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The Desmond Whyte Lecture.

A Golden age and the Floating Man: Ireland, Avicenna and the Canon of Medicine.

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It is both an honour and a privilege to have been invited by your president, Dr Peter Watson, to give this eponymous lecture. I had the great fortune to meet Colonel Whyte on this very site, several years ago. Although retired, he retained an encyclopaedic knowledge and had a sharp enquiring mind. I clearly recall that he discussed in considerable detail, the emerging decoding of the genome and the advent of stratified medicine.

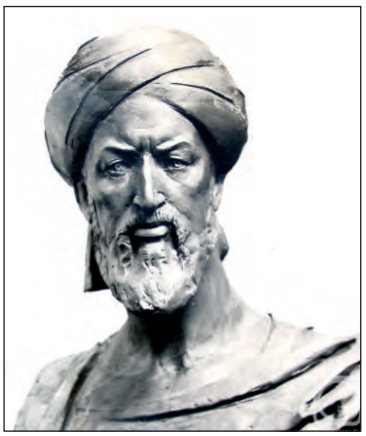

Figure 1. Avicenna

Tonight, I would like to speak to you about another polymath, lamentably under recognised in contemporary western medicine; the scholar known to us as Avicenna. (*Figure 1. Avicenna*)

A philosopher and physician, he is the preeminent exemplar of those who created the Golden Age of Islamic Science, between the 7th and 11th centuries CE. Their dedication to truth, science and knowledge, regardless of their sources; and their fastidiousness for record keeping, connects us with antiquity. Without them, much if not all of it would be lost to us. As you will hear, Ireland played its crucial part, confirming as Andrew Marr has stated in his *History of the World* that 'History is often made at the margins.'

The story I would like to recount tonight spans approximately 1,000 years and extends from our rugged Western coastline across the world to The Persian Empire. My narrative isn't linear, but to weave the story's threads into shape, I must oscillate, hither and thither in time and place. We shall consider two disparate first-millennial cultures at the margins: one to the East and one, West. Neither had been influenced by the prevailing culture at the centre. Neither had been dominated by its greatest city: Rome.

The Roman Empire was the greatest empire the world had ever known. For centuries, it had provided stability, prosperity, and technological advance. Within its mighty -and seemingly impregnable- borders, there had been peace. In 407 CE, the unthinkable happened. Germanic tribes defeated the Roman army and crossed the Rhine. Their objective was Rome. In 410 CE, Alaric the Goth sacked it. Arriving at the gates of Rome, empty threats from the Roman envoys were ignored. He warned "I will take all your gold, your silver, your slaves and everything that is precious to you." The startled envoys then asked, "But what will that leave us with?" "Your lives," replied Alaric.

So, Rome fell. With its demise, the Pax Romana ended. Order was replaced with chaos. Civilisation as it had existed, was gone. It had become, as William Manchester wrote, 'A World Lit Only by Fire'. But it wasn't *the world*. That's a Eurocentric view. Elsewhere, two other civilisations were flowering. Neither was aware of the other's existence. From one would emanate The Golden Age of Islamic Science.

Persia and the Caliphate.

The Abbasid caliphate was the second of the Muslim Empire's two great dynasties. (*Figure 2. The Abbasid Caliphate*) The first, the Umayyad Caliphate had been overthrown by the

Figure 2. The Abbasid Caliphate

Abbasids in 750 CE and the Abbasid caliphate itself would ultimately be destroyed with the Mongol invasion of 1258 CE. The local Samanid Dynasty had been Persian converts to Islam. They were tolerant of other sects and religions. They reinstated Persian as the court language, promoted poets, writers and philosophers. Above all they collected books. The Gestational Theory attests that Islam kept all the great books of antiquity, having borrowed, copied and translated them in their Houses of Wisdom and facilitating their eventual journey into Europe when it had been reborn with its 14th century Renaissance. They certainly did that but that's just the beginning of our, and their, story.

