Mire are a tough bunch of fighters, but there’s no reason to assume they
are more so than, say, the Daleks or any one of a number of other battle-hardy galactic
species. Instead, it’s that application of the sonic screwdriver that’s key. Assume for a
minute that the sonic realises that the med-patch doesn’t have the ‘oomph’ to do what the
anguished, enraged Doctor wants. The tech in the patch needs more power.

‘Ah,’ thinks the programming of the sonic screwdriver. ‘Power. I know where to get
that.’

Of course it does – the sonic being inextricably linked to a certain blue box parked a
certain distance away. Power source, sorted. And the blue box?

It’s powered by the Eye of Harmony.

A Mire medikit is presumably there for fixing pretty big wounds. A Mire medikit
powered by a suspended, permanently collapsing star radiating artron energy to every
point in the space-time continuum? Much more like it, and much, much, much more
powerful. So this is the theory: Me is essentially TARDIS-powered, in a way different but
not entirely dissimilar to Jack as another basically-immortal being.

Precisely how Me got to Gallifrey we may never know – but this theory would at least
explain why she ends up there, at the end of time. It makes poetic, and perhaps even
(dare I use the word) logical sense for her to end up sat with the energy source that
powers her strange, curse-long lifetime, perhaps waiting for the clock to finally run out
on the universe itself.

And then of course she goes and runs off in a TARDIS shaped like a Midwestern diner
with someone who should definitely be dead. Perhaps some things can’t be explained
logically after all…

Radio Times put this image together following the transmission of Hell
Bent, when there was a wave of fan
interest in Me and Clara having their
own series. The Doctor, meanwhile,
would be getting his coat if it wasn’t
far too hot in the desert. Will the
programme be able to fit in a revisit
to these two before Peter Capaldi and
Steven Moffat leave, or are they best
left to their own devices? More
importantly, do Maisie and Jenna
have any time in their diaries? —MK
WHEN SHE COULD SECURE DISPENSATION, Sister Peren went for long walks.

There was no physical need for her to do so. The Elixir of Life regulated her metabolism perfectly. She would have been happy to acknowledge, had she been challenged, that she enjoyed the landscape of Karn. She had once walked for months across continents, leaving the rock faces beloved of the Sisterhood and instead crossing meadows and forests, sahel and savannah. She had memorised the world's flora and found what plants were safe to eat, savoured the experience, and analysed the effect each substance had on her body. She had walked pebble beaches and counted the colours in the stones, then suspended sand in salt water and lapped to taste the elements. She’d found straits which she could comfortably swim, and met twelve-legged beasts of many-coloured fur, none taller than four feet, who had been overjoyed to meet her. She’d tried their milk and had felt renewed. They had something of the Elixir in them too, with something more, and she knew then it was time to return and tell the sisters of her discovery.

When Peren returned, Ohila confined her with centuries of documents and bade her dispute with the oldest sisters, in public, every week for ten years, before writing her conclusions. Gradually other parties of sisters were sent out to make more specialised studies, to cultivate, to try more of the rainbow creature’s milk.

The first thing Peren did when she was released was to find the many-coloured creatures and express repentance. They spoke to her in her head, and told her not to be sad; all was foreseen, and the needs of this world were being met. They said that under the ministrations of the farming sisters they had grown taller and stronger. Peren measured them and agreed.

Ohila requested a formal report on her return, but at least there wasn’t another decade of public examination. Ohila read Peren’s report and called her to her chamber for further discussion.

The first thing she said was: ‘After all these centuries, you still use feet and inches.’
There had been little of the Warrior’s original organic form left to be incorporated in the metal shell the sisters had found themselves tending. His remains had been buried in soil barely adequate for their preservation. After a few years, even the skeleton had crumbled. Nevertheless, the repugnant fusion of Gallifreyan and Cyberman technology had extrapolated the DNA and strung through the mechanics a flesh that owed a lot to the human.

‘Not enough,’ Ohila said. ‘The helices are compromised. The protocols of the Cybermen are written into every cell.’
‘He is human, despite them.’
‘He has the will to resist. He knew his enemy. We share a friend, he, me, you, all of us. He has a daughter, whom he believes continues the best of his life’s work.’
‘Not a soldier, then.’
‘No. You see, you know him already. He will know you. Sister Peren, I am going to ask for your spirit, and for your flesh.’
Peren closed her eyes.
‘I know you don’t like to be reminded, sister. But all that has been made of you on Karn has drawn from she who was born on Earth. This man lives despite being remade by heretics after death. Will you give of yourself so life can triumph over unlife?’
Then Peren looked into herself, and travelled.

* 

For almost as long as she remembered, it had been Mam and Sal and Dor. Sal wasn’t sure if she really remembered Dad; there was a large figure in a dark corner of the kitchen, smelling of beer and man-piss, whom she watched fearfully from a stool in case he shouted again and hit Mam. Then he was gone and she didn’t know if he had ever been there, or if she had only dreamed him.

Then there were the years of running about and playing with sticks in the street and staying out of the drains. There had been a piece of wood she’d drawn a face on with a fragment of coal, tied a strip of cloth round her and called Jenny, but she’d dropped her in the street one day and some lads took her and stuck her in the midden. Sal had more sense than to try to dig her out. So began and ended dolls for Sal.

Mam took in washing and mending and if she was really lucky a bit of baking for the neighbours when times were good. Sal helped more as she got older. Mam helped Sal with her letters and sent her to the National School by the church. Even though she was often tired from helping Mam sew at night and with keeping an eye on Dor, she remembered spellings and sums and the other chil-
dren whispered she’d make monitor when her time came.

Then Mam said it was no good and she couldn’t manage as well as she had done when she was younger. There would be no more school for Sal. There was a job in the match factory three streets away; Mrs Kendal had told Mam so at church. Dor could do her share in the house now; Sal and Mam had worked together well but Dor needed to be trained up so she could manage something, as her attention was always wandering. The factory needn’t be for ever but it brought in a steady wage.

So Sal started at the matchworks. She was meant to be growing up, but the place made her feel smaller and weaker: large machines grinding and splitting wood drowning out the noise of people, smothering them with the foul stench of the poisonous soups which made the matches burn. Sal was frightened that if she fell against a rough paving slab on the way back from work, she’d burst into flames. In the winter she was lucky if she saw the sun. Fourteen hour shifts were usual and if you weren’t careful you could lose all your pay in fines. She saw one girl get all her fingers cut off when unblocking one of the machines, another made to sit in the corner like a naughty child when she put a burnt match down with the fresh ones by mistake. Then there were the people whose teeth fell out and whose mouths began to bleed, their chins swelling up with bruises as their bones shrunk.

Sal worked on when she started losing her teeth. What else could she do? She was exhausted, but the pain kept her awake. At home, Mam wrapped her jaw up for an hour or two at night as if she could stop it falling apart. Dor was out of it; Mrs Kendal at church had told Mam about a merchant’s senior clerk’s house in a better part of town which needed a scullery maid, so off Dor had gone. She’d come back every fourth Sunday and Mam had told her to make sure her pretend courting of the butcher’s boy stayed pretend, and said things which made Sal feel queer, as if she wasn’t meant to be here; and she thought Dor might just have felt the same. So it was just as well she was falling to bits.

Then one Sunday her mouth started to bleed in church. She had her Sunday best handkerchief – well, her only one, really, a gift from Mrs Rowbotham the baker’s wife one Christmas after Mam had helped with the baking – and couldn’t stop it. She got up and fainted in the aisle, her mouth falling uselessly open, the sores visible to everyone. She came to ashamed and not caring all at once.

Mr Whitmore – Father John, he asked them to call him – had a word with Mam, she saw, as the verger and Mr Eccles the butcher took her away. She saw Mrs Kendal at the vicarage, but from the look in her eyes Mrs Kendal thought everything was Sal’s fault. When Father John arrived Mrs Kendal went to meet him and said something about wickedness showing itself and little else could be expected from anyone from Sal’s street which was full of vice as anyone who came within nine yards of it could see. Father John talked of charity and a merciful Father (not, thought Sal in delirium, she’d had much of
and mentioned the sisters. Mrs Kendal said she’d keep house for Father John, but he should find himself a wife before more Papistical notions took root in his head; but nuns were welcome to a factory girl.

So much, thought Sal, for Mrs Kendal. Then, almost too quickly she thought, two silent women in very plain gowns and covered heads took her from the vicarage back parlour and down the street to the nunnery.

As Sal expected, the nunnery was a peculiar place to live. She was given a bed in a large room shared with other young women. That was to be expected. There were prayers all times of day. She wasn’t sure she understood them. The sisters fed their charges thin soup with no meat and vegetables cut into tiny pieces so Sal didn’t have to chew much. There was medicine too, but it wasn’t like anything you could buy in bottles from the chemist, or that Mam might get as a hand-me-down at church. Instead it was ladelled into small dishes, like a thin tea really, and tasted differently each time. The sisters had syringes and took blood samples, which Sal hadn’t known before. The girls had nicknames for the different nuns. Sister Mary Ethelfled didn’t seem to bother whom she hurt, and she was called Bitch Nancy after the guard dog at the docks who’d torn off Beth Williams's brother’s thumb and bitten his leg so badly he never walked without a limp again. Sister Frideswide was very gentle and was the smooth to Bitch Nancy’s rough, always smiling and smelling like she’d just bathed in flowers. It was the bathing idea that stuck, so they called her Suds.

Bitch Nancy didn’t like Beth Williams, they decided. Beth had a hole in her jaw which had to be wrapped and dressed and which oozed pus and blood everywhere, given the chance. Bitch Nancy would unwrap Beth’s jaw every morning, snort, paste ointment on the wound, force Beth to drink what was definitely a different medicine every day from one of her old metal bowls, and then bind Beth’s jaw without word or regard for her tears. Sal was one of Suds’s girls, and Suds was far more gentle, talking Sal through the pain in her gums and whether she would be able to eat properly again, always offering hope even when Sal knew that if there had been change it was only that the shrinking and splintering of her bones had stopped for a few days.

Then one day Bitch Nancy looked at Beth’s wound, snorted, prodded it with a knife, which made Beth scream, and snorted again. Before anyone knew it Beth had been taken away without explanation. Two silent sisters Sal hadn’t seen before appeared, grabbed Beth and her few possessions, and took her away.

A couple of days later, Sal asked Suds what had happened to Beth.

‘She’s not dead, if that’s what you are thinking,’ said Suds. ‘She’s moved to another room because she is getting better.’

Sal repeated the words back to her. She’d not truly recognised how she’d not believed anyone recovered from this disease, but she trusted Suds.

‘Yes,’ Suds said in her bright voice, just a little like a mother to a small child. ‘You are
getting better too. Say your goodbyes and come with me.’

Upstairs was a large red-painted room, where more effort had been put into the furnishings. Dark wood screens separated four beds which looked more comfortable than the ones Sal had left downstairs. Curtains hung from rails, drawn back for now. By each bed was a chest of drawers and a jug and a bowl.

‘Sal!’ called Beth from one of the beds, more strongly than Sal had ever heard her. ‘Look!’ She unwrapped her bandage. The hole in her jaw was no longer bleeding, and it was noticeably smaller.

