

**THE HISTORY OF ENGLISH PODCAST
TRANSCRIPT**

**EPISODE 90:
HEALERS, HOSPITALS AND HOLY WARS**

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Welcome to the History of English Podcast – a podcast about the history of the English language. This is Episode 90: Healers, Hospitals and Holy Wars. In this episode, we’re going to turn our attention away from England – and even away from Europe. We’re going to shift our focus to the Near East – and the growing influence of the Islamic world during the Middle Ages. This was a period when the Christian and Islamic worlds were coming into contact with each other in many different ways – through trade, through pilgrimage, and through the series of violent clashes known as the Crusades. Through these interactions, Christians in Europe discovered a civilization that was more advanced than its own in many ways, especially in fields like mathematics, astronomy and medical care. And as Europeans discovered those new ideas and technologies, they started to borrow words from that culture. So this time, we’ll explore those developments, and we’ll see how that eastern culture influenced the English language.

But before we begin, let me remind you that the website for the podcast is historyofenglishpodcast.com. And you can sign up to support the podcast at [Patreon.com](https://www.patreon.com/historyofenglishpodcast). Just go to historyofenglishpodcast.com and link from there.

And one other quick note. I recently spoke with the Silly Linguistics Podcast about podcasting and putting this particular podcast together. For those of you who are interested in listening to that discussion, check out the Silly Linguistics Podcast at iTunes or wherever you get your podcasts.

Also, in these next few episodes, I’m going to be discussing developments in the Islamic world during the Middle Ages. That means I’ll be using some Arabic words from time to time. And I’ll be discussing a different part of the world. So I thought it might be a good idea to invite someone on who could help me out.

[Elias Belhaddan] This is Elias Belhaddan of the History of Islam Podcast.

[Kevin Stroud] Thanks Elias. Elias has been a great help with some of the Arabic words I’m going to be discussing, and he may also pop in from time to time to offer a few thoughts of his own. And if you want to learn even more about the history of Islam, be sure to check out his podcast appropriately called the History of Islam Podcast.

So let’s turn to this episode, and let’s return to the events on the ground that shaped the history of the English language. A few episodes back, we left the overall historical narrative with the death of Henry II after a protracted battle with his son Richard. Richard had been a thorn in his father’s side for most of his life, but he was also the eldest son, so he was next in line to the throne. And when his father died, Richard promptly headed to England to be crowned as the new king. And in 1189, Richard became the King of England and the new ruler of the Angevin Empire.

Now Richard was a fascinating figure. He epitomized the concept of the chivalrous warrior, and he was the first King of England to fight in the Crusades. In fact, his reign is really synonymous with the Third Crusade. I have alluded to the Crusades in earlier episodes, but I haven’t spent much time

on them. And that was partly because they didn't have much of an impact on the English language at the time. But all of that was starting to change around the time of Richard's reign in the late 1100s.

By this point in history, Persian and Arabic influences were starting to make their way into Western Europe and into England. And as English manuscripts started to be produced again, those new documents included words that be traced back to the Near East.

So this time, I want to digress from the main storyline, and I want to give you a quick history of the Muslim world up to the current point in our story. This is important for a couple of reasons. First, it will help to set the stage for the Third Crusade, but it will also reveal a remarkable period of scholarship and technological innovation. Frankly, this story is often neglected in the West, and that's unfortunate because I think we fail to realize how much influence the Arab world had on Western culture in the late Middle Ages. And that influence is still reflected in some common words that we use all the time.

But before we turn to the Near East, I want to mention something about a particular piece of technology – the magnetic compass. At the current point in our story, it was a relatively new invention. A few episodes back, I mentioned that it was invented in China in the 1100s. Like many Chinese technologies, it made a slow and gradual trek eastward across India and the Arab world before it finally reached Europe. When it reached Western Europe, it changed everyone's perspective on the world. It allowed for greater travel at sea – and it enabled geographers to make better and more accurate maps. And because the compass needle always pointed to magnetic north, those maps were drawn from that perspective. And even today, almost all maps are drawn with the north at the top of the page. Even most modern GPS devices are oriented toward the north by default.

But that northern orientation didn't always exist. Before the magnetic compass arrived, Europeans tended to be oriented toward the east. That was the direction in which the Sun rose. And that was also the general direction of the Holy Land where Christianity was born. So when a new church was built, it was usually designed so that its axis faced east toward Jerusalem. Today, we would say that the church was 'oriented' toward the East. And in its original sense, the word *orient* literally meant to arrange something so that it faced toward the east. And that's also why the lands to the east of Europe came to be known as the Orient. The word *orient* comes from a Latin word that meant the east or the place where the Sun rises. So the East was the Orient and, over time, things pointing toward the east were said to be *oriented*.

Of course today, when we speak of the Orient, we are usually referring to the Far East – to places like China and Japan. But the word originally had a much broader sense. It included India, as well as the Middle East – or the "Near East" as it was once more commonly known.

Now even though most Europeans tended to be oriented toward the Orient, they actually knew very little about the Orient. Most of them were illiterate, so they weren't able to read books about it. They gathered some knowledge through the stories of the Bible as told to them by priests, but even then, those stories were set in the distant past.

