

Late Medieval Philosophy

Piero Scaruffi 2004

What the Middle Ages knew

- **Scholasticism (1050)**
 - **Before the Scholastics: the Bible is infallible, therefore there is no need for scientific investigation or for the laws of logic**

What the Middle Ages knew

- **Scholasticism (1050)**
 - Reason can prove the Christian revelation
 - Philosophy and science of Aristotle
 - Systematic understanding of Nature and Christianity
 - Monasteries
 - God is the source of both scientific and religious phenomena
 - God is truth
 - Therefore science must be consistent with religion
 - Averroes: two truths, one the approximation of the other
 - Scholastics: only one truth

What the Middle Ages knew

- **Scholasticism (1050)**
 - **Problems with Aristotle:**
 - **Matter pre-existed the prime mover (“Physics”)**
 - **The mind dies when the body dies (“Ethics”)**
 - **“Physics” and “Ethics” are banned by the Pope in 1210**
 - **Only the “Logic” can be taught**

What the Middle Ages knew

- **Scholasticism (1050)**
 - **Peter Lombard's five fundamental topics of scholasticism:**
 - **God**
 - **Creation**
 - **Incarnation**
 - **Redemption**
 - **Sacraments (seven) by which divine grace is transmitted to humans**
 - **Baptism removes the original sin**
 - **Confession removes this life's sins**
 - **Eucharist**
 - **Sacraments can only be administered by priests⁵**

What the Middle Ages knew

- **Universities**
 - **9th c: Charlemagne orders that all churches must provide schools for clerics (reading, writing, music, arithmetic)**
 - **Until the 11th c the intellectual life of Europe was relegated to monasteries**
 - **Reform movements downplay education in monasteries**
 - **They are not founded but formed spontaneously by networks of students and teachers**
 - **There is no building**
 - **“Universitas” means an association/guild**
 - **11th c: cathedral schools (Canterbury, Chartres, Orleans, Notre Dame) created around the newly⁶ built cathedrals to teach more practical topics**

What the Middle Ages knew

- **Universities**
 - **Original mission: training not research (train doctors and theologians), not creation of new knowledge but transmission of canonical knowledge**
 - **Needs of 11th century Europe: medicine (no guild for doctors) and law (investiture controversy)**
 - **Loose control of authorities turns them into places for debate, not training (unlike China and Islam)**
 - **The high mobility of the age (pilgrims, traders, troubadours, soldiers) transfers to education and students travel just to learn**
 - **The scholarly equivalent of a pilgrimage site**

What the Middle Ages knew

- **Universities**
 - In the 13th c, monasteries lose the monopoly on spiritual perfection
 - Secularization of the mystical experience (lay people can also achieve unity with God while remaining in the world)

What the Middle Ages knew

- **Universities**
 - **Al Azhar, Cairo (988)**
 - **Medical school: Salerno (11th c)**
 - **Law school: Bologna (1088)**
 - **University**
 - **Paris (1150): the French kings encourage education among clerics**
 - **Oxford (1167): benefits from Paris' 1229 student riots**

What the Middle Ages knew

- **Universities**
 - **Cathedral schools**
 - **Several liberal arts**
 - **Boethium's Quadrivium ("mathematical" disciplines to conduct scientific research): Arithmetic, Geometry, Music, Astronomy**
 - **Trivium ("verbal" disciplines to express the results of such research): Grammar, Rhetoric, Logic (recently discovered Aristotelian logic)**
 - **Chartres: mostly liberal arts**
 - **Orleans: mostly law**

What the Middle Ages knew

- **Universities**
 - **1200: University (“studium generale”) of Paris recognized by Philip Augustus**
 - **13th c: the University of Paris replaces the cathedral schools as center of learning, and students flock from all over Europe**

What the Middle Ages knew

- **Universities**
 - **Medieval universities conferred degrees that included the right to teach in any Christian country**
 - **International body of students and teacher**
 - **Latin is the lingua franca of education**
 - **The new wealthy bourgeoisie created by the revival of trade can afford to send their children to a foreign university**