‘Elizabeth, take care!’ said an insistent, motherly voice. To Sal’s astonishment, Bitch Nancy dashed from a corner carrying more bandages and waving a polished metal tube which she brought up to her right eye and pointed at Beth’s jaw. She busied herself tying a new bandage on Beth.

‘She’s changed!’ said Sal to Beth afterwards.

‘I know. It’s not the same as downstairs. They all bother about us more.’

And they did. The number of upstairs girls grew, and two other rooms in the house were opened to fill them. Sal’s teeth stopped falling out and her jaw stopped hurting. Beth’s wound disappeared. Other girls, Sal swore, were recovering from worse. Mary Kelly, a tiny thing whom Sal barely recognised from the matchworks, had as good as grown a new jaw. She asked Sister Frideswide – she felt too close to her and the other sisters to use nicknames like Suds now – about it once, but the sister only smiled.

The girls were allowed out for exercise, and spent more time in the garden as the weather grew warmer and they got better. First, they walked in circles round the lawn. Then, Sister Frideswide and Sister Mechthild asked them to sing songs they knew, while the sisters played on a stringed instrument picking up the tune.

‘You’re not from round here, then, sister,’ called one of the girls. ‘Everyone knows Johnny Todd.’

No, thought Sal. Of course, they are not from round here.

Sal couldn’t sleep that night. Once she turned over in bed to catch sight of someone tall and willowy looking up at the night sky, raising her right hand as if joining up the stars to make constellations. She got out of bed and made as little noise as she could on her way over to the sister, whose face was serene but wistful, in the room but not in the room at all. It was Sister Frideswide, and though she made no sign that she had heard Sal, Sal knew the sister was aware of her.

‘Which star have you fallen from, sister?’

Sister Frideswide inclined her head very slightly towards Sal, and might have begun to smile and thought better of it. She spoke softly and firmly.

‘Bed.’

* 

‘Sister Mary Ethelfled, when might we go home?’
The question was asked by Ellen Flowers, a tall, round, red-haired lass whom Sal couldn’t imagine anyone getting the better of if everyone was in good health. She’d ploughed through the question without stopping for permission from the sister to talk, which wasn’t usual when all the patients were present.

Why had no-one asked before? Sal thought.

‘It’s good to know,’ Sister Mary Ethelfled replied, somewhat stingingly Sal thought, ‘that you can think for yourself, Ellen Flowers.’

There was no further explanation, but Sister Mary Ethelfled and the other nuns would have been able to hear the girls hum with a curiosity about their families. Sal wondered whether Dor was still seeing that butcher’s boy and how Mam was getting on without either of them. It had been months. She was suddenly consumingly guilty that she’d not thought of them.

She felt a lot better after her medicinal draughts. She was alert enough not to be surprised by this.

The next day a new figure was seen in the corridors. Sal had a first impression of overwhelming toughness, like Mrs Neill in the next street from home, who had arms like pistons and who took in so much washing Mam always had the leftover clothes that no amount of pounding would clean. This wasn’t so much a physical presence as a thought, heating the house like a furnace. That wasn’t to rule out this woman’s features. Mary Kelly said she had a face like an old chicken, like Mrs Gregory who was the housekeeper for Father Byrne at St Patrick’s and whose eyes saw where to peck and whose beak could hurt if you had something she wanted to know and you weren’t telling.

‘I bet you she’s Reverend Mother. She’s the head nun.’

She was.

The morning after, all the patients were assembled in chapel to hear the head sister speak. She walked with a stick but no-one dared to look away as she talked. Her eyes were piercing but at the same time seemed to be looking a long way away. She thanked them for helping the sisters in their work, and apologised for keeping them so long from their families. They knew that their lives had been in mortal danger; those gathered in the chapel were the lucky ones. Others lingered in the room below; others had returned home in coffins. Family members had visited hoping to see the recovered, and had been told that they were in good spirits, but still unwell. Those gathered here must understand that the sisters’ work was new and experimental; there was little that was certain about the results of their work –

‘What about me bairns?’ asked a woman sitting across from Sal. This gave Sal a start; she’d not thought of any of the ‘girls’ as being old enough to be mothers, but of course there were girls her age who had babies, and the matchworks bosses employed women in their twenties and older too.

‘Margaret,’ began the Reverend Mother, who was called Catherine.
‘Yor canny lasses in grey have told yous wor name, then. That should be Mrs Robert Marling to yous. I’m worried sick about who or feeding wor lad and wor lass. My Robert’s been on the sick two year, five years at the docks since we came down from Newcassel.’

If there was one thing Sal remembered, so many years later, it was Margaret’s voice, from a town somewhere to the north of where Sal had lived.

Something had to be done. The sisters started to take their patients out of the house, and into the streets, in groups. The way they did so was underhand. The girls had to cover their lower faces as if they were still disfigured. Were they cured, thought Sal, or not? The others must be thinking the same.

Sister Frideswide took Sal to her old home herself. The streets were dirtier than Sal remembered, and she could pick out every scent from the gutter and the privies and the midden. It should have been foul, but she felt detached. It was queer, really it was.

They knocked on the front door. Mam came to the door. She looked older than Sal remembered. How long had it been? Sal didn’t know. Months, she guessed.

‘Our Sal…’ said Mam. ‘Poor Sal…’ Then they went outside, and Sister Frideswide unwrapped the scarf covering Sal’s face.

Mam sobbed. Sister Frideswide had something prepared in a phial, and put it to Mam’s lips. Then they all sat down, and Sal took in the sight of Sister Frideswide, enveloped in her thick grey gown, sitting in her kitchen.

‘I wish we had a parlour, sister,’ was the first thing Mam said.

Dor wasn’t there, of course; she was still in service but had been promoted to kitchen maid. Mam said she wanted her butcher’s boy to come and visit with her next time. Mam had said yes, but she was too young to think about being engaged. Mam asked when Sal would be coming home, and Sister Frideswide replied, to Sal’s surprise, that Sal would be helping them with their work and she would not be able to go home yet.

‘But are you managing?’ asked Sal. Mam said yes; Mrs Neill had fallen over a few months before and had never got properly back on her feet. Mam had taken over the lion’s share of Mrs Neill’s laundry customers and Mrs Kendall had asked her for more baking for church and paid her on time, too. So, she did manage.

Then Sister Frideswide asked again about Dor and the butcher’s boy, and when they would next visit, phrased in such a way as not to sound nosy, and with a voice full of concern.

‘Not for a couple of weeks, love – sister, I mean.’

Sister Frideswide smiled with grace.

Almost immediately after their return, Sister Frideswide told Sal that Mother Catherine wanted to see her right away.

Mother Catherine had moved into a small office at the very top of the house. Sal thought it must have been built for a servant. It had been painted red, very quickly, she thought, and smelled of sulphur. It reminded her, unhappily, of the matchworks. She
fixed Sal with those eyes, so beady, as if a stuffed bird had come to life, and came straight to the point.

‘Sister’ – was there a slight pause? ‘Frideswide says that you are literate. That you can read and you can form letters. That you are numerate, too.’

‘I remember all my arithmetic, if that’s what you mean, Mother Catherine. My headmaster said my handwriting was the best in the school, before I had to leave, that is.’

‘Good. We have letters for you to write, and ledgers where numbers will have to be written. There is not very much time, if we are to achieve what we seek to do.’

So Sal set to work. She took dictation from Mother Catherine, writing letter after letter to shipping companies enquiring about passage to the colonies at short notice. The letters requested meetings here, in the nunnery, with Mother Catherine. At the same time blockily printed messages were arriving from the telegraph office from around the world – Canada, Australia, New Zealand, Cape Colony, with promises of places for families of different sizes. Sal wrote the details of each one down in columns as they arrived, once in each of two ledgers. There was a good deal about this that worried her.

‘Why are you sending us away?’ she eventually asked. ‘Aren’t we meant to be better?’ It was a peculiar thought, but she was sure it was the right one.

Mother Catherine frowned, but she didn’t tell her to get on with her work immediately. ‘My child. You are certainly meant to recover, at least from our point of view. As for how your society understands it… There is no cure for your condition.’

‘Then how am I better? How is everyone?’

Mother Catherine paused, and then told her ‘We have knowledge beyond that of your medicine, child.’

Sal wanted to ask where Mother Catherine and the sisters were from, but then was not the time.

Before too long, the girls started to disappear. Sal saw parents, siblings, aunts, cousins, and children and sweethearts and husbands, at doors, on stairs, and through windows. There were thanks, but there was sometimes anger. This soon disappeared after one of the sisters put something in the tea. Families would head down to the docks with new clothes and trunks. Sal had accounted for them in her ledger, alongside the names of the benefactors. Even the hardest of hearts, Mother Catherine said, can be influenced to kindness.

‘I don’t want to forget this,’ Sal said. ‘I mean it.’ Mother Catherine said nothing.

Sal wrote the final entry in her ledgers knowing Mam, Dor and her husband-to-be, Albert, were downstairs. Four places were booked on a ship bound for New Zealand. Sal met them in the parlour in their new clothes. There were jobs for butchers in New Zealand, Albert said, but perhaps one day he’d be a farmer, with his own sheep, in the country, and he and Dor could have lots of children running around and Mam would only have to do their washing and not take in other people’s.
Mam’s face was composed and polite throughout, but especially when the last sentiment was expressed.

‘Sal,’ said Sister Frideswide. ‘You’ve not touched your tea.’

‘I’m just excited, that’s all,’ Sal replied, convincingly enough for Dor and Albert, not so convincingly for Mam, and not at all for Sister Frideswide. ‘Can I speak to you, sister, alone? Just once. Sorry, Mam.’

They went outside into the hall of a deathly quiet house.

‘You’ll make me forget. It’s all done with drinking with you, isn’t it? Making us better, making everyone else forget why we are better, and never understanding how. You’re not from here. You’re not fairy folk like Mary Kelly said, and she forgot all that after one night. With all the red you like about you, I’d think you came from the Devil, but I’d not believe the Devil is so kind, but you are, so who are you? Tell me.’

‘We are not kind, Sal Thompson.’ It was Mother Catherine, perched on a step, bannister in one hand, stick in the other. She was wearing a habit Sal hadn’t seen before – red, she wasn’t surprised to see, but with a kind of apron decorated with gold embroidery. A pattern of circles arranged in regular lines caught the eye. ‘Did you see all the bodies leave this house? Did you see all the people who still suffer in this city, of cancers in their jaws, of great hollow sores in their lungs, of palsies and tumours and deaths sudden or lingering from plagues that we could easily cure?’ She climbed down towards Sal. ‘You are right that we come from somewhere else. Another world, with its own place in time and space which can be found by those with the proper thread to guide them through the maze. We are the champions of life, Sal, but we can only gift it in circumstances we deem proper. Here, we wanted to learn about human beings and the potential for tissue regeneration when suffering from cancers influenced by the environment. We looked through human history and found this moment.’

‘So you aren’t going to help anyone else?’

‘Not here, not now.’ Mother Catherine turned, to look up the stairs towards a stained glass window. It showed St Luke. ‘Our science is based on the properties of one element, found only on our world, and extracted by a single flame, which we venerated above all things.’ She reflected. ‘Veneration of a flame is a useful discipline. It reminds us that immortality comes with a price.’ She turned again. ‘We are not the risen to whom your hymns look forward. We are those who have deferred our eternal rest.’

