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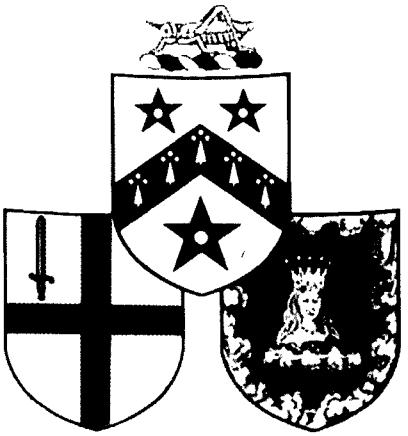



# BEARS, BULLS AND AIRPUMPS: THE ORIGIN OF THE CONSTELLATIONS

A Lecture by

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# BEARS, BULLS AND AIRPUMPS: THE ORIGIN OF THE CONSTELLATIONS

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Have you ever wondered why the constellation patterns in the sky have such peculiar names? More to the point, why is it that the patterns look nothing like the birds, beasts or bits-and-pieces they are named after? And how on earth do you get to tell one star pattern from another?

As you will have guessed, the constellations go back a long way. Thousands of years ago, our ancestors - under clear, star-spangled skies - took to "joining up the dots". They peopled the heavens with their heroes and heroines, the animals they hunted, and the places that were special for them. Different cultures, as we will see, had different ideas on *how* to join up the dots. The constellation patterns that are familiar to us in the West today had their origins in the near-east - probably arising with the ancient Chaldeans. Via the Minoans, the constellations (and their stories) came to the Greeks - and it is this vision of the sky that has been handed down to us today.

In this talk, I want to concentrate on some of the more amusing stories about the constellation patterns. But while we're on the subject of stories, it's a good point to ask the question: "why did they go to all the trouble of making patterns and inventing stories anyway?".

5000 years on, it is hard to be certain about what motivated our ancestors. But historians studying the fragmentary evidence that surrounds the constellations have found that many were "designed" to be used by sailors crossing the Mediterranean. They were navigational aids. But how would sailors recognize one from the other? The logic is very simple: use familiar stories to "associate" neighbouring constellations, so that knowledge of one leads to another. The well-known folk-stories and legends were pinned to the groups of stars - not the other way round - so it's hardly surprising that very few constellations actually look as they are supposed to.

What sort of stories are attached to the constellation patterns? Let's start with Orion: a very familiar pattern that is up in the sky at the moment (and even looks like a mighty hunter!).

His head is not very impressive (some legends reckon that Diana, goddess of the hunt, shot him in the eye when she was in a jealous rage, and the faint stars now reflect his blindness), but his shoulders are magnificent. Blood-red Betelgeuse (pronounce it Beetle-juice if you like) marks the left shoulder. Translated from the Arabic the name comes out as "The Armpit of the Sacred One"!

Orion's neat waist is gripped by a belt of three stars, below which hangs his faint sword. Blue-white Rigel and white Saiph are the stars that complete the main outline of the hunter, while underneath a loose jumble of faint stars represents his favourite quarry - a hare. To find Orion's adversary in this cosmic tableau however, you need to go back to the belt and follow the line of stars upwards. First you cross the line of his protective shield (or lion's skin, as some prefer) and then you hit Orion's antagonist straight in the eye - literally - for the reddish star Aldebaran, in line with the belt, is the eye of Taurus the Bull.

Legend has it that Orion vowed to exterminate all the animals on Earth, but in Taurus he clearly met his match: the bull is gigantic, with horns as long as the hunter himself. But follow Orion's belt downwards and help is at once to hand. This line leads directly to the brilliant star Sirius, the eye of Canis Major, Orion's larger hunting dog; while just above lies a somewhat imaginative small hunting dog (Canis Minor) comprising all of two stars. It is a supposedly well-known fact that bulls are terrified of dogs, so Taurus's fate is never to vanquish the hunter but instead be chased by him and his faithful companions across the sky for eternity.

The number of constellations representing animals - at 44 out of a total of 88, exactly half - makes it seem as if animal stories were just as popular in the ancient world as they are on the TV today. But the motivation of the ancient scriptwriters was a little different. To turn a popular character into an animal and consign him to the heavenly vault was one way of bestowing immortal life - and thereby avoiding the sticky problems of killing off super-heroes. According to one account, that is how the bears came to be up there.

You can spot both bears in the north, on either side of the Pole Star: the Little Bear (Ursa Minor) hangs from the Pole Star itself, while the seven brightest stars in the Great Bear (Ursa Major) make up the famous shape of the Plough (the Big Dipper to transatlantic readers, and Charles's Wain in the eyes of our medieval forebears). On winter evenings, the Great Bear's long tail practically touches the horizon. But as people are quick to point out, bears do not have much in the way of tails. And thereby hangs ...