Most of what they knew about contemporary Eastern culture came from traders and pilgrims who traveled to the Holy Land and returned to tell stories about their journey. But in the year 1072, most of those pilgrimages to the Holy Land were interrupted. Turkish Muslims had captured Jerusalem, and they essentially sealed it off from the Christian world. In Western Europe, the reaction to those events was outrage, and it led to a concerted military effort to reclaim Jerusalem. Of course, those series of wars were the Crusades.

The First Crusade was a victory for the European forces because they briefly recaptured Jerusalem. And that allowed Christian pilgrims to return to the city. But it was an incredibly long and difficult journey from Western Europe to Jerusalem. Many pilgrims were sick and exhausted by the time they got there. And there were also threats from hostile forces in the region. So various groups of Christian knights in the region started to join together to defend the lands that had been won in battle – and also to offer shelter and protection to Christian pilgrims. Very soon, those knights formed two major military orders to serve those purposes. One of those orders was the Templars. But the other order is more important to this story. They were called the Hospitallers – and their primary function was to protect pilgrims and provide lodging for them. The Latin word for an inn or a lodge was a *hospitum* – from the same root as words like *host*, and *hospitable*, and *hotel*. And this particular hospitum, which provided hospitality to pilgrims, was called the “Hospital of St. John of Jerusalem.” But the word *hospital* didn’t mean what it means today. Again, it was more like a hotel or an inn – a place of refuge and shelter. But so many of those pilgrims needed medical attention by the time they got to Jerusalem that the facility was soon swamped with sick and injured people. And as a result, this particular facility started to acquire a new mission – a medical mission. And again, the name of that facility produced the name of the military order that was in charge – the Hospitallers.

As pilgrims and knights returned to Europe from the Crusades, they saw the value of facilities like the one in Jerusalem run by the Hospitallers. So around the current point in our overall story – in the late 1100s – a lot of brand new hospitals started to be constructed throughout western Europe, including several within the city of London.

And it is probably appropriate that these new facilities were ultimately connected to events in the Holy Land because the words *health* and *holy* come from the same Indo-European root word. I’ve mentioned this before, but it’s a good time to mention it again. The words *health* and *holy* come from Old English. And they’re both also related to the word *whole* – W-H-O-L-E. And that word *whole* is really the key.

In Old English, a sick body was considered to be broken. And in fact, Old English used the word *broc* – B-R-O-C – to refer to a state of sickness. Of course, it could literally be a broken condition, as in broken bones, or broken skin in the form of lesions or cuts. By contrast, a healthy body was considered to be ‘whole’ – and that’s how we got words like *heal*, and *health*, and *healthy*. And by analogy, this idea of physical health was extended to spiritual health.

If person was in good physical health, he or she was pure and whole, uncontaminated by bad or evil contagions. In that case, the person was deemed to be *healthy*.

And if the person was in good spiritual health, pure and whole, uncontaminated by bad or evil temptations, then that person was deemed to be *holy*. And that's the ultimate connection between *healthy* and *holy*.

Now back in Episode 63, I discussed how the Anglo-Saxons dealt with sickness. In that episode, I noted that the Anglo-Saxons relied on herbal remedies and charms. But in certain parts of Europe, especially those regions familiar with Greek medicine, they tended to use a different treatment – blood-letting. This was tied to the Greek concept of the four humors. If a person was sick, the humors were out of balance, and blood-letting was a way to achieve the proper balance.

Now, here's the thing about blood-letting. First of all, that term *blood-letting* was entering the English language around the current point in our overall story. But the term really has two different meanings. It can refer to both medical treatment – and warfare – as in “There was much blood-letting between the two armies.” So the intended meaning of that term really depends on why the blood is being let. And that takes us back to those Hospitallers because they engaged in both types of blood-letting. They provided comfort and medical care to sick people. But at the same time, they were warrior knights engaged in a Holy War. So there was a lot of blood being spilled, but whether it was intended to heal or kill usually depended on whether you were a Christian or a Muslim.

And in order to understand why that distinction was so important, we need to turn our attention to the origin of the conflict. And that takes us back to the rise of Islam in the early Middle Ages. This part of the story takes us to Arabia which was the home of Mohammad – the man known to Muslims as the Prophet Mohammad. By the time of his death in the year 632, the whole of the Arabian Peninsula had been united under Islam. It was also increasingly unified under a common language. The nomadic peoples of Arabia spoke a wide range of dialects, but a common Arabic dialect started to develop during this period. And this process was furthered after the region was unified politically. This actually served as the model going forward. As the Arab world expanded, it encountered a variety of other peoples and ethnic groups with different religions and languages. But under Islamic rule, many of those people started to speak Arabic, and they converted to Islam. So they were increasingly unified by a common religion and a common language.

Within about 20 years after Mohammad's death, the Quran had been written down – and that important text also helped to standardizing the language. All of this is very similar to the way Christianity and Latin spread together throughout Europe. The spread of the religion and the spread of the language were fundamentally linked in both cases.

Within a couple of decades, Mohammad's followers had spread north and conquered the Persian Empire. That took the Islamic religion and culture to modern-day Iraq and Iran. By the 660s, the Islamic Empire encompassed most of the region we know today as the Middle East, including Syria, Palestine and Egypt. Within another decade, it had expanded all the way across northern Africa to modern-day Morocco.