Another nun had joined Sal’s family in the parlour, to keep them company. Sister Frideswide stood with Sal, and spoke softly. ‘We have all been very taken with you, Sal. The spirit with which you recovered. The questions you asked and the help you offered.’

‘There is undeveloped potential in you,’ Mother Catherine stated. ‘It will never be realised fully in this world.’

‘Not even in New Zealand,’ laughed Sister Frideswide. Sal realised she’d never heard her laugh before; it was happy, musical, so full but so ethereal at the same time, that Sal
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wasn’t sure it could be made by human speech. ‘So,’ she smiled. ‘Mother Catherine has a suggestion.’

‘I ask that you come with us, and join our order.’

Sal felt that the world was ending and beginning at once. She didn’t know what to say, and couldn’t remember afterwards what she had. The enormity of the choice was too great.

‘The question is always unfair.’ Mother Catherine acknowledged. ‘You have the time it takes you and your family to ride to the docks. Sister Frideswide will accompany you.’

Of course, Sal was almost silent on the ride down in the cart. She felt every cobble, heard every voice, smelt the open possibilities of the sea. Above her, though, was space; and within her, an abyss which she had never known before, which she yearned to stare into.

At last they were at the riverside, overhung by the shadow of the future. There was a queue for the gangway. Mam began to say goodbye to Sister Frideswide.

‘I’m not coming with you,’ blurted Sal. ‘I’m staying with the nuns.’

Mam, Dor and Albert were dumbstruck, Sal thought, but Sister Frideswide was speaking softly: ‘I understood you discussed this possibility with Sister Anthony.’

‘Oh Sal,’ Mam said and clasped Sal to her. Sal remembered how small Mam seemed. She looked up at her smiling through her tears. ‘It was so good of you to see us off.’

‘Aye, Sal, it was grand of you to come down.’ Albert held out his hand.

‘Look after yourself, Sal,’ said Dor. And they were off.

‘I might have known,’ said Sal. ‘Just as well you didn’t tell me, as I might have changed my mind.’

‘No, you wouldn’t,’ said Sister Frideswide. ‘That is an observation. To reassure you, your choice is based on free will, as far as such a thing exists. But I leave that question to philosophers.’

When they returned, the sisters were all dressed in red, cloth bags hanging behind their shoulders.

‘Sister Mehila,’ called Mother Catherine. ‘You must robe yourself appropriately for the return to Karn.’

Sister Frideswide knelt and rose quickly. ‘Of course, Mother.’ She disappeared.

‘Ah, Sal. You must be prepared for travel. Drink deeply.’ Mother Catherine gave Sal a flask. ‘There are vital minerals here, and proteins, and other factors of which you will learn. You have decades of study ahead of you. Now, drink!’

Sal felt unsteady on her feet, but the sisters held her and took her to the garden. She heard behind her talk of the ledgers; one copy was to go with them, the other would be left behind, ‘a puzzle to their historians,’ said Mother Catherine.

It was early evening by the time all the sisters were gathered in the garden. They formed a circle, with a gap facing the sinking sun. Winter, Sal realised, was ending; she
had been confined for all of it, and more. Mother Catherine was in the centre of the ring. She raised her hands and called out.

‘Sisters! Think on this setting sun and remember the flame of Karn which never dies. Remember, and find your way through the paths of the universe back to it. Welcome the woman who will become our new sister there. Hand her the thread, and hold her hands.’ A cord was threaded through Sal’s hands and other hands took both. ‘I, Ohila, leader of the Sisterhood of Karn, open the way.’ She made a gesture with her staff, and the ground and sky shook and split. Mother Catherine – no, Ohila – joined the circle and they began to dance, circling closer and closer to the gap. When Ohila reached the gap she loosened one hand and raised her staff again –

– and Sal was somewhere else. Her first sight of the sacred plain of Karn.

‘This young woman listened carefully to my instructions,’ said Ohila. ‘When I admit her to the order I will name her Peren. As you all know, this means attentive listener in the tongue of the Triff people of Amboskan, before their subjection to the Geroks.’

So Sal became Peren; and despite the ability to read minds which she gained as a sister, she never knew whether or not Ohila had just made the name up.

*

Now Peren was standing with Mehila and Ohila looking down at the buckled and scorched form of the Warrior. He groaned and inclined his head towards her.

‘Free me,’ intoned his mechanical voice, yearning for the organic.

Peren looked at the obscene parody of a human being in front of her; the segmented torso like an insect’s abdomen, the handles on its head like a giant padlock running through the top of the skull.

‘I will,’ she told him.

Mehila approached with a syringe, preparing to take the first sample immediately, but Peren held out her hand, palm open.

‘It’s over a century since you were my nurse and my doctor, Sister Mehila. I can do this myself.’ So she took the syringe and plunged it deep into her forearm.

The Warrior turned away, his expression, as always, blank.

**Next: THE BROTHER OF KARN**
The Adipose first appeared in the 2008 episode *Partners in Crime*, and were creatures composed solely of adipose tissue (or fat) that were being bred on Earth after the loss of their home planet. They were created from the fat, and sometimes other tissues, of obese humans, in a process called parthenogenesis. They are soft and squishy, cute and cuddly. How could such a sweet creature be responsible for so much scientific inaccuracy?

The term parthenogenesis already exists in biology. It is a form of asexual reproduction where an egg cell will develop into an embryo without fertilisation. There are three types of parthenogenesis. The first is where a cell undergoing meiosis to become a haploid (half DNA amount) egg cell only undergoes one division, or mitosis, producing a diploid (full DNA amount) cell that is a direct clone of the mother. Another type, known as full cloning, has the cell replicating its DNA twice, during interphase (the period when the cell isn’t dividing), and so when it divides twice during meiosis, this results in a diploid cell. Identical pairs of sister chromosomes line up, instead of homologous chromosomes (which have the same genes but not necessarily the same allele/type) so the offspring are clones of the mother. In half cloning, the egg cell divides as normal, but a haploid polar body fuses with the haploid ovum to produce an embryo, and so will be either ZZ (male), WW (female, usually infertile except in species like the boa constrictor) or ZW (female) in ZW sex selection or XX (female) in XY sex selection. This fusion can either occur after meiosis I or II. This does not produce complete clones, as recombination, where sections of chromosome change between which pair they are on, leads to novel combinations of genetics, leading to the activation of genes that may be dormant or repressed in the mother.

As most of our studies come from captivity, many vertebrates have been found to parthenogenetically reproduce, but many of these are attributed to tycoparthenogenesis.
or accidental parthenogenesis, when errors in meiosis lead to hatching of unfertilised eggs, many of which don’t survive. Another competing theory, however, suggests that female Komodo dragons and some other reptiles can conduct facultative (intentional) parthenogenesis, and do this to create a number of male offspring with which sexual reproduction leads to colonisation of a new habitat. Sawfish have been found in the wild to do it in response to a huge drop in species numbers, though again, this may be accidental. It’s even possible in human cells, where embryos can be made that last for a few days before they die.

Parthenogenesis is not more widespread at least partly due to genomic imprinting, especially in mammals. Here, certain genes are only active when they are inherited from a particular parent, something regulated by the binding of epigenetic markers like methyl groups. The trophoblast defence hypothesis suggests that only with the presence of genes from the father can the placenta and embryo develop properly, with the mother’s equivalent genes imprinted to stop parthenogenesis.

The mobilising lipase breaks up the triglycerides stored in the adipose cells...

--- Partners in Crime

So what biological process is similar to the one described on the show? The general transport of lipids comes to mind. Normally, lipids are transported around the body in the form of lipoproteins, a complex of fats and proteins.

Lipoproteins are made in cells when ribosomes, the makers of protein, bind to the rough endoplasmic reticulum (ER), a series of membranes that extend throughout the cell. On binding, they continue forming the apolipoprotein into it. Here, the microsomal triglyceride transfer protein (MTP) binds to the inside of the ER, where it disrupts the membrane. This allows it to start transferring fats to the apolipoprotein, which changes its conformation so it starts to coil up. After forming a pre-lipoprotein, this is then moved by vesicles to the smooth ER via other membranous structures. Vesicles are formed by coat proteins, that bind to the membrane and deform it into a specific shape, determined by which is most stable with the intermolecular forces of the proteins themselves.

Once the membrane has formed the vesicle and detached, the coat proteins can leave to form more vesicles, and then the vesicle is free to fuse to its target. In this case, it is targeted to the smooth endoplasmic reticulum, which is the same as the rough ER but without ribosomes, and it synthesises lipids. In the smooth ER, MTP appears again, this
time forming the lipids into a large droplet, with a membrane layer around the outside. This then fuses with the pre-lipoprotein to form a lipoprotein. The exact composition varies to give different types of lipoprotein depending on the protein. These lipoproteins can then move around the blood, and are then taken up by specific receptors, which import the lipids into cells in vesicles.

The genesis of the Adipose is normally caused by the accumulation of lipids, stimulated by the Adipose pill. Assuming that this pill contains a large amount of these receptors, it could be possible to accumulate a large enough amount of lipid to form an Adipose. However, the ability to mould these lipids into specific shapes would probably require a skeleton of some kind, perhaps a protein based structure to deposit it on. In addition, it is mentioned that they can convert other tissues for Adipose formation, which is transdifferentiation as mentioned in the Time Lord article.

Seems to be a bio-flip digital stitch...
— Partners in Crime

So is the term parthenogenesis used correctly in Doctor Who? No. While they are virgin births (parthenogenesis translates to this in English), they do not involve genetics of any kind, and so cannot be termed parthenogenesis. In addition, the ability to create these Adipose through genuine biological methods would certainly show noticeable symptoms over the three-week course, and more time than the few minutes when the signal on the inducer is fully activated. The use of the pill is also problematic. To form the skeleton, or even just collect the required amount of lipid, would require a much larger object to have the needed number of receptors, and some kind of method to stimulate the creation of the Adipose, which would probably require some kind of genetic aspect. Therefore, the use of parthenogenesis is totally unrealistic, as the two concepts have no link, except in name.
Snakedance

William Shaw

The mouth of the cave
Opens in my dreams. I daren’t
Enter its belly.

A gaudy showman
Offers enlightenment in
His dusty glasses.

‘I won’t harm you’. In
My own voice, a god commands:
Look in the mirror.

Temptation and fear;
Fine subject matter for a
Children’s puppet show.

Through the carnival,
A loud, eerie shout rings out:
Submit to the snake.

Refuse to give in.
Find the still point, and banish
The monsters inside.
Previously...
...it was shown last issue how Marco Polo came to the court of Khubilai Khan, Emperor of China and nominal ruler of vast tracts of Asia, and how after his return he set down his experiences in a book, which survives in many versions and with many names (here referred to as the Wonders). Its original is however lost, much like a certain Doctor Who serial. Some of the historical and fictional characters encountered by the TARDIS crew have also been introduced. Now it is time to follow their caravan.

From the Roof of the World to the Great Capital

Part two of Marco Polo - over fifty years later

Katrin Thier

Twentieth-century Asia...