Both bears started off as human beings. Callisto was a beautiful princess, wickedly led astray by the insatiable Jupiter, who had been hoping for a quick fling without his wife Juno finding out. Alas, he was not too careful; Callisto gave birth to a son and it was just a matter of time before Juno found out who the father was. Although she was incensed with her husband, Juno was even more jealous of the stunning Callisto. Summoning up all her powers as a goddess, she turned the unfortunate beauty into a great shaggy bear and banished her to the woods.

For nearly 20 years, Callisto feared daily for her life as huntsmen roamed the forest. But one day, skulking in the shadows, she realised to her intense excitement that she recognised one of the hunters. It was Arcas, her son, now fully a man. Forgetting she was a bear, she rushed forward to embrace him - whereupon Arcas, thinking he was being attacked, loosed his hounds and prepared at once to shoot. Jupiter, up in heaven and clearly conscience-stricken, must have had to think quickly. Within an instant, he turned Arcas into a bear and grabbed hold of him and Callisto by the most obvious parts of their posterior anatomy. With great force, he swung both bears by their tail-stumps away from the scene of a potentially bloody encounter and up into the heavens forever - guaranteeing their immortal existence for the price of a pair of very stretched tails.

If you turn to face west again, you should be able to spot a much bigger, dimmer version of the Plough plunging nosewise towards the horizon. Just to confuse the modern stargazer utterly, this is not one constellation, but two. The square "bowl" part is supposed to represent Pegasus, the winged horse. But the eastern section, resembling a tail, turns out to be nothing of the sort: in fact, it is supposed to be a naked girl, chained to a rock, about to be devoured by a sea monster. If you can see that, you are well qualified to become an astronomer.

Our naked maiden's tale approaches *War and Peace* in its complexity, so here we present only the barest bones. Young Andromeda was the daughter of Queen Cassiopeia (the W- or M-shaped constellation almost overhead), who unwisely boasted that the girl was more beautiful than any of the Nereids (water nymphs). The aggrieved nymphs complained to their god, Poseidon, who promptly created a horrible sea monster (Cetus) whom he despatched to the shores of Cassiopeia's country to enact a classical version of *Jaws*. Cassiopeia became a trifle distressed over all the mass mutilations and asked Poseidon if there might be some way of appeasing Cetus's unhealthy appetite. The answer - as you might have guessed - was to sacrifice Andromeda to the monster.

We see Andromeda in the sky pegged lengthwise with Cetus just about to strike. But deliverance is swooping down from on high - in the shape of super-hero Perseus, who just happened to be passing by. Perseus (almost over-head on early winter's evenings) may *look* like gushing pumpwater, but clutched in his hand is a portable forerunner of the neutron beam weapon. It is the head of Medusa, the Gorgon, she with hair of writhing snakes and a gaze which turns all beholders to stone. Perseus, who has been quite clever to kill Medusa anyway (that's another story) is in no doubt what to do when he sees Andromeda's plight, but first checks whether she will marry him if he *does* save her. Faced with a voracious sea monster, Andromeda rather quickly agrees. And then it is only an instant before the rearing monster is confronted with Medusa's head and is fossilised forever, and Andromeda and Perseus speed off for the land of Argos to live happily ever after.

Other cultures, who had other uses for the starry skies, saw things differently. The Pampas Indians of North America regarded the sky as the haunt of their ancestors. There, away from the rules and regulations of earthly life, they could get permanently drunk and hunt all the time. The Aborigines had such clear, star-studded skies that they made constellations out of patches where there were *no* stars. And the ancient Chinese saw things in their own, unique way. They divided up the sky into hundreds of extremely tiny patterns - the only recognisable constellations on a Chinese star chart are the Plough and Orion. W-shaped Cassiopeia, for instance, is divided up into three constellations, representing a path across the mountains, a by-road, and a charioteer with a team of four horses!

Not everyone has been happy with the traditional constellation patterns and their stories. Almost 1,000 years ago (quite recently in the history of the constellations), the Venerable Bede decided that the 12 signs of the zodiacal constellations should be stripped of their heathen associations, and named after the 11 apostles and St John the Baptist. The idea never caught on. But nothing daunted, an obscure German lawyer called Julius Schiller conceived an even more audacious plan in 1627. Twenty-four years earlier, the German astronomer Johannes Bayer had drawn up the first definitive star atlas, with the figures of the legendary characters and animals drawn over the stars. In his *Coelum Stellatum Christianum*, Schiller re-drew every one of Bayer's constellations as a Christian figure. Patterns in the southern hemisphere became figures from the Old Testament, northern constellations from the New. Thus Aries, the Ram, finds himself miraculously transformed into the venerable figure of St Peter, complete with the keys to heaven. The Great Bear no longer exists: she is now St Peter's Ship, while her son, the Little Bear, becomes the archangel Michael, poised at the north pole of the sky.