From Morocco, the Muslim forces crossed the Mediterranean and spread into southern Spain. This meant that their power and influence extended into Europe itself. And this had tremendous long-term consequences because it provided an avenue for Muslim culture to spread into Western Europe.

For this important development, I'm going to let Elias jump in and describe the Muslim capture of Spain.

[Elias Belhadden] The man responsible for this was known as Tariq ibn Ziyad. Tariq was an ethnic Berber who were the indigenous inhabitants of North Africa. And he was a former slave the slave of a man called Musa bin Nusayr, who was the governor of Ifriqiya – a province within the Umayyad Empire which stretched from the deserts west of Egypt all the way to the shores of the Atlantic. Tariq was freed and appointed as a general by his former master. In 711, he hopped over from North Africa to the Iberian Peninsula landing somewhere near Gibraltar giving it his name. *Gibraltar* comes from the Arabic *Jabal Tariq* meaning “Tariq’s mountain.” The Iberian Peninsula was ruled at this point and time by the Visigoths, a Germanic people who had been present in former Hispania since they took it from the Romans a few centuries earlier. Before beginning his march northwards, Tariq waited with his force of around 7,000 mostly Berber men for some further reinforcements. These came in the form of 5,000 men – a contingent sent to him by Musa bin Nusayr. Tariq could finally head north but his march was soon interrupted by the Visigoths. The two armies faced off near a river known as Río Barbate. And in this battle, Tariq ibn Ziyad’s highly skilled horsemen managed to carry the day and decisively defeat the significantly larger Visigoth force. Following this great victory, Tariq ibn Ziyad was joined by Musa bin Nusayr, and in just two very short years, the vast majority of the Iberian Peninsula was subjugated in an almost blitzkrieg fashion.

[Kevin Stroud] Ultimately, the spread of Muslim of power was checked in the north. The Franks were able to repel the forces from southern France. And that ended the expansion of Muslim armies into Europe. But it left most of Spain under Muslim control. And as I noted, that was really a crucial development in our overall story – because Muslim Spain was the primary source for the introduction of Arab culture to Western Europe.

So in less than a century, a massive region had come under the control of Muslim forces, almost all of which was loosely organized under the leadership of a family of rulers called the Umayyads. Their capital was established at Damascus in Syria. And they were generally tolerant of native religions. They didn’t force conversions, and they allowed Christian pilgrims to continue to travel to Jerusalem and the surrounding areas. But over the next few generations, more and more people within these regions converted to Islam. Arabic was also the official language of the government. So Arabic gradually replaced most of the native languages throughout this massive region.

Then in the year 750, the Umayyad rulers were defeated by a rival family called the Abbasids. And this ushered in a new dynasty called the Abbasid Caliphate. Then, in the very next year, there was another important development. Muslim armies had spread so far east that they encountered a Chinese force along the Silk Road in Central Asia. And the Muslim army defeated that Chinese force at an important battle in the region north of Afghanistan.

That obscure battle is important to our story because it gave the Muslim forces access to a specific Chinese innovation. That innovation was paper. The Chinese had figured out how to make paper, and following that battle in 751, the victorious Muslims took the defeated Chinese as prisoners of war. The Chinese prisoners included several craftsmen who knew how to make paper. And according to tradition and legend, those craftsmen were forced to reveal how that paper was made.

Whether or not the Muslims actually acquired papermaking knowledge in this manner, the fact is that paper mills started to spring up throughout the Arab world a short time later.

I'm going to have a lot more to say about paper in an upcoming episode, because for now, it still hadn't reached Europe. But from the mid-700s, it was an increasingly common writing material in the Arab world. And it allowed for the mass production of documents – in Arabic of course. Before paper, most scribes used papyrus or parchment. Those materials were difficult to produce and could be very expensive. So previously, writing was limited to the most important documents. And only a few copies existed.

But now, in the Arab world, paper could be mass produced. So it was abundant and cheap. That meant scribes could make as many copies as they wanted. The only limitation was the number of literate scribes that could be assembled. And that soon became a priority for the Abbasid rulers.

I should note that the Arabic paper trade became quite substantial in the period before paper mills were introduced to Europe. And that's why the word *ream* – as in a 'ream of paper' – is actually an Arabic word. The original word was *rīzmah* meaning 'a bundle of something,' specifically a bundle of paper.

Now three years after that victory over the Chinese and the acquisition of paper, the Abbasids got a new leader known as a caliph (/kæ-lif/) – or (/kay-lif/) – either pronunciation is acceptable in English. I'll just use caliph (/kay-lif/) going forward. The new caliph was al-Mansur, and he is very important to our story for a couple of reasons.

First, he decided to move the capital from Damascus to a brand new city which he established between the Tigris and the Euphrates in modern-day Iraq. That city was called Baghdad. There had been a small settlement there before, but al-Mansur laid the foundations for the modern city. So that's one reason why al-Mansur is notable. The other reason why he is important to our story is because he accidentally made a major discovery a few years later when he became ill.