What the Middle Ages knew

- **Universities**
 - **Bologna**
 - **A university controlled by the students who are basically “customers”:** students elect their teachers, rate their teachers and even punish underperforming teachers
 - **Irnerius (1087) rediscovers and teaches the Codex Justinianus (Justinian’s law code)**
 - **Trains legal specialists who stand outside the government (the beginning of the rule of law by which even the ruler has to abide)**
 - **Several alumni of its law school become popes**

What the Middle Ages knew

- **Universities**
 - **Paris**
 - **Controlled by teachers, not students**
 - **Protected by Pope and Emperor**
 - **Four faculties**
 - **Arts**
 - **Medicine**
 - **Law**
 - **Theology (dominant specialty)**

What the Middle Ages knew

- **Universities**
 - **Oxford**
 - **Controlled by teachers, not students**
 - **Main specialties: mathematics and natural science (especially after papal ban against Aristoteles in Paris)**

What the Middle Ages knew

- **Universities**

- Cambridge (England, 1209)
- Salamanca (Spain, 1218)
- Padova (Italy, 1222)
- Napoli (Italy, 1224), first university created by the emperor
- Toulouse (France, 1229), first papal university
- Siena (Italy, 1240)
- Sorbonne, Paris (France, 1257)
- Montpellier (France, 1289)
- Coimbra (Portugal, 1290)
- Pisa (Italy, 1343)
- Prague (Czech, 1347), first northern university
- Krakow (Poland, 1364)
- Wien/ Vienna (Austria, 1365)
- Pecs (Hungary, 1367)
- Erfurt (1379), first in Germany
- Heidelberg (1385)
- Cologne (1388)
- Leipzig (1409)
- Roma (1431)
- Barcelona (1450)
- Venezia/Venice (1470)
- Copenhagen: 1475

What the Middle Ages knew

- **Universities**
 - **Johannes Gratian: “Concordantia discordantium canonum” or “Decretum” (114x), father of canon law**
 - **Peter Lombard: “Liber Sententiarum” (1151), father of theology**
 - **Peter Comestor “Historia Scholastica” (117x) father of Biblical history**
 - **Full Latin translation of Aristotle from the Arabic (12th c), translation of Al-Khwarizmi’s algebra book (“Arabic” numerals) and translation of other classics**
 - **Toledo (Arabic to Latin)**
 - **Sicily (Greek to Latin)**

What the Middle Ages knew

- **Universities**
 - **Logic as the main subject in the trivium**
 - **The scholars of the urban centers demand formal demonstrations of God's attributes**

What the Middle Ages knew

- **Universities**
 - **Universities create an expanding market for books**
 - **Books also spread to private libraries (eg the Duc de Berry in 1408 owned 155 books)**

What the Christians Knew

- **Johannes Scotus Erigena (870)**
 - **Nature is divided into**
 - **that which creates but is not created (God as creator)**
 - **that which creates and is created (the ideas, or Logos)**
 - **that which is created but does not create (the objects in space and time)**
 - **that which which does not create nor is created (God as supreme end)**

What the Christians Knew

- **Johannes Scotus Erigena (870)**
 - **The uncreated creator (God) originates...**
 - **...the created creators (the ideas) from which originate...**
 - **...the created non-creators (the objects), i.e. according to which Nature is formed, which returns to the...**
 - **...uncreated non-creator (God again)**
 - **Only God truly exists (God is the beginning, the substance and the end of the universe)**

What the Christians Knew

- **Johannes Scotus Erigena (870)**
 - **Extreme realism: universals have a real and independent existence of their own (e.g., the Church is not just a community of individuals but a real entity)**

What the Christians Knew

- **Walafrid Strabo (9th c)**
 - **Commentary on the Bible**
 - **Man is composed of body, soul and spirit**
 - **The Bible contains three levels of meaning: literal, moral and mystical**
- **Gerbert (10th c)**
 - **Introduces Arab science and mathematics to Christian Europe**

What the Christians Knew

- **Anselm (1070)**
 - **Ontological argument to prove the existence of God**
 - **God is the greatest possible thing**
- **Peter Abelard (1079)**
 - **Most influential of Parisian intellectuals**
 - **Aristotle rather than Plato**
 - **Reason: we can discover truth through systematic reason**
 - **Moderate realism (conceptualism): the universal is an attribute of an entity, not an entity in itself**