The Falasifa

The *Falasifa* (philosophers) of the Golden Age form the nucleus of this segment of my story. For them, earlier civilisations such as the Babylonian, Egyptian and Greek were simply a continuum. They were greatly influenced by the wisdom of what they called 'The Ancients', or 'The First Ones' (*Al-Awail*) principally Plato and Aristotle. (*Figure 3a. Plato. Figure 3b. Aristotle*)

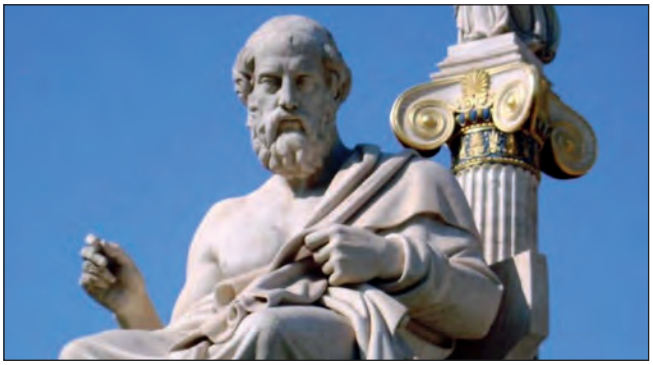

Figure 3a. Plato.

Figure 3b. Aristotle

Let's now consider some of The Golden Age's greatest luminaries. I have taken the liberty of using abbreviated versions of their names. I have attempted, where possible, to maintain chronological order. I have also limited the listing of their achievements to what are considered their greatest contributions to the world.

Al-Farazi (746 -796 CE) was a philosopher, astronomer and mathematician who built the first astrolabe and translated the Indian mathematician Brahmagupta's book, the *Brahmasphutassanta*, thereby introducing 'Indian Numerals' (The Decimal System) to the Islamic world and eventually to Europe. Al-Khwarizmi (780 -850 CE) was a mathematician, astronomer and cartographer. (*Figure 4. Al Khwarizmi)*. He was the head of Baghdad's House of Wisdom and was known as The Father of Algebra. One of his books was entitled *Kitab-al-Jabr (The Book of Calculation,)* from which we get our word, algebra. Another book of his, *The Compendious Book on Calculation by Completion and Balancing* (*Kitab al-Jabr wa-l-Muqabala)* was studied in Europe until the 16th century. His work, *On The Calculation With Hindu*

Figure 4. Al Khwarizmi

Numerals helped spread the adoption of a decimal system throughout the Middle East and Europe. Among his other achievements, he measured the circumference of the earth accurately and calculated it, correctly, to be 23,200 miles. His name was latinised to Algorithmi, from which we get the word, algorithm.

Al-Kindi (801-873 CE) was the Father of Arabic Philosophy. A true polymath, he studied medicine, pharmacology, metaphysics, ethics, psychology, logic, mathematics, astronomy, music, meteorology and geology. It is estimated that he wrote 260 books, of which 30 were medical texts. He also made huge developments in the fields of optics and cryptography. Al-Farabi (872 -950 CE) was a philosopher, jurist, scientist, cosmologist, mathematician and music scholar. He was an accomplished metaphysician in the tradition of Plato and Aristotle. In the Islamic tradition he is known as The Second Teacher, after Plato who was considered The First Teacher. Al-Zahrawi (936 -1013 CE)

was considered The Father of Surgery. He was the first to use Kocher's method to reduce a dislocated shoulder; posited a hereditary explanation for haemophilia and ligated blood vessels six centuries before Ambrose Paré. Al-Zahrawi wrote a thirty-volume medical encyclopaedia; designed over 200 surgical instruments including scalpels, retractors, curettes, pincers and specula and introduced catgut for internal suturing. He discovered that it was soluble when his pet monkey ate the strings of his oud!

Primus inter pares was Avicenna. Abū-Alī al-Ḥusayn ibn-Abdallāh Ibn-Sīnā (Avicenna) was born in 980 CE in Afshana, Uzbekistan; a region controlled by the local Samanid dynasty within the enormous Abbasid caliphate and was the foremost Islamic physician and philosopher of The Golden Age. His immense contributions to both disciplines would stretch far into the future. Before we consider him in detail, we must make a detour, West.

Europe after the fall of the Roman Empire

Meanwhile, what became of Europe? The order that had been imposed by Rome was gone and had been replaced by chaos. Philosophy, literacy and education was for the most part obliterated. Except, that is, in a small remote western island, a place never colonised by Rome and unknown to Islam, where another culture was vibrant; learning, travelling and above all, writing. This was Ireland.

Christianity and The Irish Martyrs

Following St Patrick's death, three categories of Irish 'martyr' were recognised. The first were The Red Martyrs prepared to die for their Christian faith. In practice, there were no Irish Red Martyrs during the first millennium as Ireland's conversion to Christianity had been peaceful. The second were The Green Martyrs who, as hermits, went into internal exile and the final group were The White Martyrs who would leave Ireland forever.