He was having stomach problems. And no one in Baghdad could provide an effective treatment. So he looked elsewhere. About 150 miles north of Baghdad, in the mountains of southern Persia (in Jundi Shapur), there was a Christian monastery that had been around for over a century. And this particular monastery traced its origins back to Constantinople, so it had a lot of old Greek texts. And the monks had translated those Greek texts into their native Semitic language called Syriac.

Those translations included medical texts from the classical Greek period. Those were the texts that described the humors and how to treat people using blood-letting and other treatments. The monastery had even established an early type of medical school and hospital to treat people using some of those theories. Now I say 'hospital,' but that's being a bit generous – especially when compared to modern standards. It was a place where sick or injured people went to find a treatment for a particular illness, but again, there was no modern medicine. So the monks used these old Greek medical texts and combined them with folk remedies and whatever other treatments they could provide.

Well, the new Arab leader, al-Mansur, reached out to the monks in this medical monastery, and he summoned the head of the medical center (Jurjis ibn Jibril ibn Bukhtishu) to come to Baghdad to see if he could treat the caliph's stomach problems. And apparently, the monk provided a cure – or he at least provided some relief – because al-Mansur made the monk his personal physician. And in fact, the monk's family continued to serve as personal physicians to the caliphs for several generations after that. So a close personal link was established between the Abassid court at Baghdad and that medical monastery in the Persian mountains.

Thanks to that connection, al-Mansur and his successors came to realize that there was a world of practical knowledge locked up in some of those old books. They also realized that the wisdom of other cultures could be put to practical use in the Islamic world. So Muslim scholars started translating some of those Greek texts. The monastery also had a lot of Persian texts, so those were also translated.

The next major development took place about 20 years later with one of al-Mansur's successors named Harun al-Rashid. Al-Rashid became caliph in the year 786, and he ordered the construction of a large medical center in Baghdad. But more importantly, he organized all the translators and scholars in Bagdad into a new research center called the House of Wisdom. The House of Wisdom was an attempt to collect all of the practical knowledge of the world in one place. At its most basic level, it was a library filled with scholars. Their goal was to collect as many documents and texts as they could and then to translate them into Arabic.

Indeed, many manuscripts were translated into Arabic during this period from the late 700s through the 800s. It included Persian, Hindu and Greek texts. And in fact, some of those texts, including several important Greek texts, would have been lost to history had it not been for these Arabic translations.

Interestingly, the translators weren't really interested in history or drama or other works of literature. So for example, they never bothered to translate the works of Homer. They were only interested in documents that provided a practical knowledge of the natural world. So they copied works related to natural science, medicine, math, astronomy, geography, and so on.

The access to all of this knowledge led to a new era of scholarship and learning in the Arab world. One of the earliest figures to emerge from this new culture was a scholar named Jābir ibn Hayyān, but he is generally known in the West as Jabir the Alchemist. Jabir was primarily interested in an ancient pursuit – the attempt to transform various metals into gold and silver. This became a popular pursuit throughout the Middle Ages. As part of that pursuit, Jabir did a lot of work and experimentation with various metals and other substances. He studied processes like evaporation, distillation and crystallization. Remember this was the late 700s, so we're still 7 or 8 centuries away from the scientific revolution in the west.

Jabir's work was influential, but later scholars had a tough time making sense out of some of his notes and research. And they couldn't always follow his theories. So there is one school of thought that says that Jabir's name gave us the word *gibberish* to mean writing or speech that's difficult to understand. Not everyone agrees with that etymology, but it is one of the popular theories.

Though modern scholars sometimes struggle with Jabir's theories, his work was picked up and expanded upon by other scholars at the new House of Wisdom.

To explain the work they were doing, Arab scholars turned to a Greek word – presumably a word they had encountered in all of those translations. That word was *chymeia*. It was an old Greek name for Egypt, and it apparently referred to earlier Egyptian attempts to transform metals into gold or silver. The Muslim scholars took that Greek word and added the word *al* to the front of it. That produced the Arabic word *al-kīmiyā*.

Now that prefix *al* is going to be very important as we discuss Arabic words that passed into English because it appears in a lot of those words. And it is very common because it is the Arabic word for *the*. And when those nouns passed into European languages, the *al* part was often retained at the front.

So *al-kīmiyā* is often translated as ‘the Egyptian Art’ – or simply ‘the Art’ – which again is a reference to the earlier Egyptians who worked with metals. And *al-kīmiyā* eventually passed into Latin, and then into English, as the word *alchemy*. But many European translators understood that the *al* part at the front was merely an article – the word for *the* – so it was sometimes dropped at the front. And that ultimately produced the word *chemistry*. So for much of the Middle Ages, there wasn't much of a difference between a *chemist* and an *alchemist*. One version retained the Arabic article and one didn't.

But by the 1600s, the scientific revolution was underway in Europe, and scholars tried to distinguish pseudo-science from actual science. Actual science used the scientific method. And it was at that point that the word *alchemy* was relegated to attempts to turn metals into gold and silver. And the word *chemistry* – without the *al* – was used for the scientific study of the properties of matter.