What the Christians Knew

- **William of Saint-Thierry (1085)**
 - Progress from the body (center of animal life) to the soul (center of reason) to the spirit (center of ecstasy)
 - Focus on love: “De natura amoris”
- **St. Bernard of Clairvaux (1090)**
 - Against dialectics and logic: “Quia amare dei est deus” (what causes us to love god is god)
 - The Virgin Mary, mother of God, as a symbol of love
 - Focus on love: “De amore Dei”

What the Christians Knew

- **Hugh of Saint-Victor (1096)**
 - **Every visible thing is a sign of the invisible truth that the soul will discover after death**
 - **Cogitatio to penetrate the secrets of the material world**
 - **Meditatio to penetrate the secrets of one's soul**
 - **Contemplatio to intuit the real essence of the universe**

What the Christians Knew

- **Jean Roscelin (1100)**
 - **Nominalism: forms and concepts only exist in our minds (first major nominalist)**
- **Realism: forms and concepts exist independently of our mind (supports the feudal and clerical order)**
- **Realism prevails in early medieval times, Nominalism prevails in late medieval times**

What the Christians Knew

- **Pre-Aristotelian Christian thought: St Augustine (mostly neo-Platonic)**
 - **Sensory knowledge is illusory**
 - **Direct mystical knowledge**
- **Robert Grosseteste (1175)**
 - **Commentary on the "Physics" of Aristoteles**
 - **Treatises on Geometry, Meteorology, and Optics**
 - **All science must be based on Mathematics**
 - **Scientific inquiry based on reductionism**
 - **The universe is light, and everything radiates from light**
- **Dominicans adopt Aristotelianism**
- **Franciscans stick to St Augustine**
- **Condemnation of Aristotelianism in 1277**

What the Christians Knew

- **Cross-pollination of civilizations**
 - **Barlaam and Josaphat, a novel written in Greek by Euthymius in the 1020s**
 - **Which was a translation of a book from Georgia titled "Balavariani"**
 - **Which was a summary of an Arab book titled "Kitab Bilawhar wa-Yudasaf"**
 - » **Which was a rewrite of the sanskrit Buddhist hagiography "Buddhacarita" (2nd c AD)**

What the Christians Knew

- **Thierry of Chartres (12th c)**
 - **Physical explanation of the Genesis**
- **Albertus Magnus (1206)**
 - **Compendium of living creatures**
 - **The first “summist”**
- **Amaury of Bene (13th c)**
 - **Pantheism: Everything is one, everything is god**

What the Christians Knew

- **Francesco d'Assisi (b 1181)**
 - **God is in nature**
 - **Intuitive knowledge of God**

What the Christians Knew

- **Art of Memory**
 - **Dominicans and Franciscans rediscover the art of memory**
 - **Ramon Lull: "Ars Magna" (1305)**
 - **a combinatorial system ("ars combinatoria") of letters and revolving wheels that would allow missionaries to prove systematically the truth of the Christian faith**
 - **A system to solve any theoretical problem**
 - **the mechanical production of truth**
 - **"De Memoria Artificiali" (Anonymous, 14th c)**

What the Christians Knew

- **Islamic philosophy**
 - **Avicenna**
 - **Al-Ghazali**
 - **Averroes**

What the Christians Knew

- **Siger de Brabant (Averroism):**
 - **Philosophy is independent of revelation**

What the Christians Knew

- **Thomas Aquinas (1264)**
 - **Finally reconciles Aristoteles and Christianity**
 - **631 topics for discussion and 10,000 objections and counterobjections**

What the Christians Knew

- **Thomas Aquinas (1264)**
 - **There is only one truth, not two (logic can prove religion true)**
 - **Attributes of God can be proven logically**
 - **God is the mover that does not move (the first cause)**
 - **God is omniscient, omnipotent and perfect**
 - **Creation ex nihilo**
 - **In God, essence and existence are the same ("the essence of God is his existence", "existence is the substance of God", "God is in all things")**
 - **God is the ultimate process of self-realization**

