Free essay about renaissance natural magic ran into some opposition from religiou...

Parts of the World, Europe

Assignment title:

Question 9) What was alchemy? What later subjects did it embrace? What was the philosopher's stone? Compare and contrast the alchemical traditions associated with Jabir ibn Hayyan and al-Razi.

Islamic scholars wanted to utilize their knowledge and to apply philosophy to the material world. " Alchemy was in some ways the precursor to the modern material sciences of pharmacology (iatrochemistry), chemistry, mining and smelting, and parts of physics and engineering, as well as aspects of biology such as the study of fermentation, decay and reproduction. At a basic level, alchemists were trying to identify, classify, and systematically produce useful or interesting substances.

Alchemy was regarded as mere craft. The true study of alchemy was the manipulation of the material world, particularly the transformation of substances from one kind to another.

One of the greatest sources for both Islamic and later European alchemy was the work attributed to Jabir ibn Hayyan. The majority of the work ascribed to him was compiled by Ism'iliya, a tenth-century Muslim sect; it is not certain which, if any, texts were written by him.

Over 2, 000 pieces pf text have been attributed to Jabir, but the Books of Balances and the Summa Perfections cover the central aspects of his alchemy. Jabir starts from an Aristotelian foundation, accepting the four elements and the four qualities, but extends Aristotle's idea of mimima naturalia, or smallest natural particles, as the basis for the difference between metals. The more densely packed the particles, the denser and heavier the metal. The objective of the alchemist was to transform less noble

metals into gold by manipulating the structure and packing of the particles by a process of grinding, purification, and sublimation. The process was also governed by mercurial agents that were either catalysts or active components in the process of change. These agents were referred to by Jabir as medicines, elixirs, or tinctures, which reinforced the biological model of metals - the purification of metal was seen as akin to curing disease or purification of the body.

Jabir's work was very influential, but he was something of an anomaly among Islamic scholars because of his concentration on alchemy. More typical of those scholars engaging in alchemical work was al-Razi. Trained in music, mathematics, and philosophy and likely able to read Greek, al-Razi became a famous and sought-after physician.

For al-Razi, alchemy was less esoteric than it was for Jabir, and certain aspects of his work, such as the development of drugs and the use of opium as an anaesthetic can be seen as an extension of his medical work. His most important alchemical text, the Book of secrets, does not reveal the secret of transmutation of base metal into gold. It is one of the first laboratory manuals. The list of equipment remained almost identical to the standard equipment found in alchemical, chemistry, pharmaceutical, and metallurgical laboratories until the middle of the nineteenth century, and most of it is still familiar to chemists even today.

" Al-Razi believed in transmutation and subscribed to the same general alchemical theory proposed by Jabir. What separates the two is al-Razi's concentration on practical issues and systematic approach. For al-Razi, alchemy developed from experience working with materials, rather than

from a body of theory tha presupposed chemical behaviour. Because of the practical advice he offered, his work became extremely popular in the Latin West, where he was known as Rhazes."

Question 17) In the twelfth century, why were the works of Plato generally privileged over those of Aristotle in Christian Europe?

" The natural philosophers of the twelfth century privileged Plato's Timaeus over Aristotle's works, because Plato's idealism accorded well with Christian theology."

There was a debate between the works of Plato and Aristotle in the Middle tweflth century. Their views on nature of reality differed. Plato privileged conceptual over physical reality and doubted the abilty of sensory information. Human experience is related to sensory interaction and therefore more adequate for people to comprehend. " Aristotle believed that physical reality was ultimate reality and that the physical world was causal and intelligible."

People could understand the universe through sensory information and with the aid of reason. In the early Middle Ages, Platonic philosophy was privileged over Aristotelian, which can be seen in works of Augustine and Boethius.

Question 26) Why did some scholars of the medieval scholastic/Aristotelian tradition criticize the use of experiments?

Alchemy was one way of investigating material that was not dominated by ancient philosophy. Medieval scholars were themselves quietly examining

nature and finding Aristotelian observations wanting. By using Aristotelian methodology, medieval scholars challenged what was true knowledge without risking an attack on authority. The natural philosopher would begin by praising Aristotle and then proceed either to explore an area that had not covered or to demonstrate a new idea in the guise of a moderate correction to his impeccable system. Grosseteste and Theodoric both worked on optics and the rainbow. Grosseteste argued that he was not demonstrating that Aristotle was wrong about the rainbow; rather, he was merely filling in that part of the investigation that Aristotle did not cover. " This was a common ploy for scholastic natural philosophers, allowing them to maintain their allegiance to the Philosopher while they presented original work without fear of being accused of hubris for placing their work above his."