The 1964 serial Marco Polo shows its protagonists travelling along the eastern part of one of the routes of the ancient Silk Road, from remote parts of Central Asia to the capital of China. Some of the places they visit (and others mentioned in the script) are now UNESCO World Heritage sites and draw a fair amount of tourism from the West; in 1964, however, they might as well have been on a different planet. Some of the more famous Silk Route stations are now in Turkmenistan and Uzbekistan, which along with many other Central Asian countries, were part of the Soviet Union in 1964. An exception was Afghanistan to the south, which was then a peaceful, forward-looking country, keeping on friendly terms with the neighbouring superpower. To the east, Mongolia (independent from China since the early twentieth century) was effectively a vassal state of the Soviet Union. The story was broadcast two years after the Cuban Missile crisis, when the Soviet Union maintained a rather chilly relationship with the West. In
addition, most of the places that appear in the serial (except at the very beginning) are, and were, in China, which at the time was just beginning to recover from what its government had called the ‘Great Leap Forward’, and internationally was maintaining chilly relations with just about everybody.

...and thirteenth-century China

*Marco:* China? I do not know this place. Shang Tu is in Cathay.

The story begins with the TARDIS broken down in an icy desert, surrounded by mountains, its occupants finding themselves unable to fix it immediately, and without enough food for a lengthy repair break. When they meet Marco Polo’s caravan and try to establish their whereabouts (in both time and space), the impression arises that the TARDIS’s translation circuit (though not yet invented…) has also suffered some damage. While most of the conversation is perfectly intelligible to all parties, the name of China causes some confusion. For a considerable time in history, the European name *Cathay* corresponded to what is now called China (with varying boundaries over time, but essentially the same single political unit), so the TARDIS might be expected to translate the modern name into something Marco could understand.

However, in the thirteenth century, the political situation was slightly more complicated. The *Song* dynasty had come into power in the late tenth century, following a period of unrest, and tried to consolidate a rather fragmented China into a single state again. In the north, however, the *Khitan*, a nomadic people related to the Mongols, formed their own state, and their leader proclaimed himself emperor, founding a new dynasty called *Liáo* against the Song. With time, the Khitan became increasingly Chinese in their administration and culture. In the twelfth century, complex and violent political developments led both to their downfall at the hand of the *Jurchen* (another, unrelated, nomadic people), and then to the Jurchen conquest of a large territories in the north of the Song state, including the capital. As the Song Emperor fled south, the Jurchen in their turn formed a new Chinese-style dynasty (called *Jin*, meaning ‘golden’), effectively
resulting in two parallel Chinese states. The Jin state was then conquered by Chingis Khan in 1234. It was held and expanded by Khubilai Khan, and when the Polos first came to his court, this was the part of China under Mongol control, the part which the historical Marco later refers to as Catai (after a Persian form of the name Khitan). By contrast, the remains of Song China, finally secured by Khubilai in 1279, are called Mangi in his account (from Chinese Mánzi, a rather unflattering term then used by the northern Chinese for the inhabitants of the south). So the idea that Marco would not think of China as a territory with a single name is not all that surprising. The serial’s writer, John Lucarotti, had clearly read Marco’s book in some detail and must have been aware of this, even if the designer of the serial’s original map (which survives in the telesnaps) was not: the map in episode one shows the travellers’ route against the backdrop of much of East Asia, with ‘Cathay’ written over the entirety of Khubilai’s Empire. The final irony is of course that it was Khubilai’s conquest which made China into a single entity again; and this (with some changes in outline) it has remained to this day.

The serial uses Chinese names for many places (but not all!). However, much of the territory covered in the first few episodes lies outside the ‘Cathay’ of Marco’s Wonders and changed hands many times in history. This is reflected in the multitude of languages spoken there (then as now): Mongolian, Tibetan, and Chinese as well as various languages related to Turkish and Persian, respectively. The name forms used in the Wonders come from more than one language. For the merchants like Marco operating in this multilingual environment, Persian was often used as a lingua franca, much as English is used in the western world today.

Chinese is not written in an alphabetic script, so any attempt to transcribe it into Latin letters are initially made on the basis of sound. As a result, speakers of various languages at various times have come up with rather different spellings for the same names. The forms in Marco Polo’s account, for example, are intended to be read (and pronounced) by someone familiar with Italian. In the mid-twentieth century the Chinese government introduced an official transliteration system called pinyin to overcome such differences; this has now become the international standard. However, pinyin was not fully developed until 1958 and only gradually superseded other transliteration systems. In 1964, the writer and

*The mountains of the Wakhan Corridor. Image: Mr afghanistan.*
producers of the serial mainly used the Wade-Giles system (developed in the nineteenth century by two sinologists with these names). Writing in the twenty-first century, however, I prefer to use the now familiar pinyin for the Chinese place names, except when quoting directly from the script.

**The journey**

**Marco:** It is twelve hundred and eighty nine and this is the Plain of Pamir, known to those who travel to Cathay as the Roof of the World.

It turns out that the TARDIS has landed on the **Pamir**, an extensive high-altitude mountain range adjoining the Himalayas, spanning regions mostly in modern-day Afghanistan and Tajikistan. The best route across these mountains was via the so-called Wakhan corridor, which now belongs to Afghanistan, a narrow strip of land linking the rest of that country to China.

Although the expression is now also used for the Himalayas and the Tibetan Plateau, ‘roof of the world’ originally described the Pamir mountains. It is first seen in English in the works of a mid-nineteenth century explorer and literally translates Persian bām-i dunyā (or something similar in a related local language). In various Turkic languages (of which some are spoken in the region) pamir means ‘high pasture’, and Marco reports that the lower tracts of the range are valued for that purpose. The highest parts, however, are a hostile desert which, according to the *Wonders*, it takes twelve days to cross. When the travellers first meet the rest of the company in the encampment over dinner, the serial adds its first scientific observation, namely that the thin air of the extreme altitude affects the boiling point of water. This is not a random insert but something the historical Marco also experienced in the same region, although he attributed the effect to the intense cold.

**Marco:** The strangers and their unusual caravan accompany me to Lop. Our route takes us across the Roof of the World, down to the Kashgar Valley and southeast to Yarkand.

The easiest descent from the passes of the Wakhan corridor is along a valley leading north to Kashgar, a key point at the end (or beginning) of the mountain crossing. From here on, the route the travellers take is dictated by geographical necessity, a narrow passage between the southern edge of the Taklamakan desert, which has the reputation of being one of the deadliest places on the planet, and the Kunlun mountains on the edge of the Tibetan Plateau. This has not changed, and most of the places described in the *Wonders* and in the serial still exist; they are now in the Chinese region of Xinjiang (formerly known in the West as Chinese Turkestan), where even now, Chinese is not the main language of many people. Similarly, none of the names in the area given in either the
Wonders or in the serial are in Chinese (although nowadays, there are Chinese alternatives).

**Marco**: Travellers of the Gobi Desert have good reason to fear the singing sands, Barbara.

The **singing sands** (which give the second episode their name) are a phenomenon described in the *Wonders* of the desert of Lop rather than the Gobi desert. The substitution was probably made for the benefit of European audiences not familiar with each of the various deserts encircled by the mountains of east-central Asia. The desert of Lop lies between the Taklamakan and the Gobi deserts, cutting across the route. According to the *Wonders*, caravans tend to stop at Lop for a week to prepare for a crossing that will last a month at the narrowest point. The *Wonders* report that the desert makes noises resembling human voices at night which are likely to lead astray any stragglers who are separated from their caravans. Susan and Ping-Cho experience something very similar when they leave their encampment in a sand storm. The phenomenon is caused by the wind on the sand (combined with human imagination), and while Marco’s original report was long dismissed as fantasy, it has now been confirmed both in the deserts of Central Asia and elsewhere in the world. It is also recognized in the name of a large sand dune near Dunhuang, *Míngshā Shān*, often translated as ‘Singing Sand Mountain’ (although the first element just means ‘to make a sound’).

**Marco**: Now we journey on across this burning desert and I shall not rest until I see the temple spires of the city of Tun-Huang.

**Dùnhuáng** is indeed our travellers’ next destination. It appears in the *Wonders* by a different name, Shâzhōu (written Saciou). Dunhuang is now best known for the Mògāo caves, also known as the Thousand Buddha Caves. These caves are not described separately in the *Wonders*, but are presumably among the many Buddhist temples and monasteries Marco observed in the city. Religious sites made up of caves painted with religious images and peopled with statues are not unusual in the Buddhist world, but are particularly common on this part of the Silk route. The Dunhuang caves are therefore not
unique, but they make up the largest and most spectacular site, with about five hundred man-made caves, most of which were already centuries old at the time of Marco’s visit. When Barbara refers to a Thousand Buddha Cave, she may be thinking of cave 148 (now called the Nirvana Cave), which features a giant statue of a reclining Buddha, a number of smaller statues of his followers, narrative scenes on the walls, and a seemingly endless succession of Buddha images on the ceiling (all going back to the eighth century). The Wonders describes a similar statue in Ganzhou, which also still exists. The cave of five hundred eyes (which gives episode 3 its name), does not exist, but may have been inspired by cave 285, which has sixth-century murals of a story in which five hundred robbers are converted to Buddhism.

Lucarotti takes a lot of liberties with this site. Firstly, the decorations are thoroughly Buddhist, and very few of the images are about anything other than Buddhist tales or individuals, so any connection with the Muslim hashashin is highly unlikely. Secondly, the caves are carved into a gravel-based sedimentary rock (a relatively soft material), not the kind of hard old rock which could contain veins of quartz, so the doctor’s explanation for the shining eyes of the paintings does not hold up.

**Marco:** The route takes us to the ancient cities of Su-Chow and Kan-Chow, where the Great Wall of Cathay begins. Following the wall, we travel south to Lan-Chow which lies on the banks of the Yellow River. Here, our route swings north, and with the river always in sight, we journey towards Shang-Tu.

The names mentioned here are three cities in Gânsù province, in what is called the Gansu corridor, a relatively narrow strip of fertile land between the outer reaches of the Tibetan Plateau and the Gobi Desert; it meets the Yellow River at Lánzhōu. Súzhōu is now part of a city called Jiūquán (and in no way related to the more famous Súzhōu on the Pacific coast), while Gânzhōu has become part of Zhângyè. Both are mentioned in the
Wonders (as Succiu and Canpiciu respectively), but Lánzhōu is not. The apparent similarity of these names is not particularly significant; the element zhōu just means that the town is the capital of a particular kind of administrative district.

Marco: For the past three days, I have followed the course of the Yellow River as it flows north to the small town of Sinju, which lies nestled against the Great Wall.

After this, Lucarotti begins to have some trouble with the geography, which may well be due to a change in underlying text. From where we joined on the Pamir and as far as Ganzhou, the sequence of places described in Marco’s account has been following a well-known part of the Silk Road, as well as the route Lucarotti wanted his characters to take. After Ganzhou, the text of the Wonders goes on to describe the route to Karakorum, which is of no use to the story for reasons relating both to the historical context and the immediate plot. In 1289, Karakorum was no longer the capital of Khubilai’s empire, so while it was significant enough to Marco to merit a long description (including some historical chapters on Chingis Khan), it is of no immediate interest to a group of travellers headed for Khubilai Khan’s court. Also, it needs to stay off-screen (and initially off the radar) as a place where background action can take place. More about this place below.