What the Christians Knew

- **Thomas Aquinas (1264)**
 - **Aristotelian view of mind**
 - **Vegetative life (reproduction, metabolism)**
 - **Sensory-motor life (perception, locomotion)**
 - **Sentient life (reason, free will)**
 - **The soul is the form of the body**
 - **God creates the soul (that did not pre-exist) and the soul is then immortal**
 - **All living beings have souls, but only humans have spiritual souls**
 - **The mind (intellect) is the device by which spiritual souls perceive other forms**
 - **Knowledge comes not from divine illumination but from sensory experience plus intellect**

What the Christians Knew

- **Thomas Aquinas (1264)**
 - **Aristotelian view of mind**
 - **The mind does not perceive matter but form, not individuals but universals**
 - **Forms perceived by the mind become concepts (no innate ideas)**
 - **The soul is the form of the body and uses it to acquire knowledge**
 - **The quest for happiness is a quest for knowledge (the human essence is to understand)**
 - **True happiness can only be achieved in the afterlife (the "vision of the divine essence")**
 - **Reason can never attain full knowledge of God**

What the Christians Knew

- **Thomas Aquinas (1264)**
 - **Ethics: Greek virtues plus theological virtues (faith, hope, charity, love)**

What the Christians Knew

- **John of Fidenza/Bonaventura (126x)**
 - **The soul is the form of the body, and sensations are changes caused by an object to the body, but we also judge (not only perceive) the objects, and that judgement is made according to a timeless standard created by God**
 - **Knowledge presupposes divine illumination, otherwise it would remain pure sensation**
 - **Proofs of the existence of God**
 - **Coincidentia oppositorum: God is infinite and finite, eternal and actual, transcendent and active, etc**
 - **There is a path to God that we can ascend**

What the Christians Knew

- **Roger Bacon (1269)**
 - **Encyclopedia of logic, mathematics, physics, ethics, etc**
 - **Logic and observation allow an understanding of nature**
 - **Science to be founded on logic and observation**
 - **The Earth is round**
 - **Founder of science fiction (in his letters)**

It is possible that great ships and sea-going vessels shall be made which can be guided by one man and will move with greater swiftness than if they were full of oarsmen.

It is possible that a car shall be made which will move with inestimable speed, and the motion will be without the help of any living creature. . . .

It is possible that a device for flying shall be made such that a man sitting in the middle of it and turning a crank shall cause artificial wings to beat the air after the manner of a bird's flight. . . .

What the Middle Ages knew

- **Johannes Eckhart (Dominican, 1308)**
 - **God is being, and being is God**
 - **Anything that "is" is God**
 - **Everything emanates from God**
 - **God is One, and brings the many into One**
 - **God is the being of all things**
 - **The soul can know God by forgetting itself, by renouncing its self-consciousness**
 - **The soul can do God's will by renouncing its self-will**
 - **Self-will causes inner conflict**

What the Middle Ages knew

- **Johannes Eckhart (1308)**
 - **The soul becomes divine**
 - **“I was the cause of myself and of everything else”**
 - **Negative theology**
 - **We cannot say anything about God**
 - **“God is without name”**
 - **“God is a being above being and a superessential negation”**

What the Middle Ages knew

- **Johannes Eckhart (1308)**
 - **The Christian stories are merely metaphors for higher truths**
 - **Influenced by Vedanta**

What the Middle Ages knew

- **John Duns Scotus (1300)**
 - **Human reason cannot grasp the nature of God (God is infinite, the human mind is finite)**
 - **One can only prove a few truths (limit of the scholastic program)**
 - **Truth via reason AND divine revelation**
 - **Theology and philosophy are distinct: Theology is the (practical) discipline of the nature of God, Philosophy is the (theoretical) discipline of the “first cause”**
 - **Theology is concerned with saving souls**
 - **The scholastic program of proving faith by reason is doomed to failure (beginning of the decline of scholasticism)**

What the Middle Ages knew

- **John Duns Scotus (1300)**
 - **The world is a set of individual entities**
 - **No overarching unity or order**
 - **The forces that keep the world together are beyond human understanding**
 - **His philosophy mirrors the breakdown of the medieval worldview**

What the Middle Ages knew

- **Jean Buridan (1300)**
 - **“Buridan's ass”**: the ass starves to death between two equally alluring and equidistant bundles of hay because it has no rational basis for preferring one bundle over the other
 - **Appearance of motion is relative**: there is no way to determine if it is the Earth or the universe that moves (**Galilean invariance ante-litteram**)
 - **Movement is due to an internal impulse**
 - **Movement continues unless disturbed by external forces**
 - **Celestial bodies are governed by the same natural laws that govern Earthly bodies**