The most famous of the Green Martyrs was St Kevin of Glendalough (498 -618 CE) who initially lived the life of a hermit until he was persuaded to found a colony at Glendalough. St Columcille (521 to 596 CE) was the first

Figure 5. Ruins of Columcille's Monastery, Gartan, Co. Donegal

Figure 6, The Bar Library, Royal Courts of Justice, Belfast

of the White Martyrs. Christened Crimthann (The Fox), he was born in Gartan, County Donegal into a prominent and privileged family (*Figure 5. Ruins of Columcille's Monastery, Gartan, Co. Donegal*). St Columcille was the most influential of the Irish Abbots. He surreptitiously copied a psalter without permission of its owner, his master Bishop Finian entitled *An Cathach* (*The Warrior*). For this crime, King Diarmairt delivered his famous judgement, "To every cow its calf and to every book its copy." (*Figure 6, The Bar Library, Royal Courts of Justice, Belfast*).

Diamairt's judgement was in effect for breach of copyright. St Columcille was subsequently excommunicated and eventually exiled. He travelled to the island of Iona, then part of the kingdom of Dalriada. He settled in a site where there was no view of Ireland. He founded a community whose limit was set at 150. When this number was exceeded, 'twelve monks plus one' would leave to establish a new community. Visitors came to learn and many never left. The first to go was his greatest disciple, St Aidan. Aidan founded the great monastery at Lindisfarne. St Columbanus and St Gall travelled East founding Monasteries such as those at Auxerre, Regensburg, Salzburg, Vienna, Bobbio and Lucca. Others like St Brendan sailed West and is said to have discovered America, possibly Newfoundland. (*Figure 7. St Brendan The Navigator*).

Irish versus European Christianity

Rome was now, in every sense, very remote. As Sedulius of Liège, a 9th century Irish Ciceronian scholar wrote:

To go to Rome
Is little profit, endless pain;
The Master that you seek in Rome,
You find at home or seek in vain.

Celtic Christianity was therefore practised very differently

Figure 7. St Brendan The Navigator

than it was in mainland Europe. The Irish monks' tonsure involved shaving the head from the forehead back to a line between the ears and was worn long at the back, a nod to Ireland's druidic past. The influence and authority of women in the Celtic church was much more recognised and Abbesses were common, notably St Hilda, the Abbess at Whitby. The Irish Church's date for Easter was different from Roman Europe's, and the Irish practised private confession, unlike their European counterparts. Differences between the Roman and Celtic churches came to a head in 655 CE at the Synod of Whitby and consequently Ireland fell into line with European Christian practice. The Irish delegation scored one victory and the European church adopted private confession, abandoning the practice of a penitent's public humiliation.

The monks in their monasteries copied the gospels. They principally wrote in Latin but also in the vernacular, Irish, which was most unusual. They copied any Greek and Latin work they could find, almost indiscriminately, but also loved to record folk stories and legends. As they travelled East across Europe, they brought their books, tied to their belts. As they fanned out, founding monasteries and copying books, the influence of these Celtic monks increased. However, they weren't philosophers. All that had gone in Europe for now. Gone, except for one man; an Irishman named John Scotus Eriugenus (815 - 877CE). Eriugenus was a neo-Platonist philosopher, and as philosophical discourse had been dormant since the death of Boethius in the 5th century, he stood out on the landscape. Aside from the Papal Librarian, Anastasius, he was the only man in Europe known to be fluent in Greek. He posited that philosophy should come first and that theology was derived from it. His great work, *The Division of Nature*, probably advocated Pantheism. The Pope, Honorius III, said that his books were "swarming with worms of heretical perversity" and ordered all copies to be burnt. Many were but not all. Burning books was not part of these Irish monks' psyche. So, Irish monks copied books and travelled East. In Spain, Venice or Constantinople they encountered Muslim scholars who copied the monks' books. The survival of the Latin canon is largely due to these Irish monks. Although other sources were available for Greek and possibly Hebrew works, Latin texts had all been but lost outside Ireland. So; now, we finally consider Avicenna.

Avicenna

Avicenna was a philosopher, physician, mathematician and metaphysicist. He was also, as you will learn, not tortured by self-doubt. As a young boy, it was necessary for him to learn Arabic in order to read the Koran. He wrote later, "By the age of ten, I had mastered The Koran and I was marvelled for my aptitude." Next, he learnt the sayings of Muhammad (*The Harith*); Islamic law (*Sharia*) and jurisprudence (*Fiqh*). Then he turned his attention to philosophy. His father engaged a philosophy teacher named Al-Natali, for him, and Avicenna began to study Plato and Aristotle. He also studied the mathematics of Euclid and Ptolemy. He wrote "Al-Natali was extremely amazed at me; whatever problem he posed, I conceptualised better than he." Avicenna contended that philosophy encompassed the pursuit of all knowledge and for him its most important branch was theology. Knowledge, he believed, was the criterion by which souls would be judged in the afterlife. Avicenna sought to reconcile his belief in God (revelation) with the rationalism and logical methodology that he had learned from those ancients, the Greek philosophers.