Theodoric also praised Aristotle and then tossed aside his theory to present his own, one based on refraction and reflection. This served as and intellectual bridge between Aristotelian philosophy and the move to test observations that would transform the study of nature. " In the Middle Ages, the argument Aristotle had made against experiments was still taken seriously. That is, forcing nature to perform unnaturally (in an experiment) does not give one insight into its natural behaviour.

Question 2) According to Ede and Cormack, what factors contributed to the recovery of Greek natural philosophy during the European Rennaisance?

The European Rennaisance began with a renewed interest in the discovery of classical texts. Europeans found that they were living in a world of expanding possibilities. Intellectuals used ancient knowledge as a stepping stone to the

new information and ideas. At the same time the Catholic Church lost its preferred monopoly on truth with the upheaval of the Reformation, while university scholars found themselves under attack, no longer the sole controllers of philosophic knowledge. Patronage in the princely courts and merchant halls appeared. Princes no longer valued syllogistic logic and theological subtleties, but wanted spectacle, power and wealth. Natural philosophers who were practical were valued.

Two major factors contributed to the rediscovery of Greek natural philosophy in this period. The first was the fall of Constantinople to the Turks in 1453. With the fall of ancient Greek scholarship, hundreds of books were brought all at once to Italy. Knowledge of Greek became absolutely necessary for scholarly work.

This rediscovery combined with the discovery of mystical and magical treatises. What made the rediscovery of Greek natural philosophy, and with the growth in interest in the study of nature, a European phenomenon, rather than just an Italian one, was the invention of the printing press.

Question 9) What was parallax, and why was it a problem for the Copernican theory? How did Copernicus respond to the problem of parallax?

Copernicus's system was aesthetically pleasing and eliminated the diurnal motion of the whole universe. It was not without its own problems. For example, Venus and Mars should have phases like the Moon in this new schema, but these had never been observed. More worrying, the stars did not appear to move, even though Copernicus's schema called for the Earth to move across the stars. This is called parallax and was not seen until 1838.

There existed no test that could demonstrate the motion of the Earth, and this flaw plagued astronomy for several generations. Copernicus's system violated the whole Aristotelian ordering of the universe. Without the Earth in the centre, Aristotle's physics of " natural motion" fell apart. If the Earth was just one of many planets, could there not be other Christs and other salvations? Giordano Bruno was burned at stake in 1600 for just such speculations. Copernicus, a canon and thus an officer of the Church, delayed publishing his ideas until he was on his deathbed.

25. If Kepler was the " first true Copernican" why would his views of planetary motion have offended Copernicus?

Kepler is often called the " first true Copernican" because he whole-heartedly endorsed the heliocentric system. In the process of doing so he changed it to one that would have horrified Copernicus, since he destroyed the idea of the perfect circular motion of the heavens. He also attempted to join the physics of the heavens to a mathematical model of their motion.

Question 5) According to Ashworth, why should Renaissance natural magic be taken seriously as an important context for the development of science? How did Descartes' mechanical philosophy offer an alternative to natural magic, especially in regard to phenomena such as magnetism?

" In the late Renaissance there arose a whole host of alternative natural philosophers, which have been variously labeled as " Hermetic" or " naturalist" or " magical"; we will use the terms " magical" and " natural magic" to refer to these philosophies. Natural magic tended to accept Aristotelian matter theory as a starting point, but it unleashed on the Aristotelian worldview a battery of new forces and influences."

" Magnetism appears to be another example of a sympathetic force. A magnet attracts only iron, it works at a distance, and it is undeterred by a barrier. It is difficult to explain how a magnet works if you do not invoke a sympathy of some sort."

" One other interesting feature of natural magic is that it placed great emphasis on experiment and observation. Aristotelians tended to think about how nature works; natural magicians tinkered with nature instead."

Magnetism must be explained mechanically without recourse to sympathies, and Descartes described a possible mechanical model for the magnet. Alleged sympathies that cannot be explained mechanically are denied existence in the Cartesian universe. Matter is one ingredient of Descartes' universe. Mind is the other - the only thing besides matter that God created. Everything in Descartes' universe is either mind or matter, and nothing is both.

" Mechanical philosophers reduced matter to its simplest parts, atoms, just as Descartes had stripped away ideas through skepticism. These atoms had only two qualities: extension and motion. Since extension was a definition of matter - a vacuum was not possible in this philosophy. Therefore, the universe was filled with a plenum of particles. All force-at-a-distance was actually motion through the plenum, which explained magnetism and the motion of the planets. "

Question 16) According to Andrew Cunningham, what was significant about the title to Newton's great work, The Mathematical Principles of Natural Philosophy? Why was the title making an important claim about the

disciplinary status of mathematics and of natural philosophy?