Now as I noted, one of the primary goals of most alchemists was to find a substance that could turn a base metal like mercury into gold or silver. Now this may seem a little crazy today given what we know about modern chemistry, but at the time, many people thought it was possible. And they thought it was possible because there were ancient legends about people who had discovered a magical substance that could make that kind of transformation. According to those legends, there was a specific stone that could be used to produce this transforming substance. The stone could be ground into powder, and that powder could then be mixed with other substances to produce gold. This legendary stone came to be called the ‘philosopher's stone’ in the West. And according to some of those legends, the stone's powder could also be used to extend life and cure illnesses. The Arabic term for this magical powder was *al-iksir*. Again, the term was probably borrowed from an earlier Greek word. But Arabic *al-iksir* passed into Latin and then into English as *elixir*. And we still use the term today to refer to a liquid substance with healing properties. The word first appeared in English in the mid-1200s, so again, around the current point in our overall story of English. And in that word *elixir*, we can see that these Muslim scholars weren't just interested in turning metals into gold, they were also interested in treating illnesses.

Now in order to discover this magical elixir, early alchemists worked with different substances, changing their qualities, melting them, burning them and distilling them. They also worked with

plants. And when plants were burned in a pot, it left ashes behind. Back in Episode 71, I mentioned that this type of residue was called '*pot-ash*' in the Germanic languages. The Dutch version of that term '*pot-ash*' was later borrowed into Latin, and that produced the Latin word *potassium* for the metallic element that was produced through that process.

Well the Arabic term for that ash was *al-qaliy* – literally 'the ashes.' Now if you think back to all of those fun chemistry classes that you had in school, and if you recall the periodic table of the elements, you might remember that the chemical symbol for potassium is K. It's not P – for potassium – it's K. Well, now we know why. It all goes back to this Arabic word for pot-ash – *al-qaliy*. Remember the *al* is just the Arabic word for *the* – so it was sometimes dropped. And *qaliy* passed into Latin as *kalium*, and it produced the symbol K.

But that Arabic term *al-qaliy* also produced another word – the word *alkali* – and its related word *alkaline*. So if you go to the store and buy an 'alkaline' battery, you're using this Arabic word – which has its origins in alchemy. An *alkali* is a substance that's used to neutralize an acid. So if you have a swimming pool or a spa, you have to keep the water checked to make sure that everything is balanced. It sort of like balancing the humors according to Greek medicine. You don't want the water to get too acidic. If it does, you can add a chemical that balances the water. It increases the alkalinity of the water, and that neutralizes the acid.

Well, the same thing happens in your stomach. If you have heartburn, it's sometimes caused by too much acid. So you might take an antacid like Rolaids or Tums. Well, an antacid is just a strong alkaline substance. It neutralizes the acid in the stomach.

The earliest remedies for an upset stomach can be found among the Sumerians around 3500 BC. That included remedies like milk, peppermint and baking soda. All of those substances have a high alkaline content. So again, they help to neutralize the stomach's natural acids. Now the Sumerians probably didn't understand the science behind that, they just knew that those substances worked. But thanks to the work of some of these early Arab scholars, we now know how alkaline substances work. And in fact, Jabir the Alchemist not only recognized the difference between acids and bases, he also studied how to use a specific amount of one substance to neutralize the other. Again, for our purposes, the important thing to take from all of this is that the word *alkaline* comes to us from Arabic, and it refers to a substance that has a very practical medical application today.

I should also note that we have another English word related to alchemy that probably came to us through Arabic. When mercury was blended with another metal, it was called an *amalgama* in Medieval Latin. And we still have that word today as *amalgam*. Today, it means any kind of mixture or combination. Most scholars trace the origins of that word back to an Arabic term *al-malgham*, which referred to a softening agent used for sores. Like a lot of these words, the ultimate root may have been borrowed from Greek.

But all of that means that words like *alchemy*, *chemistry*, *elixir*, *alkaline* and *amalgam* can all be traced back to Medieval alchemy, and all of those words either came from Arabic or came from an Arabic translation of an earlier Greek word.

In these words, we can see how these scholars were working with metals and other substances in an effort to figure out how they worked and to see if this research could improve their quality of life. And that was really the key. The Muslim scholars were more focused on the practical benefits of those old Greek texts.

They were especially interested in texts associated with astronomy. Islam required them to pray in the direction of Mecca at certain times each day. Since the magnetic compass hadn't been invented yet at this point in history, they had to come up with other ways to locate Mecca. And modern clocks didn't exist yet, so time-keeping was also an issue.

One way to determine direction and time was by studying the location and movement of the sun during the day and the stars at night. As it turned out, the Greeks and Persians had developed very detailed star tables, so the Muslim scholars proceeded to translate those into Arabic.

The study of the stars and planets was important as a means of navigation. So merchants and other navigators were also interested in this research. And Muslim doctors also consulted the stars. Like many ancient people, they consulted astrology when diagnosing illnesses and prescribing cures. They thought a person's birth sign could be used to diagnose and treat illnesses. Some of these ideas had also been picked up from the Greeks. So astrology and astronomy were important for a lot of different reasons, and it was the most widely practiced science in the Islamic world.

In the year 813, the Abassids got a new leader named al-Ma'mun. And shortly after he became caliph, he ordered the building of the first astronomical observatory in Baghdad. The primary reason for the observatory was to check all the measurements in those texts on astronomy had been translated into Arabic. The problem is that all of those old Greek and Persian texts had conflicting measurements. So the Muslim scholars needed to check the measurements and figure out which ones were accurate and which ones were off. Over a one-year period from 828 to 829, the scholars conducted an extensive study of the stars and planets, and they checked them against those older texts.

