I SPY IN THE NIGHT SKY

I AM STANDING, in the middle of a field, somewhere. I lost all my friends hours ago and this is long before the era of the ubiquitous mobile phone, let alone the possibility of a fifteen-year-old owning one. Mud seeps into my Pumas, making its way through the sagging plastic bags I have duct-taped around them in an improvisation of waterproofing.

I know the words inside out. I belt them out at a volume and intensity that I feel (alongside all the other thousands of people vibrating against one another like particles of some dense gas trapped in a bell jar, sometimes jostling into one another, sometimes walking off for a beer) is in direct proportion to my unrivalled passion for the four stars in front of me.

Although I have sung these words hundreds of times – in my bedroom, at pheromone-heavy house parties, on the unaccomplished edge of the sports pitch – I have no idea what they mean. I couldn't spell them or write them down: to me they are just sounds and syllables.

So I have no idea that Alex James is singing about astronomy. Or that the strange words in the Blur song I am wailing far out into the night sky are the names of the moons, planets and stars above me. Even if I did know the meaning of the lyrics searing themselves into my imagination, I doubt I would look up: it is raining heavily and large globules of water are pounding down on the hood of my Adidas cagoule. But if I were to shift my gaze away from the bright lights on the stage, and up to the June night, I might see Scorpius and Sagittarius approaching their highest point, or the sparkling diadem of Corona Borealis high above me, or even Altair and Vega, two of the very stars whose names mean so much to me, even in abstract song, and which, along with Deneb, form the Summer Triangle currently rising in the darkness.

For now, though, I am singing. I am singing unfathomable words that have been passed on to me in song to explain the joy, vastness, and mystery of the universe, and they make perfect sense.

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In about 150 AD, an Egyptian astronomer, mathematician and geographer of Greek descent living in Alexandria, named Klaudios Ptolemaios, created an astronomical treatise unprecedented in size and scope. Not only did it represent the apex of Graeco-Roman wisdom on the subject, but it shaped and determined the way that we still gaze up at the stars today. For, at its centre, was a catalogue of over a thousand stars arranged into forty-eight constellations that form the basis of the system we still use to chart the sky. Based largely on the observations of a second-century BC Greek polymath, **Hipparchus**, it was in some ways a swan song to Hellenic astronomy; by 8 AD, the home of that ancient science was no longer in Alexandria but in Baghdad. Luckily, the *Mathēmatikē Syntaxis*, as this monumental treatise was called, was preserved in Arabic manuscripts. Swiftly becoming the astronomer's bible, it came to be known by its Arabic title, the *Almagest*, while

the man who made it – about whom very little is actually known – became the notorious and often mythologised **Ptolemy**.

Like history's fascination with Ptolemy himself, our curiosity about the stars is as much about story as it is about science. While any astronomical scheme carving up the firmament represents the scientific achievement of the society that created it, it also represents its culture: the way in which a people plot the stars is a distillation of their collective imagination. As the English artist and writer John Berger has written:

> *Those who first invented and then named the constellations were storytellers. Tracing an imaginary line between a cluster of stars gave them an image and an identity. The stars threaded on that line were like events threaded on a narrative. Imagining the constellations did not of course change the stars, nor did it change the black emptiness that surrounds them. What it changed was the way people read the night sky.*

For all the impressive empiricism of Ptolemy's great masterpiece, it is hard to imagine that it would have been preserved – and loved – for thousands of years if it wasn't as brilliant a compilation of myth as of mathematics.

It was not Ptolemy who first told the story of a wild beast growling across the night sky, or a hunter leaping through the heavens with his dogs at his heels, but it was Ptolemy who put the bear of Ursa Major and the belted figure of Orion on the map. We can never know exactly how the tales told thousands and thousands of years ago by our ancestors – looking up at the vast darkness above them, whether from deserts or mountains or the sandy streets of ancient cities – morphed into the legends that Ptolemy identified so definitively in his *Almagest*; nor how the animals, gods and heroes worshipped in Assyria, Babylonia or Ancient Egypt made their slippery ways across seas and centuries and into the Greek *zeitgeist*. Nor can we ever fully solve the riddle of how these characters changed their names and became Roman, thus creating endless confusion about whether we should call the hero who carried out twelve fearsome labours Hercules or Heracles, or whether the queen of the gods is **Hera** or **Juno**. (I've opted for an intentionally capricious mix throughout.) Even after the Ancients had swallowed up the star-lore of Mesopotamia and spat it out as their own, the Arabs, medieval monks, intrepid voyagers of the sixteenth century, and the telescoped astronomers of the Enlightenment all had a good tinker with the sidereal stories of the past. A nineteenth-century mapmaker called Schiller once tried to Christianise the sky by giving all the constellations biblical names and stories; while a twentieth-century globe maker reconfigured their narrative co-ordinates to tell the story of *Alice's Adventures in Wonderland*. And all this is only within the Western view of things. The Ancient Chinese had an equally complex and entirely different astronomical system, while entire universes of indigenous myths, so often ignored by colonising forces, have only been recently begun to be told outside of the cultures that invented them.