Some of Schiller's ideas do, however, seem to be an improvement. A big drab region of the sky, with a sprawling fan-shape of dim stars, appeared to the ancients as yet another super-hero, the famous Hercules. For some reason, he is always shown in the star atlases of the 17th century as standing on his head - one labour that is not mentioned in the classics. Schiller turns the stars of Hercules into the Three Kings (the right way up), bearing gifts to the baby Jesus in the manger - otherwise the constellation of Lyra, the lyre.

In the 20th century, astronomers have agreed to parcel up the sky by international convention. The areas of sky corresponding to each constellation now have rigidly fixed boundaries, stretching like invisible frontiers that divide the dome of night into 88 regions, whose peculiar shapes remain to remind us of the old fanciful patterns. After the International Astronomical Union decided to fix the constellations in this way in 1930, it would have taken a brave man indeed to try single-handed to alter constellations once more. That man did appear, in the shape of A.P. Herbert, the well-known British MP and humorist.

In 1944, A.P.H. published a slim volume provocatively entitled *A Better Sky*. He started with a statement that few would dispute, namely that most people know "shockingly little about the stars". Writing in the depths of the Second World War, Herbert thought that people were hindered if they were called upon to navigate at night: "Any seaman, steward or passenger may find himself in charge of an open boat in mid-ocean ... any schoolboy may be destined to carry bombs to Berlin by the stars."

The reason for this ignorance, he insisted, lay in the difficult and apparently meaningless names of the constellations, and particularly the individual stars. The only solution was to begin all over again. The stars and constellations should be renamed, with tags that would actually mean something.

In Herbert's scheme, Orion remains a man of action, but no longer a dim shadowy figure of past legend from a distant country. He is now the Sailor. The bright star Betelgeuse is not anyone's armpit, but is dignified with the name Nelson; the other brilliant star, Rigel, is Drake. The three stars girding Orion's belt are Cook, Columbus and Cabot - a trio of Cs more easy to remember than Mintaka, Alnilam and Alnitak.

Around Herbert's sky lie groups representing great human activities, their stars named for individual human "stars", A.P.H. has taken the liberty of dismembering the old patterns where necessary, to fit his grander scheme. The stars Marconi, Edison, Euclid, Newton, Darwin, Einstein, Watt and Stephenson make up the geometrically-precise constellation of the Scientist - previously seen to be a sea-goat and a southern fish. Other new constellations include the Poet, the Music Maker, the Statesman and the Heroes. Realising that there was one category of human being he had not yet covered, Herbert took some faint and insignificant stars from Eridanus (the river) and Cetus (the sea-monster who threatens Andromeda) to fashion the Women. In the small patch of sky devoted to this sex, Edith Cavell, Queen Victoria and Madame Curie uneasily rub shoulders with Sappho, Helen of Troy and Salome.

There is of course nothing sacrosanct about the accepted constellation names - which is really the point that A.P.H. was making - nor about the actual patterns of stars one joins together to make them. The stars in a constellation are, more likely than not, completely unassociated with each other. If we could come back in, say, 100,000 years time for a spot

of stargazing, the sky would look completely different. The stars would all have moved on, changing the constellation shapes for ever.

In this talk, I have brought you bears, bulls ... and a great deal more. But what, I hear you ask, do airpumps have to do with it? Yes, there *is* a constellation called the airpump. Understandably, it is not a very ancient constellation, but it is one of the official 88. For this, we have to thank a Frenchman: Nicolas-Louis de Lacaille. He was known as "the father of southern astronomy" in honour of his observations of the skies of the southern hemisphere from the Cape of Good Hope. Between 1750 and 1755, he named 14 new southern constellations (all the 'traditional' constellations are, of course, northern). Antlia Pneumatica (as it was first called) is a tiny constellation made entirely of very faint stars.

But at least it still exists. Spare a sympathetic thought for Lacaille's contemporary, the French astronomer Joseph Jerome Le Francois Lalande. He too named a new constellation - right next door the Antlia, as it turned out - which evidently was quite close to his heart. 'Felis' entered the skies of the southern hemisphere in 1805 because, as Lalande wrote: "I am very fond of cats". Alas, Felis must have gone through every one of his nine lives - for the constellation is no more, its stars shared out between its neighbours.

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