The observers didn't have access to telescopes, because that technology wasn't available yet. So they had to make their measurements with the naked eye.

Given all of this interest in astronomy and astrology, it probably isn't surprising that several English words related to those subjects come from Arabic. For example, the word *zenith* – meaning the highest point in the sky – and the word *nadir* – meaning the lowest point – both come to us from Arabic, and both words came in during the 1300s. And the name of the star *Betelgeuse* was also derived from an Arabic phrase.

Most scholars also think the word *almanac* came from Arabic. It came into English via Latin and French in 1300s, and it meant a 'book of tables of astronomical data.' And some people still use the Farmer's Almanac to predict the weather months in advance. This is really a type of astrology, and it shows how interconnected astrology and astronomy once were. After the scientific revolution, they became distinct disciplines, in much the same way that alchemy and chemistry became distinct.

I noted that the caliph named al-Ma'mun ordered the construction of the first astronomical observatory in Baghdad. Well, he did a lot more than that. He was really an essential figure in the overall evolution of Muslim scholarship and the growth of the House of Wisdom. One thing he did was to put his court physician (Hunayn ibn-Ishaq) in charge of the House of Wisdom. And that physician was another doctor from that medical monastery north of Baghdad.

Al-Ma'mun was fascinated by books, and he was really a key figure in the collection of manuscripts from other cultures. He sent his emissaries far and wide to collect scientific texts. When he defeated foreign rulers in battle, he sometimes forced them to make tribute payments in books rather than gold. It was really during his reign that the House of Wisdom became such an impressive place of learning and study. I should note that the actual building that contained the House of Wisdom no longer exists, so no one knows how big or grand it was. But it must have been impressive given the amount of scholarship that it produced.

One of the scholars who worked at the House of Wisdom was named al-Khwarizmi, and he may have been the most influential scholar of them all. He contributed to many different fields, but he is most famous for his contribution to mathematics.

Around the year 825, he composed a great work on arithmetic using Hindu numerals that had originated in India. Thanks to the contribution of al-Khwarizmi and others, those Hindu numerals replaced the native numbering system that the Arabs had been using. The Arabs had previously used letters for numerals. And as we know, the Romans did the same thing, and the Roman numerals were used throughout Western Europe. So for example, the Romans represented the number 1 with an I. The number 5 was V – which remember was just a different way of writing letter U at the time. 10 was X. 50 was L. 100 was C.

Now that was fine, but it wasn't easy to do math with those numbers – or letters. You couldn't line them up to do math the way we do with modern numerals. Today, we can line up a group of numbers, and we can add or subtract or multiply one column at a time. But Roman numerals didn't work that way. Like a lot of ancient numbering systems, there were no columns. There was just a random collection of letters. And the number of letters didn't necessarily reflect the inherent value of the number. As I noted, the Roman number 100 was represented by a single letter – C. But one number less – 99 – was represented by 4 letters – XCIX. So again, you couldn't really line them up to solve math problems.

But Hindu numerals worked on a completely different system. It was basically the same system we use today – because those Hindu numerals were the original version of modern numerals. And they were introduced to the Arab world, and ultimately to the Western world, thanks in large part to al-Khwarizmi's book. Since these numerals passed through the Arab world before they reached the West, they are generally known today as the Hindu-Arabic numerals. Some people just call them Arabic numerals, but their ultimate origin was in India.

I'll have much more to say about numbers in a future episode where I intend to discuss the development and evolution of numbers, and I'll look more closely at our modern words for numbers at that time. But for now, the important thing to know is that those Hindu numerals had one major

advantage over other numerals – like Roman numerals. That benefit was the fact that Hindu numerals put an emphasis on position and place value.

The position of each digit in the overall number told you something very specific. It wasn't random. So the number 5,432 tells you that you have 5 groups of a thousand – four groups of a hundred – three groups of 10 – and 2 groups of 1. And all of that is determined by the specific order and position of each individual digit. Because position is so important, we can line up those numbers, and we can add or subtract or multiply each column. It makes complicated math relatively easy. And it was a huge improvement on the systems that had been used previously.

Al-Khwarizmi described this system in his book called “The Book of al-Khwarizmi on Hindu Numbers.” It was later translated from Arabic into Latin. And the Latin version of the title was “Liber Algorismi de Numero Indorum.” And notice how al-Khwarizmi's name was translated in that title – as “Algorismi.” And throughout the text, the translator uses the phrase “Dixit algorismi” – literally “al-Khwarizmi says.” Well, that book was very influential, and that translation of al-Khwarizmi's name as “Algorismi” became very common and well-known. And Latin version of al-Khwarizmi's name led to the word *algorism* to refer to the use of those Hindu-Arabic numerals – as opposed to Roman numerals. In fact, that word entered English in the early 1200s, around the current point in our overall story of English. And *algorism* later produced the word *algorithm* to mean the specific way in which those numerals were organized to solve a math problem. So ultimately, *algorithm* is derived from the name al-Khwarizmi.