Avicenna distinguished Existence (*wujud*) and Essence (*mahiat*). For him essence was the characteristic of something, living or inanimate. Existence was the addition of matter to essence. For example, a centaur has the essence of a man and a horse but does not exist. Avicenna introduced the concept of God as *Necessary Existence*. For him, the universe was eternal, emanating from God's self-knowledge and caused because it is an aspect of His essence. God, he believed was The Necessary Being. Everything else was simply possible.

The Floating Man

This is perhaps Avicenna's greatest metaphysical thought experiment. He asked the reader to consider the following idea. A man is born, fully formed, floating on his back in mid-air. He is blindfolded. Created from nowhere, Avicenna posed the question, "What would that man's first realisation be?" His answer was that the man would realise that he *existed*, despite the absence of any sensory input, evidence or memory. Avicenna considered this as proof of the soul's existence. This philosophical thought would resonate centuries later as Cartesian Duality: that of the soul and the body.

Avicenna and Medicine

Muslim medicine was greatly influenced by the Greek tradition. Avicenna studied both Galen and Hippocrates. By the age of 15 he had become a physician. About medicine he wrote "Medicine is not a difficult science and naturally I excelled at it in a very short time." At the age of 18, he had a very lucky break by curing the Sultan, Nuh Ibn Mansur. His reward was access to the Sultan's Royal Library. In 1012 CE, he began to write *The Canon of Medicine*. This work is in five volumes and has greater than a million words. Avicenna wrote "Medicine is a science from which one learns the status of a human body with respect to what is healthy and what is not in order to preserve good health when it exists and to restore it when it is lacking." It would become a standard global medical work until the 18th century. *The Canon of Medicine* was influenced by Galen and Hippocrates, but Avicenna also linked it to Aristotle's philosophy. William Osler described *The Canon of Medicine* as, "The most famous medical textbook ever written."

In later life, Avicenna was often on the run and wrote many of his 200 books entirely from memory. He died on the road with the Sultan, fleeing Isfahan, at the age of 57. He wrote, "I prefer a short life with width to a narrow one with length." Avicenna didn't believe in a physical resurrection. He denied that humans could define God. These views and his unconventional lifestyle incurred the wrath of traditionalists.

The End of the Golden Age.

The reasons for the Golden Age's demise were probably multifactorial. Firstly, there was a change in theological direction. Al Ghazali (1058 - 1111CE) was the key figure responsible for this. A highly respected academic who in later life embraced Sufi theology, he was the author of over 70 books on science, philosophy and theology. His book entitled *The Incoherence of Philosophers* questioned the morality of studying Greek philosophy. Ibn Rushd (1126-1198 CE) known as Averroes in The West, was a noted jurist and physician. Born 15 years after Al-Ghazali's death, his book *On Medical Generalities and Particularities* would be used in the Jewish, Christian and Muslim world for centuries afterwards. He retaliated against Al-Ghazali with his own philosophical work, *The Incoherence of Incoherence*. However, the die was cast and he marks the end of an era. Interest in Greek philosophy was waning and the torch was passing. The Mongol siege of Baghdad in 1258 CE was also a significant event. It is estimated that a million people lost their lives and that was said that the river Tigris ran black and red. Red, with the blood of the dead and black from the ink of the books thrown into the river by the invading Mongol hordes.

Finally, Gutenberg's printing press dealt a serious blow. The Catholic Church approved of its new printed Bible. It also realised the potential of mass production of plenary indulgences, until then a hand-written (*manuscript*) document written by monks. The printing press was, literally, a licence to print money. In the Islamic world, The Koran continued to be reproduced by hand. There were technical reasons for this. Arabic characters could change their shape depending on the position within a word, and this presented difficulties for the printing press. However, as Muslims considered The Koran to be the actual divine word of God, it was not felt a suitable object for mass production. For both these reasons, mechanized printing did not find favour within Islam. Meanwhile, transmission of the printed written word accelerated across Europe, thus eclipsing The Golden Age.