" The title of Newton's great work announces its identity - then suggests that we might try and look at this as odd or unexpected, and then ask about why it merited that title. This title was of Newton's own choosing."

" Newton believed the title would speak to its intended audience. None of Newton's contemporaries seemed to think that the book had an inappropriate name. Newton's concept of natural philosophy corresponded with the contents of Magirus's old textbook which Newton read and took notes on as a student, the Physiologia peripatetica of 1597. For Newton alchemy was also amongst the range of disciplines which were part of natural philosophy.

" Natural philosophy included both physics and the soul-and everything in between. Such an extension is not shared by any modern division of knowledge. The transformation that Newton wrought in natural philosophy was to insist that it had to be treated via mathematical principles, and this is one of the messages that his title was meant to convey."

" Natural philosophy was 'about God' and about His creation. This was so fundamentally the case that it hardly ever got mentioned."

" Recognizing that Newton's commitment to his Unitarian religion came prior to his undertaking natural philosophy, might help us understand why Newton, in particular, would want to introduce an experimental and mathematical form of natural philosophy, and one depending so strongly on personal experience of the phenomena."

" Mathematics was seen as giving an inferior form of certainty to that given by syllogistic reasoning. In the course of seventeenth century a revolution in

how sciencia is got, nevertheless the transformation happened within natural philosophy - as the title of Newton's book reveals: The mathematical principles of natural philosophy! It is a transformation within natural philosophy, not a transformation of natural philosophy (into modern science).

Question 36) Briefly outline some of the reasons given by Ruestow for Leeuwenhoek's campaign against spontaneous generation.

Aristotle had stressed that no sign of spawn, milt or sex had ever been observed in eels, and when Leeuwenhoek later mounted his campaign against spontaneous generation, he found the propagation of eels by ells particularly difficult to confirm. He had given up hope, when in 1691. he discovered uterus of the eel and unborn eels within.

Leewenhoek was questioning other traditional examples of spontaneous generation in the mid-1670s. He kept several fleas enclosed until he finally saw the eggs they produced, which he then carried about in his pocket as well, he found that they spun cocoons and pupated and that within the pupa the flea could be recognized. In February 1679., his attempt to explain the presence of liver flukes in sheep would still seem to indicate that Leewnhoek had not yet categorically denied nature's capacity to produce living things spontaneously.

Swammerdam had written in his yet unpublished manuscripts that parasitic worms were the cause not the result of putrefaction. Leewenhoek would return to the question of the source of the liver flukes in latter years, when he was firmly set against their spontaneous generation, but the origin or parasitic worms in general would remain an intractable problem for at least

another century. In June 1679 he wrote Lambert van Velthuysen that he could not understand that anything " came from itself".

In the interval since his comments on the liver fluke, Leeuwnhoek had reported his discovery of spermatozoa within discharged semen, but recognized them as the impregnating principle in the semen only after finding them within the testicles as well. His concept of the role of the spermatozoa in generation apparently took shape nearly simultaneously with the emergence of his opposition to spontaneous generation.

His ensuing discovery of spermatozoa in the semen of various insects did provide the context for an explicit denial of spontaneous generation. In November 1680 he wrote that we can now be assured that no animals, however small, come from putrefaction instead of propagation, for the semen of the detested flea as well as that of the largest animals contains spermatozoa.

Leewenhoek's commitment to semen and spermatozoa as the vehicle of propagation may increasingly have predisposed him to posit their necessary presence in all instances of generation. There was no doubt about his commitment to the rejection of spontaneous generation when he subsequently turned again to experiments deriving from Redi's - experiments that now provided reassurance. Having sealed pieces of meat in glass and left the tubes in the sun for several months, he examined the meat and its fluids and was unable to discover any signs of life.

Leewenhoek followed the life cycles of insects from egg-laying adult to discover and demonstrate the continuity of life.

The sexual furnishings of the males intrigued him and he observed and illustrated the penis of the grain weevil and the testicles of the flea. In the semen of insects and shellfish he also continued to search for spermatozoa, discovering them in great numbers and their teeming movement was also great. In those small animals to which spontaneous generation was ascribed, the full apparatus of sexual generation could be found.

There was also the religious or metaphysical argument against spontaneous generation: that the emergence of an animal soul from unmoving things would be a miracle requiring the involvement of the omnipotent Creator. It would also violate the contention of the philosophers that nothing comes from nothing.

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