Al-Khwarizmi's text on numerals is also important for another reason. It didn't just use the traditional digits 1 through 9, it also used a zero. Think about that for a second. How do you write a zero with Roman numerals? Well, you don't. Because there was no zero. In fact, the number zero didn't start to become accepted as a standard number until around this time, and the writings of al-Khwarizmi helped to introduce that number to both the Arab world and to Western Europe.

That's also why the word *zero* is the only English word for a basic number that didn't come from Old English, or Latin or Greek. It came from Sanskrit – via Arabic. And it came in via Arabic thanks to al-Khwarizmi.

Now the history of zero is kind of complicated. The earlier Greeks had the ‘concept’ of zero – in the sense of a void or a number having a value of nothing, but they didn't have a specific numeral to represent that value. And the Babylonians had a symbol for a zero, but they only used it as a place holder. So they used it in the way we would use the zero today if we wanted to distinguish 15 from 105 or 1005. But they didn't really treat it as its own independent number in making calculations.

It was the Hindu scholars who took the concept of zero as a unique number and gave it a specific numeral to be used in making calculations. And al-Khwarizmi helped to introduce it to the West. And today we use that zero just like any other number. $2+0$ is 2. 2×0 is 0. 2 divided by 0 is 0. Those types of calculations weren't really possible before the zero was introduced. So zero was no longer just a place holder. It functioned as its own independent number.

I noted that the word *zero* came into English from Sanskrit – via Arabic. The original Sanskrit word meant a void – and it could also refer to an empty place like a desert. The word passed into Arabic meaning zero or nothing – and in Arabic the word was *sifr*. That Arabic word actually came into English twice. The first time was in the 1300s when it passed through Medieval Latin and came into English as *cipher*. Again, it meant zero, and we still have that word today – even though it’s a bit obscure. Over time, *cipher* came to refer to any of the Hindu-Arabic numerals. Now in the late Middle Ages, before these new numerals were commonly used in Europe, government agents would send coded messages with those numbers. Each number represented a specific letter. Of course, if these coded messages were intercepted, the other side tried to decode the message. So they had to figure out what each number – or cipher – represented. And that led to the word *decipher* to mean the process of decoding a secret message – or discovering the meaning behind something. So we still use that word *cipher* in that context.

Again, *cipher* was the first version of the Arabic word for zero to enter English. Then over the next few centuries, that word evolved within the Romance languages. First, it evolved within Italian, then the Italian version was borrowed into French, and then the French version was borrowed back into English in the early 1600s. And by the time it was borrowed into English for the second time, it was pronounced as ‘zero.’ And that gave us our modern word *zero*.

Again, the number zero was an innovation of the Hindu numbering system. And it allowed the Arab scholars to make sophisticated calculations. And al-Khwarizmi helped to introduce that number to the West.

About five years after his book on Hindu numerals, al-Khwarizmi wrote another book about mathematics. The full Arabic title is little too much for me, so I am going to let Elias pronounce it: “al-Kitab al-Mukhtasar fi Hisab al-Jabr wal-Muqabala.” Now that Arabic title translates as “The Compendium on Calculation by Restoration and Balancing.” The key is one particular part of that Arabic title – the term *aj-Jabr*. And in fact, that Arabic title was so long for people in the West, that it was usually referred to as simply *al-Jabr*. The term literally meant ‘the restoration.’ In Arabic, it referred to the setting of broken bones. So it referred to the process of re-uniting the two parts of a broken bone, thereby restoring it to its original state.

And why is that term *al-Jabr* – meaning ‘restoration’ – so important? Well, because it gave us the word *algebra*. By the 1500s, it had entered English as a specific term for a type of advanced math using letters to represent unknown numbers.

Now when al-Khwarizmi used that term *al-Jabr* – meaning ‘the restoration’ – he used it to refer to the restoration of balance in a mathematical equation. So if we have a simple equation like $x - 1 = 4$, al-Khwarizmi wrote that the first step was to restore the balance by getting rid of that negative. So you do that by adding 1 to each side. That leaves you with $x = 5$. And that gives you the answer for x . That was a type of restoration, which al-Khwarizmi likened to the setting of a broken bone to heal it. And thus, *al-Jabr* – meaning ‘bone-setting’ – became *algebra* for this type of mathematical problem solving. And the steps that al-Khwarizmi described were called the *algorithm* – again based on his name.

And notice that we once again see a connection to our theme of restoring health – taking something broken and making it whole again. So the word *algebra* has its origins in a term that referred to a type of healing.

And speaking of healing, by the late-800s, another major figure in Muslim scholarship had emerged. His name was al-Razi, and he is most famous for his contribution to medicine. By this point, it had been about a century since the Abassids had made contact with that medical monastery north of Baghdad, and similar institutions were starting to be established throughout the Arab world.

This was also a period during which a lot of charitable endowments were being set up in the Arab world as encouraged by Islamic law. And some of those endowments were being used to fund these new medical houses. I'll call them 'hospitals,' but we're still long way from what the modern concept of a hospital.

