

# ANATOMY AND PHYSIOLOGY THROUGH TIME

- Chaz Physiology: the study of how the body works.  
And until the Renaissance, they knew NOTHING about it!
- Maz Careful! They had *theories* – and some of them were remarkably near the mark.
- Chaz Not in prehistoric times...
- Maz Agreed – all spirits and animism and that sort of stuff.
- Chaz ... nor in Egyptian times.
- Maz Ooo ... what about the Channel theory – In Ebers' papyrus it says : 'the heart speaks out of every limb'
- Chaz Surely it was nonsense? They didn't know the difference between veins and intestines – they thought they were all connected.
- Maz It was the start of things – the realisation that the body wasn't wholly under the control of the spirits.
- Chaz To a degree – but they still believed that Thoth created human beings, and Bes controlled childbirth and so on. For me, it was the Greeks who made the breakthrough into natural medicine.
- Maz Hippocrates?
- Chaz Well yes – *Airs, Waters and Places* said disease was caused by environment. But it was the whole 'philosophers' thing – the theory of the four humours and all that. In its time it was revolutionary – the idea that the body was a *naturally* functioning organism!
- Maz And anatomy?
- Chaz Well – once they'd decided the body wasn't a temple of the gods, they could cut it up – so that's why you get Greek doctors in Alexandria dissecting the bodies of criminals while they were still alive...
- Maz Vivisection!!!!
- Chaz Absolutely – and that allowed Herophilus to realise that the brain, not the heart, controlled movement, and Erasistratus to discover that blood moved. WAY ahead of their time. And much better than the Romans, who dropped all that kind of Greek 'cleverness'.
- Maz Aww! You can't deny that Galen took anatomy further than ever before ... and physiology too: what about all those investigations on the nervous system of pigs...
- Chaz Galen got LOADS of things wrong! He thought that blood was burned up as fuel for the muscles, and he said there were holes through the septum – thus he STOPPED people discovering the circulation of the blood for centuries. And because he got his knowledge by dissecting animals, he made loads of little mistakes, such as how the muscles attach to the bone.
- Maz And because medieval doctors accepted Galen as the absolute authority...
- Chaz ... exactly!!! medieval physiology STAYED backwards too! Except for Muslim doctors, the whole thing was just a hotch-potch of crazy theories. God and his saints – that's what people in Western Europe thought controlled life. The Italian doctor Alderotti said that combing the hair 'comforted the brain'.
- Maz And have you seen that mad drawing of a skeleton – it looks more like an ape than a human being!
- Chaz Well, of course, no student ever dissected a body. Because the Church forbade dissection, even in the universities, anatomy lessons were simply a butcher pointing at a body while the lecturer read from Galen.
- Maz So it's not until the Renaissance that physiology moves forward?
- Chaz Agreed! There's Vesalius and dissection, of course – the *Fabric of the Human Body*, 1543. But personally I believe it was the development of scientific *method* that made the difference – they learned how to PROVE things. A fun example is that story of Paré testing bezoar, by giving poison to a prisoner and watching what happened! ...

but most of all, there's Harvey's step-by-step proof of the circulation of the blood – 1628: *Anatomical account of the Motion of the Heart and Blood*.

Maz Don't forget Leeuwenhoek, 1683.

Chaz The microscope?

Maz Doctors were able to see things at the cellular level, and that allowed Theodor Schwann in 1839 to prove that the body is made up of cells, not 'humours', and *that* finally laid the theory of the four humours to rest.

Chaz It's all about research by the 19<sup>th</sup> century. Jan Purkinje set up the first department of Physiology in 1836, and suddenly scientists were discovering all kinds of things about how the body really works. Starling and Bayliss discovered the first hormone in 1902, Funk discovered vitamins in 1912, and then there were Banting and Best, insulin; Edgar Allen, oestrogen...

Maz and Leroy Stevens discovered stem cells in 1953 – now there's a discovery which promises to transform medicine.

Chaz And of course the industrial revolution was giving them all these machines – Roentgen discovered X-rays in 1895; Einthoven invented the electrocardiograph in 1900. Suddenly we were able to measure and study the body as never before ...

Maz ... and even more into the 20<sup>th</sup> century: the electron microscope in 1931, and the endoscope, CAT scans and MRI scans in the 1970s. We know SO much more nowadays – did you know that in 1986 they set up this thing called the 'Visible Human Project', where they've sliced up human bodies, scanned them, and used a computer to build them into virtual reality 3D models – you can see them on the internet!

Chaz If you're talking about the 20<sup>th</sup> century, I think the two things you've got to mention are the discovery of DNA by Crick and Watson in 1953, and the Human Genome Project in the 1990s. I mean, these are the things which allow us not only to understand how the body works, but to MANIPULATE it ... repair it ... clone it..