Avicenna's Legacy

Avicenna's contributions to medicine and philosophy are immense. He was known in the Muslim world as The Third Teacher, after Aristotle and Al-Farabi. With *The Canon of Medicine*, Avicenna placed a keystone in the arch that bridged the medical systems of Aristotle and Galen with modern medicine. In the field of philosophy his metaphysics would have a profound effect on scholastic philosophers like Thomas Aquinas. Avicenna was searching for a way to understand the universe based both on the laws of cause and effect and a loving God. He wrote, "The heart of learning is a direct insight into the rational principles upon which the world is constructed."

The Hinges of History

In the Houses of Wisdom, Christian Jewish and Muslim scholars translated the books into Arabic. The wisdom of the ancients ignited The Golden Age. The decimal system ('Hindu Numerals') would spread across the known world. Mathematics, algebra, trigonometry and algorithms were invented and geometry would become conceptual. The luminaries of this golden age made discoveries in astronomy, geology, cartography, physics, chemistry and logic. In medicine, advances were made in medicine itself but also in pharmacology, surgery and ophthalmology.

Figure 8. The Conquering of Muslim Spain. Bas Relief, Palma, Majorca

When Christians conquered Muslim Spain (Al-Andaluz - The land of The Vandals) they found translation institutions where multicultural scholars were harmoniously at work. (*Figure 8. The Conquering of Muslim Spain. Bas Relief, Palma, Majorca*) The Now the process would reverse and Christian scholars learnt Arabic to translate these books into Latin. The Catholic Church had previously mostly banned study of the ancient Greeks, considering them to be pagan, but the scholarship of The Falasifa, reconciling Greek thought within a religious framework, reignited Western interest in Greek philosophers.

From our 21st-century vantage point, we owe a debt to those visionaries from that Golden Age. Without them, so much

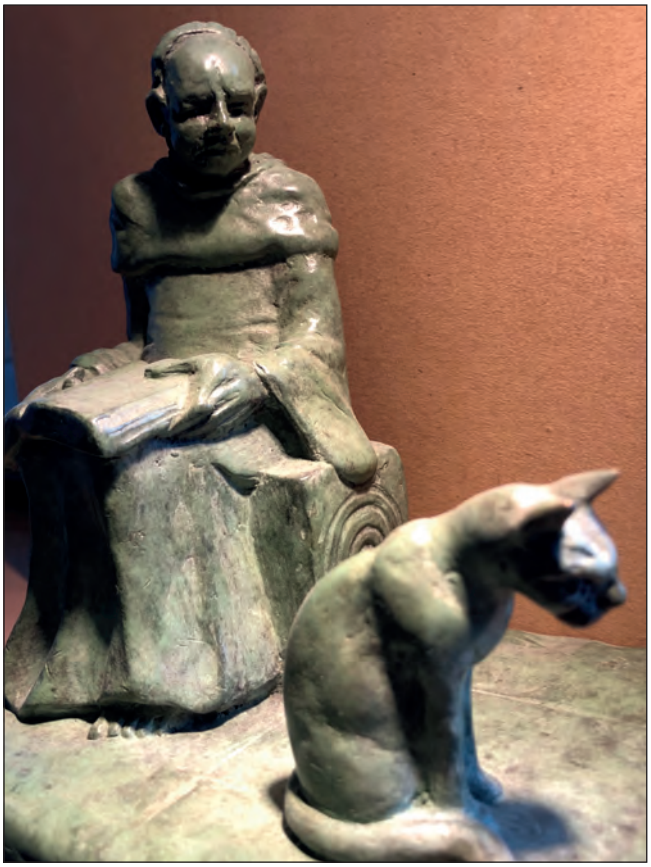

Figure 9. The Monk and Pangur Bán. Sculpture by Dr John Bryson Martin

knowledge and thought would have been lost to us. Ireland made its own contribution with the Latin Canon. Monks, spreading the gospel, writing and copying as they travelled East across Europe could be considered a flickering light in those Dark Ages. If I may, I should like to conclude with one example. On the shores of Lake Constance in Austria, an 8th century Irish monk in his cell was working on a manuscript entitled *The Reichenau Primer*. With him, in his cell, was his little cat, Pangur Bán. (*Figure 9. The Monk and Pangur Bán. Sculpture by Dr John Bryson Martin*). The monk realised that the cat's mission - to catch mice - was similar to his own: to catch souls. In the margin of the manuscript, he wrote a poem about his little cat that is still visible to this day. This is its last verse:

Practice every day has made us
Perfect in our trade
We get wisdom, day and night,
Turning darkness into light.

Thank you for your very kind attention.

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