Moreover, continuing developments in astronomy and navigation down the ages meant that whole new constellations had to be invented, and their creators mapped their own consciousnesses onto the expanded celestial cartography – whether they were European

explorers discovering whole new continents and honouring their exotic species, or eighteenth-century scientists spotting hitherto unknown galaxies, and commemorating the instruments with which they did so. All of which meant that by the beginning of the twentieth century, there was a vast – and often conflicting – array of not just stories, but also star atlases, cataloguing and charting the night sky. While the mysterious layers of folklore, fact and fiction underpinning the constellations are delightful for the storyteller, they are not always so helpful for the stargazer. Cartographers across centuries and continents varied not only in the way in which they defined or illustrated the figures in the sky, but in the very names and numbers of the constellations, and the stars within them. In addition, there was widespread confusion (as there still is today) about the difference between an asterism – which is just a pattern of stars, like the Plough – and a constellation, such as Ursa Major, which is a segment of the night sky (although historically often also seen as an image) and all that is contained within it. While the Greeks and all astronomers following in their wake (but interestingly, not several non-Western cultures) defined the constellations informally by the join-the-dot shapes of the animals, gods and heroes they saw in the stars, by the beginning of the twentieth century this antiquated, imprecise system couldn't keep up with the pace at which astronomers – and their increasingly sophisticated technology – were discovering new stars.

So in 1922, the International Astronomical Union (the IAU, which had been founded three years earlier) set about clearing up the confusion, and decided upon the eighty-eight formalised constellations that we have today. Furthermore, they commissioned a Belgian astronomer called **Eugène Delporte** to create a definitive map of the historically contested constellation boundaries. By 1930, an official and wholly scientific way of charting the night sky had been agreed upon internationally: a constellation was no longer a pattern of stars, drawn together by imaginary lines, but an area of the celestial sphere, precisely located.

This book is not about astronomical rigour (and if it was, I would certainly be the wrong person to be writing it: it is the stories, not the science of the stars that I know). Nevertheless illustrator Hannah Waldron, designer Will Webb and I have incorporated some simple astronomical elements into this celestial atlas of the imagination. The dotted lines around the constellations in Hannah's illustrations represent the official IAU boundaries. Although the IAU do not officially recognise asterisms, they do suggest 'traditional' links between the stars that form their patterns, and we have followed these lines for the most part. Hannah has taken the same, wonderfully idiosyncratic liberty with the figures she has drawn as did the illustrators of the exquisite star atlases of the past; and she has created a pattern within the boundary of each constellation inspired by and illuminating the stories I tell. Speaking of luminosity, the orange stars making up the figures that Hannah has drawn are represented with their 'apparent magnitude' as seen from Earth – the lower a star's magnitude number, the more brilliant it appears. The different sizes of the orange dots indicate their varying brightness as indicated by a scale at the bottom of each page. Stars within the IAU boundary of each constellation that are not joined in a pattern, but which are brighter than magnitude 4.0, are also represented by small blue and white circles within the dotted boundary lines and textured patterns of each illustration, but have not been allocated specific magnitudes

(are you still with me?). Traditionally, Greek letters have been used to mark individual stars, and to designate their brightness, α signalling a constellation's lucida (its most luminous star) followed by β, γ, etc. Although we have not labelled them as such on the illustrations, I do sometimes refer to them in the text. In which, incidentally, the names of constellations are highlighted in orange, and mythological and 'real' figures occurring in more than one story in bold. Hopefully, you will have fun, as I have, joining the dots.

Negotiating the stars into a narrative is one thing, but getting to grips with celestial cartography is not so simple; and there is one last piece of astronomy that is perhaps helpful to make sense of it. The celestial sphere is an imaginary sphere projected above the Earth, creating a sort of dome by which astronomers measure the night sky. This is divided into the northern and southern hemisphere – from which regions the view of the stars is as divergent as the cultures and myths that describe them. At any given moment, we can see roughly half of the sky – the Earth's rotation, and our particular location, determines the other half that is hidden under our feet. In other words, the daily rotation of our planet, and its annual orbit around the Sun, governs the view we have of the stars.