What the Middle Ages knew

- **William Occam/Ockham (1320, England)**
 - **Empiricism**
 - **Sensations are the source of knowledge:**
“Nothing can be the object of the interior sense without having been an object of the exterior sense”
 - **Sensation revived: memory**
 - **Sensation interpreted through memory: perception**
 - **Memories combined: imagination**
 - **Memory projected: Anticipation**
 - **Memories compared: Thought**
 - **Memories interpreted through thought: Experience**

What the Middle Ages knew

- **William Occam/Ockham (1320, England)**
 - **Nominalism**
 - **Universals (concepts) only exist in the mind: they are symbols devoid of reality**
 - **Only individual objects/facts are real**
 - **Human knowledge is limited to individuals, which truly exist and are open to observation.**
 - **Anything beyond the realm of sensory experience is a matter of faith**
 - **Philosophy and science are fragile generalizations prone to error**
 - **Our knowledge is limited by our senses**
 - **The truths of religion cannot be proven by reason**

What the Middle Ages knew

- **William Occam/Ockham (1320, England)**
 - **Logic**
 - **Logic is processing symbols for the sake of the mind**
 - **Abstract reasoning does not lead to certain knowledge**
 - **Science**
 - **Action at a distance is possible**
 - **Celestial and terrestrial matter obey the same laws**

What the Middle Ages knew

- **William Occam (1320)**
 - **Separation of Logic and Metaphysics**
 - **Separation of the profane and the sacred**
 - **Separation of Science and Church**
 - **Metaphysics**
 - **Knowledge of God is possible only through revelation**
 - **The existence of God, the immortality of the soul, etc cannot be deduced logically but requires a profession of faith**

What the Middle Ages knew

- **Theory of impetus**
 - **Aristoteles: nothing moves unless it is moved**
 - **Things can move if they are impressed with an original force, vis impressa**
 - **Nicholas Oresmus (XIV): metaphor of the universe as a vast mechanical clock built by God**

What the Middle Ages knew

- **Knowledge of the Earth**
 - **Giovanni Carpini: “Historia Mongalorum” (1248)**
 - **Marco Polo: “Il Milione” (1298)**
 - **Odorico Mattiuzzi da Pordenone: “De Rebus Incognito” (14th c)**
 - **Pierre d’Ailly: “Imago Mundi” (14th c)**
 - **Albertus Magnus (13th c): the Earth is a sphere**
 - **Nicolas Oresme (14th c): the rotation of the Earth on an axis explains the daily motion of the universe**


What the Middle Ages knew

- Scientific investigation
 - Leonardo Fibonacci
 - Roger Bacon
 - Benefactors of science: Alfonso of Castille and Frederick II (13th c)
 - Nichole d'Oresme (1360s): the graph to represent functions

z

ratio reddit vniforme. **U**ltim^o vni
 ce excellus graduu
 portoz a. la in a p
 ce excellus graduu
 ent pportoz equita
 ne dicitur ut p; ex
 um secunde oullois
 no seruat tunc nulla
 is in latitudine tali z
 dicitur e difformis
 .fformiter difformis
 iduu eque distantuz
 orationem sic. in se
 lotandum tamen est
 fuitoib⁹ ubi loqitur
 r se eque distantium

scip. z fiat ad n^og
 D. ffōrū diffōris
 of) or, d. ffōris



The diagrams consist of three separate bar charts. The top chart shows a semi-circular arc divided into vertical bars of equal width, representing a uniform function. The middle chart shows a curve that starts at the origin and increases at a decreasing rate, also divided into vertical bars of equal width. The bottom chart shows a series of vertical bars of decreasing height, representing a non-uniform function.