In the book, this diversion takes up a certain amount of space, but Marco eventually resumes his notional journey towards Shangdu. He explicitly sets out from Ganzhou again, leading his reader a bit further on along the valley before apparently cutting across eastwards to Egrigaia (now Yínchuān), leaving Lanzhou to the south. Travel distances are given between these places, suggesting that this is meant to be an actual route. Unfortunately, this route bypasses another place further south which merits comment, so the book goes off on another tangent, noting that Cathay could (alternatively) be entered southeast of Ganzhou, and then describes a place that appears as Sinju in some versions and translations, but as Silingju in the earliest manuscripts. This place is usually (though not undisputedly) identified as Xīníng (or Ziling in Tibetan); with the final –ju standing for zhōu again. Xining is now the capital of the province Qīnhǎi (Amdo in Tibetan), which is part of the Tibetan cultural sphere. At the height of Tibet’s power, in the eighth and ninth centuries, its influence had also extended over some of the regions just visited, so it is not surprising that Marco appears to use a Tibetan form of the name. Tibet had been conquered by the Mongols in the mid-thirteenth century under Möngke Khan, Khubilai’s older brother and predecessor as Great Khan, but it remained a distinct unit within the empire, even after Khubilai had established control over all of China. At the Mongol courts, Tibetan Buddhism was favoured over the Chinese variety, and one of the historical khan’s advisers was a Tibetan lama. It is quite possible that the Doctor’s (or indeed the TARDIS’s…) interest in Tibet and its culture (as seen, for example, in The Abominable Snowmen) started here.
However, this place (part of a textual excursion rather than the general route) appears to be a bit out of the way for the serial’s caravan, as getting there from Lanzhou would have meant turning west - the wrong direction entirely. It is also surprising that Lucarotti left the name Sinju unchanged, given that he updates most other names to more modern forms, even where these are quite different from Marco’s to the point of being unrelated (as seen at Dunhuang). This may mean that he was unfamiliar with this identification of the place and unaware of its geographical implications - on the original maps of the serial, Sinju is placed east of Lanzhou. Sinju was omitted from the novelization (which moves events to Lanzhou), suggesting that this may have been a genuine mistake in the script, which the novel corrects.

By this point in the story, the Great Wall has been mentioned twice, so it probably deserves some comment, especially since it is a marked oddity in a story based on Marco Polo’s writings: in the Wonders, Marco does not mention the wall at all. In the 1990s (long after the serial was aired), a bold claim (now largely refuted) was made that Marco Polo never went anywhere near China, and the absence of the Wall from his book was one of its main arguments. However, there is more than one reason why this need not be a problem. Firstly, the Wall as we know it today did not exist in Marco’s time. The current impressive black brick structure (partly restored) dates from the fifteenth century, when the Ming dynasty (having defeated the Mongol emperors) felt the need to make a statement towards the north.

At earlier times, the wall was a much humbler affair – technically it is not even a single structure, so is probably better referred to in the plural. Defensive linear earthworks made from locally-available materials have been built at many periods, the world over, and eastern Asia is no exception. These structures were built of a range of materials, ranging from stone and rubble to mud-bricks and compacted earth. By the time China first became a single empire in the late third century BC, the first emperor linked a number of existing earthworks up to form a continuous northern frontier line. Over the next few centuries, such walls were built, rebuilt, and expanded in a complex pattern up to the third century AD. This process continued in a smaller area in the unsettled times of the fourth
to seventh centuries. After this, the main line of walls was no longer maintained. Some eleventh-century defences built by the Jin lie much further north.

At the time of Marco Polo, many sections of the main line of walls would have been in a bad state, if they were still visible at all. This would have been especially true in regions where stone was scarce, and it would have been difficult to tell that the surviving sections had ever been part of a larger system. This means they probably did not look very different from other linear earthworks of various ages, which Marco would also have seen in other parts of the world – quite literally nothing to write (home) about. Also the main purpose of these walls (for as long as there had been a central imperial plan behind linking, building and maintaining them) had been as a line of demarcation and defence against the nomadic peoples of the north, among them the ancestors of the Mongols. Once this line had been crossed from the north (by the Khitans, more than two centuries previously), it ceased to be a boundary, and was therefore no longer important. This is not to say that the function of these walls was not known at the khan’s court – it just did not matter.

**Tegana:** The day after tomorrow, the caravan sets out to cross the bamboo forest.

After the travellers have reached the Yellow River, details become even vaguer. The next stop in the serial is an entirely fictional and generic place: a **bamboo forest**, one of many thousands which can be found pretty much anywhere in east Asia. This introduction of a random unspecified place (at an unspecified distance from the previous stop) helps to distance the script from the *Wonders*, which (as mentioned) goes off on a different route not long after Súzhōu. However, it is likely that this place is merely an excuse to import one of the curiosities described in the *Wonders* with reference to an entirely different region: on the road to central Tibet, Marco notes, travellers put green bamboo on their fires at night, so that the resulting explosions keep wild animals away.

**Marco:** So within an hour, we were on the move again, and on the sixth day of our journey, the spires of Cheng-Ting could be seen on our horizon. By later afternoon, we had arrived at the way station of the White City, as Cheng-Ting is often called.

Six days from the (conveniently) vaguely-located bamboo forest, the travellers find themselves approaching **Zhèngdìng**, which nowadays has been swallowed up by Shíjǐāzhūāng, the capital of Héběi province. The Chinese name of this place is not mentioned by Marco’s book, instead his book tells of a place called Ak-Balik ‘White City’ (written *Acbaluc* in the *Wonders*) as one of the first stages of a notional onward journey south from what is now Beijing, into the part of China that was not Cathay. The “spires” mentioned in the serial may be the four tall pagodas which were built before before the Mongol era and which still exist; however, these do not feature in the *Wonders*. Including
this place in the itinerary of the story makes a certain amount of sense, because (for plot purposes) it is important that the travellers do not approach the Khan’s court from the direction of Karakorum in the north, as the notional journey in the *Wonders* does. On the other hand, Zhengding seems a rather major detour to the south, more convenient for Beijing than their stated destination at Shangdu.

**Doctor:** It’s all Chinese. Very interesting. It’s odd that a Mongol should choose Chinese architecture, isn’t it?

**Shàngdū**, the ‘Upper Capital’, is now best known in the English-speaking world as the *Xanadu* of Samuel Taylor Coleridge’s romantic poem *Kubla Khan*. By his own admission, Coleridge’s poem was inspired by a description of the Khan’s palace in Samuel Purchas’s *Pilgrims*, a seventeenth-century collection of travel writings, which also contains a rather loose adaptation of Marco’s book. Purchas spells the name of the town *Xandu*, a form that goes back to a relatively early Latin manuscript of the *Wonders*.

The city had been founded by Khubilai as Kāipíng in 1256, when his predecessor Möngke was still in power. The site had been picked by a Chinese feng shui specialist and architect, who also oversaw its construction according to Chinese principles, making it fit for a future emperor of China. It was renamed in 1263. Even after he moved his main base of power further south, to the place now known as Beijing, Khubilai preferred to keep Shangdu with its cooler climate as a summer residence. The foundations can still be seen near the town of Duólún (Dolon Nor) in Inner Mongolia, now an Autonomous Region of China.

**The Khan:** Our patrols watch the Karakorum road, and tomorrow we’ll ride for Peking.

One of the most noticeable anachronisms is the name of the capital city, which is given as *Peking*, the old European name for *Běijīng*, and still in
common use well into the 1980s. It goes back to the reports by seventeenth-century travellers and reflects a Chinese pronunciation which was already archaic at that time. The current form Beijing, on the other and, is based on the pinyin transliteration of the same name and would not have been widely known or understood in the 1960s. However, this name (however transcribed) does not go back further than the fifteenth century, even though there had been a series of important settlements in the same place for a long time before that. This has been pointed out by critics of the story more than once, but it ties in well with the serial’s general preference for using modern Chinese names, which should be taken as a function of the TARDIS translation circuit. Although not infallible (as seen with the names of Cathay and Sinjiu), this has the useful (side?) effect of giving names an English-speaking audience in 1964 could find in their atlas.

The first city in the location of Beijing was built in prehistory, long before the formation of China as a single state, and changed names and functions several times. In the tenth century AD, the northern Khitan (Liao dynasty, mentioned above) called the city Nánjīng ‘southern capital’ and used it as a secondary administrative centre. In the twelfth century it was conquered by the Jurchens (Jin dynasty) and became their ‘central capital’ (Zhōngdū) until it was sacked and destroyed by Chingis Khan in 1215. About half a century later, beginning in 1266, Kublai Khan built his own capital city there and gave it an official Chinese name Dàdū ‘Great Capital’. However, rather than attempting to rebuild in the ruins, Kublai picked an empty spot nearby which allowed him to construct a Chinese-style planned city on a grand scale, designed by the same architect who had been responsible for Shangdu. The new site also had better access to water, which was crucial for sustaining a larger population. The city, and especially its palace, is described in Marco’s account, where it is called by its Mongolian name Khanbalik ‘city of the Khan’ (which he spells Cambaluc). Some of the details of this account have made it into the script and the set design: the colourful splendour of the throne room, and especially the dragon wall hangings are based on the Wonders, as is the number of the banquet guests (the hall can reportedly hold six thousand people).

After Mongol rule in China was ended by the emerging Ming dynasty in 1368, Dadu was destroyed, and rebuilt into a garrison. After some more changes of name and function, and in response to internal
pressures, it eventually became Běijīng, the ‘northern capital’ in the fifteenth century; around that time, new buildings began to be constructed on the site of the khan’s palace, the first Forbidden City.

**Off-screen**
The journey of the Doctor and his companions ends at the Khan’s palace, as the plot is resolved and the TARDIS takes off to a new adventure. It remains to briefly comment on two other places that feature in the story, but remain unseen.

_Ian:_ Karakorum? But Karakorum’s the capital of the Mongol empire.

_Ping-Cho:_ Not any more.

_Karakorum_ (‘Black Rocks’) had a rather shorter life than Samarkand, but was in many ways no less significant. Late in his life, around 1220, Chingis Khan chose the site as the centre of his empire. The city is likely to have started life as a collection of tents, but it was fortified by Chingis Khan’s son Ögödei in the 1230s. European travellers of the mid-thirteenth century describe a lavish palace, remains of which are now being archaeologically excavated. By the time Khubilaï moved his capital(s) into China, it was clearly a stone-built city, and remained so even after losing its status. Contrary to Ping-Cho’s claim, it was never abandoned during the time of the Mongol Empires, and the last Yuan emperor fled there in 1368 after losing China to the newly-formed Ming dynasty. Karakorum was destroyed by a Ming army in 1388; its ruins now lie in the Republic of Mongolia.

_Ping-Cho_: I come from Samarkand. My father is government official there.

Not much is said about _Samarkand_, but it may be worth mentioning as one of the better-known Silk Road stations. It is situated at the foot of the mountain barrier that separates the western parts of Eurasia from the northern approaches to China, but north of the Pamir mountains of episode one. In the fourth century BC, Alexander the Great reached this region, but went no further. Over the centuries, it was ruled by a number of different peoples and was conquered by Chingis Khan in 1220. Its location as one of the crucial places for repackaging and redistributing goods for the mountain journey (or just selling them to lighten the load) led to considerable wealth and importance. It belonged to one of the northern routes of the Silk Road which Marco does not write much about, but it is important enough to merit an own separate chapter. This marginal status in the _Wonders_ is mirrored in the serial, where the city only ever features in the distance as the home of Ping-Cho’s family. In the fourteenth century, Mongol rule was overthrown and Samarkand continued to be ruled by changing masters. It is now the second largest city of
Uzbekistan and is best known for some spectacular fifteenth-century architecture.