This simple motion is what brings us the romance of the night. The constellations shift with the seasons, so that different images are played out in the darkness at different times of year: like a magic lantern, throwing up not shadows but lights, bright, bright lights, illustrating the legends of generations.

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I am walking to school, and having an argument with my friend. She has green hair and a permanent scowl and is also a committed Blur fan. We have the same argument, often ferociously, almost every morning. Which is better: art or science? Fifteen years from now she will go on to seriously challenge my argument for the prevalence of art, by spending a perilous year in Uzbekistan fighting multi-drug-resistant tuberculosis. But really, the two are inseparable. Stories are science and science is story. We look around us, we notice patterns, we try to make sense of them.

And, we look up.

This is the glory of stargazing for the storyteller: above us is a blank page in negative. A jet canvas pricked with white dots, and a rag-bag of myths, religions, lullabies and fairytales with which to join them up. A whole universe of stories ready to steal, which are as unstable as the stars themselves – shining and magical, but soon to explode and re-form from the dust and gas of history into new stories altogether.

SUSANNA HISLOP


TUCANA
CANIS MAJOR
PUPPIS
ERIDANUS
LUPUS
CAMELOPARDALIS
TRIANGULUM
CANIS MINOR
TELESCOPIUM
CARINA
DELPHINUS
INDUS
SAGITTA
COMA BERENICES
URSA MAJOR
NORMA
ORION
CHAMAELEON
EQUULEUS
CASSIOPEIA
CENTAURUS
CORVUS
CIRCINUS
CANES VENATICI
CAPRICORNUS
LEPUS
CRATER
LEO MINOR
LIBRA
SCULPTOR
PISCIS AUSTRINUS

THE CONSTELLATIONS

ANDROMEDA

AND/ANDROMEDAE, THE CHAINED MAIDEN

RANK IN SIZE: 19

ASTERISMS: THE BASEBALL DIAMOND, FREDERIK'S GLORY, THE GREAT SQUARE, THE LARGE DIPPER, THE THREE GUIDES

LOOK UP and as far away as you can see. Can you spot it? Something flickering in faraway intensity? Something 2.5 million light years away that is hurtling towards you at 300 kilometres a second?

Squint really hard …

There it is. The Andromeda galaxy with its celestial motorway of a name: the 'M31'. It is the most distant object you can see with your naked human eye and the closest spiral galaxy to Earth.

Hurtling eternally towards *me* is Cetus, the deranged sea monster: a dragon-fish, a sea serpent, a great whale, but always a she – they always are, fishy monsters, aren't they? If you look up from the northern hemisphere in late autumn at about ten o'clock – or at eight o'clock in mid-December if that's past your bedtime – you will see fierce Cetus rising towards the ecliptic, lunging towards me from the southern depths, with only the twin fish of Pisces standing in her way.

And here am I, the original maiden in distress. The Woman Chained, who awaits her knight in shining armour; whose OWN PARENTS strung her to a ROCK. (To see how I ended up in this star-framed family horror story, read about my mother Cassiopeia, the bitch.) The horror of my fate still lingers in the Sanskrit tongue: their word *medha*

carrying the bloody echoes of ancient sacrifice. But if you name a girl Medha that means she has an intellect illuminated by love. Which I like to think is about right.

Because this much is true, ladies and gentlemen: I was saved by love. Strapped to the rocks of Joppa and screaming out to sea, I caught the beady eye of Perseus. Apparently I blushed in shame and couldn't speak – but that's a lie. I blushed in raging lust.

I apologise for trampling all over the history books with the not-so-virgin truth of my girlhood – a cheeky fumble in the olive groves here, a naughty nuzzle behind the chariot shed there – but those poets get on my tits. When gorgeous Percy swooped to my rescue on a massive white horse (not fluttering on winged sandals, **Ovid**) I was gloriously naked except for some impressive bling – something you understood when you started your star atlases, before modesty shrouded the centuries and you covered me up. Like those Arabian astronomers who, scared to draw the human form, turned me into a fat little sea calf. Thanks a bunch. They kept me in chains though, of course.

I think I like the way Rubens painted me best (sticking to the seal idea, I see, all that blubber). But if you want a sense of how voluptuously large I *really* am, that spiral galaxy your scientists have so romantically named M31 is nestled safely close to my right hip.


CAMELOPARDALIS
PERSEUS
TRIANGULUM
ARIES
PISCES


CEPHEUS
CASSIOPEIA
CYGNUS
LACERTA
PEGASUS
0 1 2 3 4 5
MAGNITUDE