What the Middle Ages knew

- **Leonardo Fibonacci (1202)**
 - **Indian numerals**
 - **Fibonacci sequence (first recursive number sequence)**
 - **Golden ratio**



What the Middle Ages knew

- **Scientific investigation**
 - **Plus and minus signs (15th c)**
 - **Richard of Wallingford (14th c): Trigonometry**
 - **Guillaume St Cloud (14th c): Astronomy**

What the Middle Ages knew

- **Effects of the victory of Nominalism**
 - **Breakdown of the hierarchical order of medieval society (feudalism and church)**
 - **Devaluation of the Church (individual faith is real, the abstraction of the Church is just a human invention)**
 - **Personal experience of God as opposed to the public rituals of organized religion**
 - **Rise of individualism**
 - **Prelude of the Reformation**

What the Middle Ages knew

- **Bestiary**
 - **Hugo of St. Victor: "Tractatus de bestiis et aliis rebus" (12th c, Germany)**
 - **Richard de Fournival: "Bestiaire d'Amour" (13th c, France)**
 - **Albertus Magnus: "De animalibus" (13th c, Germany)**
 - **Vincent de Beauvais: "Speculum naturale" (13th c, France)**

What the Middle Ages knew

- **Ramon Llull (1275)**
 - **A combinatorial system of letters and revolving wheels that would allow missionaries to prove systematically the truth of the Christian faith to**
 - **"Ars Magna" (1305)**

What the Middle Ages knew

- **Medicine**
 - **Henri de Mondeville's "Chirurgia" (1320)**
 - **Guy de Chauliac's "Chirurgia Magna" (1363)**
 - **1365: There are 40 barber surgeons in Paris**

What the Middle Ages knew

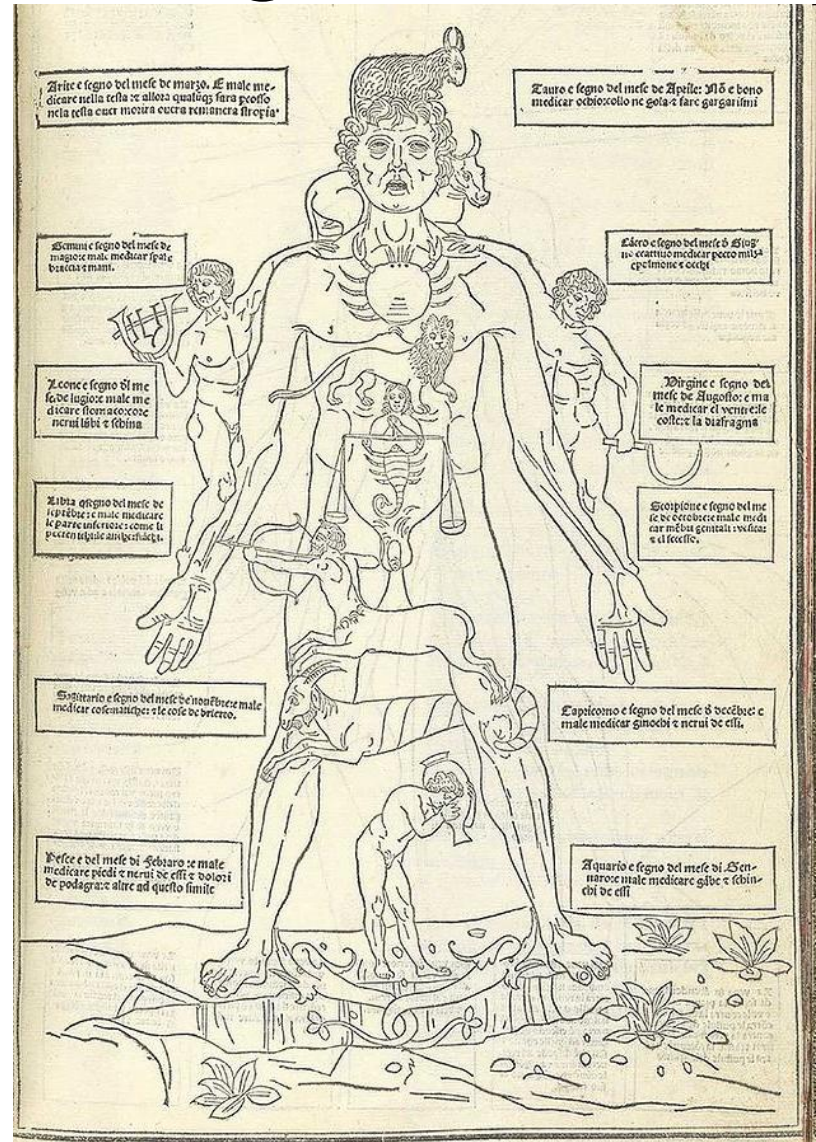
- **Mondino's *Anathomia* (1316)**
 - A guide to dissection of cadavers