**Lime Grove Studio D (675 years later)**
Unsurprisingly, recreating the expanses of thirteenth-century Asia in a small, aging television studio was a challenge, and many enclosed spaces (tents, rooms, caves and courtyards) are used to cope with its limitations, giving the story a theatrical feel. Set designer Barry Newbery researched historical and traditional architecture to make the sets believable. It helps that modern Mongolian tents (called yurts or gers) much resemble those seen (from the outside) in thirteenth-century manuscripts, and that there are archaeological finds of wooden buildings from the Central Asian deserts. In his *Signature Collection*, Newbery mentions as an important source a 1902 book by the prolific British Museum archaeologist Aurel Stein, a frequent traveller in eastern China. Stein did not publish a book that year, so the date is clearly an error, and Newbery could refer to any of a number of his books. If ‘1902’ is a typo, the most likely candidates are *Ancient Khotan* (1907), an archaeological report on a single site (with many photographic plates), or the lavishly-illustrated two-volume expedition narrative *Ruins of Desert Cathay* (1912), which contains pictures of the caves at Dunhuang.

**Closing credits**
Much of the research for these ramblings was done by raiding the shelves of various public (and to some extent, academic) libraries, as well as the internet, so a full list of sources might become a bit tedious. A version of the 1958 translation probably used by Lucarotti is still in print (Penguin Classics), and early editions of Henry Yule’s ground-breaking translation and commentary can be found on Google Books. Christopher Atwood’s *Encyclopedia of Mongolia* and the online *Encyclopedia Iranica* (www.iranicaonline.org) also make for an interesting read. Several of Aurel Stein’s books are available on the internet Archive. Another useful online resource is the *Digital Silk Road* project (dsr.nii.ac.jp/index.html.en).

I am grateful to Matthew Kilburn for letting me use his trove of *Doctor Who*-related resources and also to Inge Milfull and Jonathan Dent for looking over the manuscripts (and pointing out the faults). Any remaining shortcomings are of course entirely my own.
The Tides of Time

The Curse of Peladon
William Shaw

Peladon

Rain lashes Castle
Peladon, as TARDIS groans
Mingle with thunder.

King Peladon pleads
For patience, as Aggedor
Stalks his corridors.

Enlightened Rulers
Are seldom listened to when
Monsters are about.

Izlyr and Ssorg

Our lives spared from the
Monstrous statue; saved by the
Stranger in velvet.

A life-giving box,
Secreted in our chambers,
Wakes an old hatred.

Enlightened Rulers
Are seldom listened to when
Monsters are about.

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Monstrous statue; saved by the
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A life-giving box,
Secreted in our chambers,
Wakes an old hatred.

The Earth Princess calls
Us warriors. But she’s wrong;
We are diplomats.

Arcturus

The wires in the walls
Tell me that our enemies
Are making their move.

The Doctor is thrown
Into the pit; my plan is
Working perfectly.

The Doctor

In my line of work,
One should always be running
Towards the snarling.

The creatures we keep
In pits are not beyond the
Reach of empathy.

My life expires in
A flash of Martian light as
Smoke pours through the glass.

Taming a monster
Is sometimes as simple as
Singing lullabies.
A VERY LONG TIME AGO, there lived a wise man with his two daughters. Their wooden home was modest and small; but the daughters did not mind, for it overlooked a vast, beautiful pond, and every day, once their chores were complete, they would play on its banks while their father cooked their supper.

The younger of the sisters had a favourite spot on the eastern side of the pond, for this was where the water lilies grew. These green and pink flowers hovered on the water like little saucers, and were close enough to the bank that she could grab them with her butterfly net, and wear the pretty blooms in her hair.

One day, while fishing for lilies, she could see her sister on the other side of the pond. The older girl was picking up stones from the rocky shore and skimming them across the clear surface of the water. Deciding that she wanted to try as well, the little girl picked up a small, glimmering pebble, and threw it towards the water.

The stone did not glide over the pool as her sister’s had done, but sank to the bottom of the shallow waters with a loud plop. As it broke the liquid’s fragile skin, it created large ripples, pushing the surrounding water lilies away from the shore’s edge.

The little girl began to cry, for the precious water lilies that she loved were now drifting hopelessly out of her reach. She ran back home to her father, who saw her distress, got up from his chair, and asked her what the problem was.

‘I want the lilies back!’ she sobbed. ‘I threw a stone into the water and now they’re gone!’

‘Well,’ her father replied calmly. ‘If you take the stone back out of the water, perhaps the lilies will return.’

He walked with her back to the eastern shore, and eagerly she strode out into the pond, bent down to collect the pebble, and waded back onto dry land. But as she looked out onto the pond’s surface, she saw that her actions had been in vain. She had created even more vibrations in the water, moving her goal further still out of her reach.

She looked up towards her father, confused. He gave her a kind smile in reply.
‘Now let this be a lesson to you, young girl. Some doings can never be undone. And every pebble we throw will have a consequence, though we may not realise it at the time. We must learn to anticipate such things, and try not to disturb the way that things should be!’

The little girl promised her father that she would never throw stones into the pond again, but he wondered whether she had truly understood his lesson. Surely another day would come when his daughter would ask him to right another of her mistakes.

Indeed, it seemed almost inevitable.

*Old Gallifreyan fable*

‘Well, Doctor, I think it looks safe enough.’

‘Are you sure? The Black Guardian can be very cunning when he wants to be.’

The Doctor and Romana stuck their heads round the door of the blue police box that passed as their home, scanning their surroundings for any obvious signs of danger.

The TARDIS, which passed as that blue police box had landed in what appeared to be a small study, that might have been found in Edwardian England. On one side of the room sat a large desk and accompanying chair. Next to that towered a row of bookshelves, each packed with hardbound, dusty tomes. A single doorway on the opposite wall appeared to lead out of the room.

‘You’re right, Romana. It looks fairly innocuous.’

‘Yes, almost boringly so.’

‘There’s nothing for it, then, but to head out and have a bit of a nose round, hmm?’

The travellers left the safety of the TARDIS’s doorway, and closed the ship behind them. They were both immediately drawn towards the room’s exit, hungry for more precise knowledge of their whereabouts and whenabouts.

‘After you, Romana, ladies first,’ gestured the Doctor, performing a minor bow.

‘Oh, thank you.’ Romana, surprised by the Doctor’s sudden turn towards decorum, grabbed the door handle and jiggled it about unsuccessfully. ‘Oh,’ she sighed with resignation, ‘it’s locked.’

‘I know. Isn’t it marvellous?’

‘I fail to see quite what’s so marvellous about it.’

‘A locked door is always three times as interesting as an unlocked one. There could be anything on the other side of that!’

Romana frowned. Surely, she thought, the same could be said of any door, locked or otherwise, but she knew further discussion of this point would be quite futile. ‘I suppose that means you’ll be opening it, then?’

‘Well, it would be rather difficult to get through otherwise. Pass me my sonic
screwdriver.’

‘I haven’t got your sonic screwdriver! Isn’t it in your coat somewhere?’

‘Oh, probably. I suppose I’ll have to look.’

The Doctor began emptying his pockets onto a small mahogany table to the right of the door. One by one, he slowly drew out a trove of trinkets. Among them were three train tickets to Brighton, dated 1950; a small, tea-stained spoon; the dried husk of a well-eaten pear; two conkers tied to impossibly long strings; and a small round stone which promptly rolled away from the unlikely collection and onto the floor. Romana found herself imagining the objects stored in a large glass case at a particularly eccentric and shabby museum.

Finally, the Doctor drew his trusty sonic screwdriver from his pocket, and flashed Romana a toothy grin. However, before he could thrust the trusted device towards beckoning door, she gave a pointed look towards the pile of detritus he had accumulated on the poor, unsuspecting table. Sheepishly, he began placing the objects back into his coat pockets.

‘Now then!’ he boomed, finishing his task, ‘the door!’ He spun around with an air of theatricality, swirling his scarf around his neck, before presenting the sonic screwdriver to the sealed gateway. As the device made its familiar whir, a loud clunk emanated from its target. The Doctor twisted the handle of the now-unlocked door, and yanked it open, revealing a corridor leading further into the house.

‘Right, well, off we go!’ he cheerfully yelped, gesturing for Romana to follow him into the passageway beyond, who shook her head in slight exasperation, but followed nonetheless.

As the Doctor and Romana strode confidently through the doorway, and towards a new adventure, neither had noticed the small, round stone that still lay on the room’s floor, for the Doctor had forgotten to return it to his pocket. For a few days, it remained there, unmoved and neglected underneath the solemn table. It was still there when the Doctor and Romana breathlessly returned to the TARDIS, cheerfully going over the highlights of their recent escapades, as they hurried back into their blue box.

It was only after the TARDIS had left that the pebble began to tremble and vibrate, creating tiny, but ever growing ripples in the air around it. Ripples that could never be undone.

TO BE CONTINUED
I’ve been fascinated, entranced and frightened by insects since childhood. They are small compared to humans and many other creatures with which we interact, but they do so much that we can’t. They can fly, of course – but most of all it’s their ability to completely transform their physical state which bewitched me as a child and which I still read about today, absorbing exotic new vocabulary such as eclosure (the process of emerging from an abandoned exoskeleton) and exuvia (the abandoned, shrivelled ‘skin’). Much more is known now about metamorphosis than it was a few decades ago, but there are still competing accounts of what exactly happens when a larva pupates and how far the resulting adult insect is the same individual as the larva it was.

Metamorphosis is a recurrent device in Doctor Who. Time Lord regeneration is an obvious example, but I was reminded of the Cybermen when I saw Sam’s artwork and decided to put it on the cover of this issue. The picture (above left) is a homage to Male Figure with Skin Removed (above right) by Andreas Vesalius, a sixteenth-century Netherlandish anatomist, but rather than revealing bone and musculature, the skin is held at the arm of a Tenth Planet Cyberman, as if it has been newly cast off by the remade Mondasian whose new metallic organs harden in the night air.

There are plenty of precedents within the broadcast series. The Wheel in Space featured Cybermen being transported in eggs within which they seemed to grow before hatching. It’s not going too far to conceive of the eggs having contained machine parts,
organic material analogous to the imaginal cells from which the adult organs of an insect grow, and nutrients to feed those cells as they become organs which complement the machine components. The emerged Cybermen then parasitize human beings, turning them into their proxies.

*The Wheel in Space* built on associations begun in *The Tomb of the Cybermen*. There, the Cybermen tombs are presented as a giant nest of insect cells, each sealed unit containing not a pupating wasp but a dormant Cyberman. Weakened Cybermen can be placed in a ‘revitalizer’, and while this device has a lot of the sarcophagus about it, it’s arguably most immediately a cocoon. There, the Cyberman re-pupates and emerges restored to full vigour. It’s a little like the ‘sleeping compressor’ within which Tomb’s co-author, Gerry Davis, regenerates the Doctor in the closing pages of his novelization *Doctor Who and the Tenth Planet*.