Al-Razi was a physician during this period, and he served as the chief physician of one of those new hospitals in Baghdad. But rather than simply using conventional medicines and treatments, al-Razi preferred to experiment. He was a proponent of trial-and-error – to see what worked and what didn't. He carried out one of the earliest known examples of a clinical trial using a control group. He selected two sets of patients who were all showing signs of meningitis. He treated one group with blood-letting, but not the second. Of course blood-letting wasn't very scientific by today's standards, but the idea of using two different groups and comparing the results of different treatments was revolutionary.

Al-Razi collected his observations in a series of detailed notes. His working files were so extensive that they were later compiled into a medical text after he died. It is still the largest Arabic medical textbook covering 23 volumes in modern printing.

It was later translated into Latin, and it became an essential textbook in Western universities as well. In fact, the origins of disciplines like gynecology and obstetrics can be traced back to this text. And it also contains some of the earliest writings about eye surgery.

Al-Razi also composed a separate text on smallpox and measles which is the oldest reliable account of those two illnesses.

Al-Razi died in the year 925. And by that point, there were several major cities in the Islamic world that had emerged as centers of learning and scholarship. They included Baghdad and Cairo in the east and Cordoba in modern-day Spain. And by the way, I'll just use the English pronunciation of Cordoba going forward.

This was also a period during which the Abbasid rulers were starting to lose control over their vast and extensive empire. It was difficult to govern such a large area. So local rulers started to become more powerful, and the Abbasid caliphate started to fracture. That allowed Cordoba to emerge as an independent caliphate in Spain.

The Cordoba caliphate was named after its capital city, Cordoba, in southern Spain. And it had emerged as one of the most glorious cities in the Arab world and in Europe. The second caliph of Cordoba was named Al-Hakam. And he was another avid book collector. He sent men to the Near East to obtain copies of all the books they could find. As those books were brought back to Cordoba, he needed a place to put them. So he built a great library there. Some accounts say that the library had more than 600,000 books. Modern scholars doubt that number and suspect that it was probably more like a few hundred or perhaps a few thousand. But that still would have made it larger than any library in Christian Europe at the time.

Around this time, a French monk and scholar named Gerbert d'Aurillac traveled to Cordoba. He was fascinated by Arab culture and the Arabic contribution to math and science. He was especially fascinated by the use of Hindu-Arabic numerals and the abacus, which had been largely forgotten in Christian Europe following the fall of the Roman Empire. He returned to France a few years later, and he is considered by many to be the first Christian scholar to carry Arabic science across the Pyrenees into Europe. Gerbert would be an interesting historical figure based on those contributions alone. But later in his life, he had another important accomplishment. In the year 999, he was selected as Pope, and he became Pope Sylvester II. So, ironically, the math and science of the Arab world was introduced to Christian Europe by a future pope.

And I say ironically, because with a century, the Catholic Church had launched the Crusades which led to over two centuries of conflict between Christendom and Islam.

In many respects, this conflict was underway before the Crusades were formally launched. Since the Muslim conquest of Spain, Christian forces from the north had been fighting to take back control of the peninsula. This was known as the 're-conquest' – or 'Reconquista' in Spanish. This ongoing effort lasted for more than seven centuries.

In the early 11th century, the Cordoba Caliphate fractured due to infighting, and it soon broke into several smaller states. That gave the Christian forces in the north the opportunity to chip away even more at Muslim control. By the year 1085, they had captured the city of Toledo in the center of Spain. The capture of Toledo was an important event because the conquerors were stunned by the massive libraries they found there. To their credit, the new Christian rulers understood the value and importance of what they had found. They didn't pillage or destroy the libraries as might have happened in other places at other times. Instead, they preserved the libraries – and set about translating all of those Arabic manuscripts into Latin. And those Latin translations allowed all of that acquired knowledge to pass to the new universities that were starting to pop up throughout Western Europe.

Medical texts were also translated. In fact, around this time, a man identified simply as "Master Herbert the Doctor" donated 26 medical texts to the Durham cathedral in northern England. The books included several that had recently been translated from Arabic into Latin.

And speaking of medical texts, this was also a period in which many new hospices were being constructed throughout Western Europe. In London alone, several of those new hospices were

founded in the 1100s. And those new facilities soon came to be known as *hospitals* using that term that originated with the Hospitallers in Jerusalem a few years earlier.

Now I referred to those new facilities as *hospices* because they were really modeled on that hospice established by the Hospitallers in Jerusalem. Much like that hospice run by the Hospitallers, the new facilities mainly provided comfort and aid to travelers. So there was still an emphasis on hospitality. But over time, these facilities took in more and more local people who needed regular care and shelter. And as medical knowledge grew, and as medical treatments became more effective, these facilities took in more and more sick people who couldn't get treatment elsewhere. And through this process, the word *hospital* finally acquired its modern sense as a specialized center for treating sick people.

So the foundation of the modern hospital lies in both the fascination with Muslim scholarship and the war against Muslim rule over the Holy Land. That fact illustrates the complicated relationship between the Christian world and the Muslim world in the 1100s and 1200s.

Next time, we'll continue our look at developments in the Muslim world. We'll see how that golden age of Islamic scholarship gave way to the Crusades. And we'll see how Richard the Lionheart played such an important role in the Third Crusade. And along the way, we'll see how those events shaped the English language.

So, until next time, thanks for listening to the History of English Podcast.