(A printed version of 1493)

What the Middle Ages knew

- **Mondino's *Anathomia* (1316)**
 - Zodiac man linking the zodiacal signs to bodily organs



What the Middle Ages knew

- **Political science**
 - **Marsilio da Padova's "Defensor Paci" (1324)**
 - **National state above the Church**

What the Middle Ages knew

- **Nicholas Krebs “Nicolaus Cusanus” (1440)**
 - **Truth is simple and infinite**
 - **Human knowledge can only be complex and finite**
 - **Truth is beyond human reason**
 - **The infinitely small and the infinitely large are one and the same in God (the “complicatio” coincides with the “explicatio”) but appear like opposites to humans**
 - **God is the synthesis of opposites**

What the Middle Ages knew

- **Nicholas Krebs “Nicolaus Cusanus” (1440)**
 - **The universe is a sphere with its center everywhere and its circumference nowhere**
 - **“Learned ignorance” (“Apologia doctae ignorantiae”)**

What the Middle Ages knew

- **Nicholas Krebs “Nicolaus Cusanus” (1440)**
 - **The universe is infinite**
 - **The Earth moves**
 - **The Earth is not the center of the universe**
 - **Mathematics is the foundation of Science**
 - **Earth and Heavens obey the same laws**
 - **God is both the center of the concentric circles and the circumference of the outer one**

What the Middle Ages knew

- **Bernardino Albizeschi da Siena (1470)**
 - **Scholastic economics**
 - **Defense of the entrepreneur**
 - **Justification of private property**
 - **Ethics of trade**

What the Middle Ages knew

- Johann “Regiomontanus” Muller (1474)
 - Almanac predicting the position of planets
 - Observation of Halley’s comet

nis Lune.

Addit. Diminuit.		3				4				5				Signa			
Centi et Argumenti veri	Equatio centri.	Diminuta proportionalia	Diferentia Diametri.	Equatio Argumeti.	Corructioes unius minuti.	Equatio centri.	Diminuta proportionalia	Diferentia Diametri.	Equatio Argumeti.	Corructioes unius minuti.	Equatio centri.	Diminuta proportionalia	Diferentia Diametri.	Equatio Argumeti.	Corructioes unius minuti.	Centi et Argumenti veri	
g m	g m m	g m	g m fa fa f.	g m m	g m m	g m m	g m fa fa f.	g m m	g m fa fa f.	g m m	g m m	g m	g m fa fa f.	g m m	g m m	g m	
0 0	12 0 26	2 36	4 54 54	0 24	13 4 43	2 31	4 27 0	2 18	9 22 55	1 35	2 39 35	4 42	30 0				
0 10	12 1 26	2 36	4 54 58		13 4 43	2 31	4 26 37		9 20 55	1 35	2 38 48		29 50				
0 20	12 2 26	2 36	4 55 2		13 4 43	2 31	4 26 14	2 24	9 18 55	1 34	2 38 1		29 40				
0 30	12 3 26	2 36	4 55 6		13 4 43	2 31	4 25 50		9 15 55	1 34	2 37 14		29 30				
0 40	12 3 26	2 36	4 55 10		13 3 43	2 30	4 25 26		9 13 56	1 33	2 36 27		29 20				
0 50	12 4 27	2 37	4 55 14		13 3 43	2 30	4 25 2		9 11 56	1 33	2 35 40		29 10				
1 0	12 5 27	2 37	4 55 18	0 18	13 3 43	2 30	4 24 38		9 8 56	1 32	2 34 52	4 48	29 0				
1 10	12 6 27	2 37	4 55 22		13 3 43	2 30	4 24 14		9 6 56	1 32	2 34 5		28 50				
1 20	12 7 27	2 37	4 55 25		13 2 43	2 30	4 23 50		9 3 56	1 31	2 33 17		28 40				