The later twentieth-century Cybermen stories employ some of this imagery. The Cyberman bursting from its wrappings at the conclusion of *The Invasion* episode four is one of the well-remembered cliffhangers of the 1960s, though the otherworldly associations Tomb made, evoking not only insects but of course also ancient Egypt, are overwritten by the industrial. The freighter interior of *Earthshock* is even more mercantile, the Cybermen becoming not a swarm but bogus machine parts with attitude. While they do emerge from cylindrical cells the destruction wrought by their emergence owes little to the nest-like imagery of Tomb. In *Silver Nemesis* the tomb/cocoon imagery is displaced from the Cybermen to Lady Peinforte and the Nemesis statue, larva, pupa and adult existing simultaneously.

The *Doctor Who* of the twentieth century presented the conversion of human to Cyberman as a form of maturation. ‘Our brains are just like yours, except that certain weaknesses have been removed,’ Krail told Polly in *The Tenth Planet*. Cybermen think they have put away childish things, but they are repeatedly shown to be wrong – at least, in stories in which their creator Kit Pedler had a major hand. Their version of adulthood is one in which the ability to feel upset or happiness has been surgically removed. They can conceptualize and strategize, but have – or insist they have – no emotional connection with their plans and outcomes beyond appreciation of success.

In twenty-first century *Doctor Who* the emphasis is altered from finding perfection in a change made through necessity, to initiating change in the hope of unlocking potential. This isn’t metamorphosis into an adult, but repression into perpetual childhood, something Russell T Davies’s *Doctor Who* repeatedly warns against. Davies’s Cybermen are often looking for parents, whether John Lumic or Mercy Hartigan. Even after the ‘C’ of Cybus Industries disappears from the Cyberman exoskeleton in the Steven Moffat era, the Cybermen are still looking for a father, in the shape of Craig in *Closing Time*. The Cybermen can’t appreciate their need, nor escape it.

*Dark Water* and *Death in Heaven* again present the Cybermen as children, with Missy
as mother offering the Doctor the role of their father. However, there’s much which recaptures the earlier idea of the Cybermen as insect creatures. Missy’s Cybermen have been nesting at St Paul’s like watery wasps and her first shockwave of Cyber-troops burst forth like explosive mayflies, living briefly only to reproduce. Once Missy’s corpse-seeking rain is unleashed, Cybermen awake on top of indoor lakes, making the Danny Pink Cyberman a sort of giant mosquito, or underground like stag beetles or hawk moths. Given Steven Moffat’s interest in the fragility of masculinity it’s perhaps the stag beetle metaphor which plays out.

These Cybermen are armour-plated humans reborn to fight the Doctor’s battles for him. If at all insectoid, they are individual, with variations in the shape of their metaphorical grappling jaws and differing awarenesses of how to use them. It’s those who hold on to their identities above ground who know how to win and lead. Danny’s sacrifice of his fear does not remove his personality or reduce him to uniformity. Neither Danny Pink nor Alistair Lethbridge-Stewart want to leave their grief behind. There are no Cyberwomen; in the end it is Clara who counts and is ushered towards a foster-motherhood (of which we see nothing again). Missy’s quarrel with the Doctor is shown, at least in this instance, to be sterile. Cybermen here emerge from decay, owing something to a stag beetle’s feeding habits. However, it’s Danny and (briefly) the Brigadier who represent the self-knowledge which the Cybermen have often promised in the past. Maturity comes from facing and rejecting the deception that being a Cyberman offers any kind of growth. Danny switches off his fear and his love but not his memory of these things and does not dismiss them. They are not weaknesses.

In most Doctor Who, the transformation of a human into a Cyberman is only metamorphosis by metaphor. The change is imposed upon an individual by others through surgery. Even when a whole society converts itself, this is a technological and social shift which seeks to marginalize biology rather than change it. At the time of writing, World Enough and Time and The Doctor Falls have yet to be broadcast, but one has been led to anticipate a renewed emphasis on the origins of the Cybermen in limb and organ replacement run amok, as conceived in 1966. However, the process of conversion unleashed by Missy in Dark Water/Death in Heaven was quasi-biological: Cyberpollination, where ‘every tiny particle of a Cyberman (contained) the plans to make another Cyberman’. We were left only one stage from the infection of living people, though the effects might be too horrific for Doctor Who.

Nevertheless, the thought of someone suddenly stopping at home, school, or workplace, their skin becoming dry and brittle and then breaking open to reveal something inhuman made of steel or silver or plastic is one to tantalize. The stuff of teatime nightmares only ends when the Cyberpollen comes for you and the Cyberman within needs to eclose, abandoning your humanity as pupa sheds its caterpillar skin. Humanity is left not exterminated, but exuviated.
First seen in *The Impossible Planet* in 2006, the Ood are a race of telepathic beings, who are enslaved across the galaxy. In 2008’s *Planet of the Ood*, we learned that slave trading firm Ood Operations control them in part by confining the large, separate Ood brain that telepathically links the Ood. Ood Operations ‘process’ the Ood by removing their hind brains, which are responsible for memory and emotion. Are multiple brains possible? In a sense, yes.

**It’s a shared mind, connecting all the Ood in song.**  
— *Planet of the Ood*

Perhaps the only animal with a comparable attribute is the octopus. In addition to its main brain, it has highly developed neurons in each of its arms, which allow each arm to act independently, acting like smaller brains. During movement, for example, the central brain tells the arms where to point and how far to stretch. The combination of muscles that are used and how the arm bends is organised by the neurons in the arm itself, in the arrangement of the peripheral neurons and the ganglia in the arms. The arms create their own bends to act as joints by the contraction of muscles. Octopuses have hydrostatic skeletons composed of fluid and muscles. As fluid can’t be compressed, it provides rigidity.

There are around 320 million neurons in the arms’ nervous system, while the brain contains only 50 million neurons of around 500 million neurons total in the whole body. This shows that the arms must have some degree of intelligence, and can act autonomously. Indeed, the arm suckers secrete chemicals that prevent the arms from grasping each other, because they act separately and don’t have a somatotopic area of the central nervous system. This area of the brain informs it where its constituent body parts are, and so without one, its arms may grab each other when instructed to reach for objects. The arms can
still move even when amputated, and make complex movements, showing that the arms have a large role in co-ordinating their own movement. However, all these movements exhibited by the octopus’s arm ganglia are equivalent to areas of the main brain, such as the motor cortex, in other organisms such as humans.

There’s a low level telepathic field connecting them. Not that that does them much good.

– The Impossible Planet

Overall, this makes the use of multiple brains in Doctor Who quite realistic, as the main brain of the Ood was where thought occurred, and delegated emotion and memory control to the hindbrain. The principle of a main, central brain being separated into smaller brains, or groups of neurons, with different functions is perfectly possible and, as has been discussed, occurs in the animal kingdom. However, a telepathic, separate brain that is linked to all Ood is so far a fantasy. Unlike the Ponds in Pond Life, we are unlikely to enjoy our own private housekeeping Ood anytime soon. But now this article’s song is ending, and the universe shall sing it to its sleep...

Ood for thought

Tom Marshall

The Ood number among the greatest creations of Doctor Who’s 2005 relaunch. They represent the new series’ most coherent engagement with the idea first established in The Sensorites (1964): that those who seem monstrous can be kindly and gentle, and are probably more afraid of the Doctor and other humanoids (and by extension us viewers) than we are of them. They stand for one of the most triumphant, punch-the-air moments in the show’s entire history, when they stage their own revolution against the evil corporation which enslaves them without the Doctor’s help. The Doctor and Donna are allies and bystanders in Planet of the Ood (2008), which would have unfolded almost identically without them. They are an emblem of one of the greatest instances of the show criticising itself — notably how it failed to properly address, investigate or characterise the Ood in their debut appearance — and then doing something about it. And lastly, of course, they’re a fabulous design: icky enough to make us feel deeply uncomfortable about realizing we’re judging them because we find them ugly. They’ve been patchily used since 2008, slotting into the ‘Magical Negro’ trope, though 2011’s The Doctor’s Wife does at least voice my own position: ‘Love an Ood!’
IT WAS ABOUT 0300. Unusually for me, I'd been to sleep but had awakened as usual from a stress dream in the middle of the night. I've been unemployed for almost a year now, after [REDACTED] University decided not to renew my one year contract with them. Between then and now, I'd submitted, revised, resubmitted and been awarded my PhD on Torchwood and national identity from Aberystwyth, had two peer-reviewed pieces accepted and had given several papers at conferences around the world, three on various aspects of my dissertation, one on Agents of SHIELD and identity (#teamWard) and two on the Ianto memorial (as I call it).

One of the two peer-reviewed pieces I have coming out is a co-authored digital book with Liza Potts and three of her students that uses the memorial as a case study. (Details are below in the Further Reading section.) We're developing a digital archive of the dedications that were left there as well, an archive based on the three years and two months where I walked at least an hour each way from my flat in Cathays or Roath, in all weather, three days a week, every week to catalogue the items left behind. I've also published twice on this, indirectly when talking about the commodification of Cardiff (Beattie 2013) and directly about the memorial in relation to counterhistories (Beattie 2014).

It's not uncommon for me to get two or three job rejections in a day. Each one tells me essentially the same thing: there was not only somebody better than me but there were, in fact, a great many somebodies better than me. More publications, more teaching experience, better name recognition or any of a dozen other things it could've been (or could have been perceived as having been). I'm currently living in my mum's spare room, trying to keep up with the flow of scholarship without institutional access, and often without the money to buy the books I need either.

Now I'm not telling you this in order to make you feel sorry for me, but in order to give you an idea of both my state of mind at the time and to show you the common situation...
of many early career researchers, in the humanities and social sciences especially. In the case of fan studies in particular, a large proportion of us are part-time academics at best (and not so out of either choice or lack of ability) and a majority of us are female.

At the time of writing, to the best of my knowledge, there have been only a handful of published works on the memorial. I know this because I've written or co-written a lot of them; the exception being Rebecca Williams and Ruth McElroy's chapter in Osborne's *Queer Wales* which contextualises the memorial with regard to Cardiff and sexuality. Apart from that great chapter (full details are, again, in the Further Reading and both scholars' other academic work is highly recommended), it's been basically me and/or Liza Potts and her team.

There are also a very few scholars who work in both contemporary archaeology and media studies; of that tiny group, to the best of my knowledge I am one of the only ones with postgraduate degrees in both (MA Archaeology for Screen Media from Bristol which had a focus on contemporary archaeology, MPhil Ancient History from Cardiff and PhD TV Studies from Aberystwyth) and who also has practical archaeology experience (five field seasons during and after my BA in Classics from SUNY Buffalo). Between that, my publications, the three years and two months that I went out to the site recording what was left behind and my various analyses (many of which are, I admit, still unpublished), I think it is fair to say that I am actually an (though not necessarily the) expert on this particular site (she said modestly).

So, this was the Tweet I saw that morning at 0300:

‘[MAN'S NAME REDACTED] should write a book on the Ianto shrine.’
— Paul Cornell.

Thanks for that!

Now, before I go any further, I do want to state explicitly and categorically that I absolutely do not believe that Cornell intended to erase or slight me personally or any of the other academics listed here. I also absolutely do not believe that he was intentionally trying to promote a man or a man’s work over women’s. I’m not accusing of him of anything, I’m not demanding an apology and I don’t mean to imply that he’s not a good ally – quite the contrary, in fact, that he is such a good ally is why it’s clear that this was an error. I also don’t mean any of this in the ‘Brutus is an honourable man’ sense. What I think this situation does show, however, is how easily women’s work (academic, fan and otherwise) can be erased. In
this situation, we have a Name (here Cornell) who, completely without malice, states that he believes that a Man, should be the one to write a book on a topic without considering the problems such a suggestion can produce. Because this person is a Name, he has a much wider reach than the various scholars who have worked on the memorial (even though we are all also fans and have our own acafan communities and networks). The Name has also implied what field said study should be confined by (here religious philosophy) which, though certainly an option, is not ideal as the major endorsed discipline as most disciplines outside Fan Studies still subscribe to such discredited theories like the media effects and uses and gratifications models, which I shall discuss below. The techniques used to catalogue the data, itself a critically important part of the study of any material culture, derives from archaeology, specifically contemporary archaeology which, like Fan Studies, also uses ethnography as a method.

Also, because this person is a Name, they are perceived to have authority (‘He wrote for Doctor Who!’ ‘He’s been a fan for decades!’ ‘He’s a professional writer!’ ‘What’ve you done that's comparable?!’), here meaning that, completely without meaning to and even though several of us have been working on various aspects of the memorial for years, the Man who the Name recommended will most likely be perceived as the best choice. That all of the scholars (thus far) are women (who are, as I doubt I need to tell anyone reading this, often made to feel uncomfortable in fan spaces at best and are actively forced out of them at worst) and that the Name chose a Man (thus giving the Man the Name’s own transferred authority, compounding the subconsciously-perceived greater authority a male author would have over a female anyway, especially with regard to fan spaces and academia both) without bothering to even check if anyone (regardless of gender) was working or had worked on the topic just makes all of this worse.

I’d like to move on to tell you a bit about the content of the memorial and a bit about the people who’ve dedicated items, who we’ve met or heard from on-site and who’ve taken the time to chat with me or with Liza and/or her students over the years. Obviously, I won’t name names or give specifics — Liza and I are both extremely concerned with keeping those people who are involved in our research anonymous and safe to the point that we’re working on a paper discussing ethics protocols for fan tourism — but some generalities are useful to help illustrate the points I’m trying to make.
The majority of people who’ve dedicated items at the memorial, at least during my recording of it and based on self-identification either on the item or in an interview with me, identify as female. Most are in either the 26-40 age group or the 18-25 age group. Neither of these facts are surprising; that fan work (or fan activities) are largely female has been known for a long time, though the reasons for it are debated (the Further Reading section has a few suggested places to start). Perhaps unsurprisingly (and I found this in my PhD research as well), there is a strongly visible LGBTQ+ presence as well, Ianto having been involved in a romantic relationship with Jack at the time of his death.

As I said above, I would go out to the memorial three times a week, every week (there were a handful of exceptions where I’d have to miss the occasional day). I met so many wonderful people out there, fans and curious non-fans alike, who gladly chatted with/allowed themselves to be lectured at by the strange contemporary archaeologist/fan studies academic with the notebook and the odd accent. Many of them gave me permission to take their photos (hands, usually, rather than anything clearly identifiable) as they placed or secured their dedication. I became friends with many of them and I still keep in touch with a few, though I now live on the other side of the planet. Generally speaking, even the people who had no idea what Torchwood was or why an archaeologist would be interested were politely confused.

Then there were the homophobes. Usually men, frequently making ugly comments; only once did I catch three of them pulling things off the memorial. Confronting them did get them to stop and to leave, and the Cardiff Bay police and Mermaid Quay security were very concerned and responsive when I reported it as a hate crime (I had a PC ring me a few days later as well because he was a big fan of the series, which was nice).

There were also those intolerant of fans. The ones who’d infantilise the dedicants (in absentia, of course) or insist that anyone who dedicated or visited was ‘insane’ or, even more often, that the dedicants were ‘sobbing teenage girls.’ So we have the (false, but socioculturally prevalent) association between open displays of emotion and insanity and being female, in particular being a young female. Also going with that is the connections between homophobia and sexism, in that LGBTQ+ males in particular are stigmatised because they are perceived as being closer to how females are perceived by those within this sort of toxic masculine environment (and, indeed, echoed in the slightly more tolerant but still very rigid codes of masculinity often constructed by societies which are then also echoed in
the fan hierarchies that develop within and from them).

Cult fandom can also be strongly perceived as feminised because of the traditional ‘geek stereotype’ (prizing knowledge over brute force or athletic skill) and, the fact that fans are still pathologised in the popular press, coupled with the association between women and insanity with regard to whatever or whoever the object of their fandom is, means that these negative associations (in the instances in which they appeared) interact synergistically. The media effects and uses and gratifications models have been debunked for over a decade in favour of Matt Hills’s interpretation of fan activity as affective play, a view I share.

In this instance, Cornell’s championing of a particular author means that the Name’s authority is now backing a male to be in charge of interpreting and disseminating (and therefore discursively controlling) a predominantly female and strongly queered space. Again, I am certain this was not Cornell’s intention, but this is how it can be read, either that the ‘hysterical women’ need a male guardian or keeper and/or that only a man is ‘fan enough’ to explain things. By a Name promoting a Man to tell the story of a primarily female/queer space, rather than promoting (or even looking for) the women who’ve already been doing so means that, instead of a diverse multiplicity of voices – which is essential for any good project – the women who’ve been working and producing data are erased by the Name and the Man’s perceived authority over the topic.

Though I am (I hope understandably) protective and probably too proprietary over the memorial and the various projects that touch upon it, I want to see more done on it by more voices, academic and not. That’s one of the main reasons Liza and I are developing the online archive, as an aid to academics and interested non-academics everywhere. I was delighted when I learnt at a conference that Rebecca and Ruth had discussed the memorial in their chapter; in addition to being excellent scholars at the University of South Wales they’re both great people.

If anyone reading this knows of other work on the memorial (or would like to do some or would like to hire me to do some) my contact details are in the Further Reading section. If Cornell’s promoted author would like to write a book on it, I have no objection; my point here is that those in (perceived) authority need to understand how easy it is for them to (unintentionally) erase or slight people who don’t have that same level of authority or reach. Words have power and Names have (perceived) authority. Used widely, they elevate and diversify. Used poorly, they erase.
Fan activity, including academic study of it, is often women’s work. Erasing us from the analysis and dissemination of that work deprives fans and academics alike of a critically important perspective, as well as diminishing those of us who are already engaged in these studies and these activities. It's hard enough being a woman in academia and in fandom.

Fan Studies is predominantly female. Fan work is predominantly female. The memorial itself is predominantly female and queer. Women’s work is devalued and erased all the time, everywhere and frequently without even realising it. That's what Cornell's statement evokes, albeit unintentionally on his part. I am an expert on this topic. My fellow (female) academics are experts too, and we are entitled to be sensitive when we find our work is being diminished.

I get enough of that from the job rejections.

**Further (Highly Select!) Reading**


For work looking more specifically at female fans, Camille Bacon Smith’s (1992) *Enterprising Women* is a good, if slightly dated, start. Rhiannon Bury’s (2005) *Cyberspaces of Their Own* looks at women in early online fandom, showing that the more things change, the more they stay the same. Laurie Cubbison’s chapter ‘Russell T. Davies, “Nine Hysterical Women,” and the Death of Ianto Jones,’ in B.T. Williams and A.A. Zenger (eds.) *New Media Literacies and Participatory Popular Cultures Across Borders* looks at female *Torchwood* fans and the fan reaction to Ianto’s death. Finally (though there are so many works to be found on the topic!), Zubernis and Larson do excellent work; I’m partial to their 2012 book *Fandom At the Crossroads*. Again, all of these authors come highly recommended.

For work on the memorial itself, the most recent is L. Potts, M. Beattie, E. Dallaire, K. Grimes, K. Turner, *Participatory Memory: Fandom Experiences Across Time and Space*. It's still ‘forthcoming’, but a draft (currently being revised in accordance with peer review) can be found here: http://participatorymemory.lizapotts.org/participatory-memory/index.
Liza and her team and I are also developing this: L. Potts, M. Beattie et al. 'A Digital Archive of the Ianto Memorial in Cardiff Bay,' which is a digital project with the WIDE Institute. We hope to have an update on the WIDE Institute's main website this summer. My 2014 chapter, 'A Most Peculiar Memorial: Cultural Heritage and Fiction', in J. Schofield (ed.), Who Needs Experts? Counter-Mapping Cultural Heritage deals directly with the memorial, why (I theorise) people dedicate and visit as well as how the memorial works as part of the official and counterhistories of the area. My 2013 chapter, 'The 'Doctor Who Experience' (2012-) and the Commodification of Cardiff Bay' in M. Hills (ed.), New Dimensions of Doctor Who, as well as my (non-academic) pieces from 2015 ('Who’s Town is it Anyway’ in R. Smith? (ed.), Outside In: Vol 2) and 2011 ('Landmark Television: A Fan’s Life in Cardiff' in G. Burk and R. Smith? (eds.), Time, Unincorporated: Volume 3) mention the memorial as part of the overall arguments relating to Cardiff, Doctor Who and Torchwood and the commodification of the city. Rebecca Williams and Ruth McElroy’s 2016 chapter, ‘Omnisexuality and the City: Exploring National and Sexual Identity through BBC Wales’ Torchwood’ in H. Osborne, (ed.), Queer Wales also contextualises the memorial. The powerpoints and, in the case of ‘Eight Years [G]on[e]...’, recording of my various conference presentations can be found at https://independent.academia.edu/BeattieMelissa.

Questions, comments, death threats and job offers may be sent to tritogeneia@aol.com.
Haiku of the Cybermen
The irrelevance
Of your emotions is clear:
You Will Be Like Us.

Haiku for the Master
My new plan is so
Stupidly complex, even
I cannot stop it.

Haiku for the Twelfth Doctor
This strange man, with his
Authoritative Eyebrows,
Puts himself in charge.

The Pirate Planet
The captain orders
Me to walk the plank. What a
Clichéd way to die.

Kinda
The serpent draws near;
I was forgetting that the
Trees have no mercy.

Listen
Words in the dark: Fear
Makes companions of us all.
Nightmares are banished.
Further reading

James’s references for his three articles elsewhere in the magazine, ranging from scholarly articles to internet aids to mass audience science journalism. Everything from virgin births to jellyfish to octopus arm reaching!

**Time Lords**


Piraino, S. et al. (1996). ‘Reversing the life cycle: Medusae transforming into polyps and cell transdifferentiation in Turritopsis nutricula (Cnidaria, hydrozoa).’ *Biological Bulletin* 190(3)


**Adipose**


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Gutfreund, Y. et al. (2006). ‘Patterns of motor activity in the isolated nerve cord of the octopus arm.’ Biological Bulletin 211(3)

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Yekutieli, Y. et al. (2005). ‘Dynamic model of the octopus arm. I. Biomechanics of the octopus reaching movement.’ Journal of Neurophysiology 94(2)

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