Medieval rise and decline of the European university and a bit about its 19th-century resurrection

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Terminology on periodization:

In the following

“Antiquity” means classical Greco-Roman Antiquity – but I start in Roman imperial times.

“Middle Ages” / “medieval” to the Latin Middle Ages, c. 500 – c. 1400

Later discussion also refers to Western Europe.

Distant background in Roman (Latin) Antiquity:

The official curriculum at the “high school level” for sons of the elite:

Trivium:	*Quadrivium:*
Grammar	Arithmetic
Rhetoric	Geometry
Dialectic / logic (with a bit of basic metaphysics)	Astronomy inc. math. geography
	Music / harmonics

(the “Liberal Arts”)

Actually, almost nobody went beyond grammar+rhetoric. That was what legitimized cultural elite status.

The young Augustine could find no competent teacher beyond these two, and no students that were interested in more.

The material (for teachers, and perhaps for those few who continued in a philosophical school): Latin compendiae summarizing the basic concepts of the disciplines.

In geometry: no axiomatics, just definitions.

In arithmetic: even, odd, prime number defined, the complicated naming of ratios. No theorems, only numerical examples.

“Roman science”: these handbooks, low-level popularization.

In the 4th century:

St Jerome, the translator of the official Latin Bible (the *Vulgate*), asks and answers, showing how lonely he feels with philosophical/scientific interests,

How few there are who now read Aristotle. How many are there who know the books, or even the name of Plato? You may find here and there a few old men, who have nothing else to do, who study them in a corner

His contemporary Augustine attacks intellectual curiosity as "concupiscence of the eye", no better than that of the flesh:

"whosoever looketh on a woman to lust after her hath committed adultery with her already in his heart"

and further

"if thy right eye offend thee, pluck it out, and cast it from thee"

But he castigates himself rather than anybody else (the attack is in his *Confessions*).

Around 500, two persons from the Christian Roman elite try to save as much as possible.

Boethius by translating:

- Nicomachos's handbooks about arithmetic and music
- Euclid's *Elements* or, more likely, an epitome containing the definitions, postulates and axioms together with the enunciations of the propositions but few or no proofs
- something similar about astronomy
- Aristotle's simpler treatises on logic (*Categories*, *On Interpretation*)
- Porphyry's introduction to the *Categories*.

Cassiodorus by founding a quasi-monastery (the *Vivarium*) where texts were to be copied, and by writing an *Introduction to Divine and Human Readings* (the latter a traditional handbook in the liberal arts) for his “monks”.

The Vivarium did not survive him, the *Introduction* did.

The Dark Ages

Nobody was interested in what they had done.

In the West, ancient science and philosophy died out not because of ecclesiastical suppression

but because they made no sense in the social world of the “Dark Ages” (early 6th to mid-8th century).

Reading was scarce: future priests were taught to read in the bishop’s household, and future monks taught a minimum in their monastery – both from age 7 or so.

Only a tiny minority would go on with whatever happened to be present in their monastic library – some works of the Fathers (which might also speak against and therefore about ancient philosophy.

And perhaps some Latin poet, some historian, or some Cicero.

Two exceptional figures to be mentioned in this period:

Isidore, Bishop of Seville (560–636), who among other things wrote a 20-book encyclopedia, *Etymologies*.

– perhaps the most-quoted authority of the Middle Ages next to the Bible.

Extensive, but with scant understanding of theoretical concepts.

But in connection with arithmetic he writes:

The science of number must not be despised. For in many passages of the holy scriptures it is manifest what great mystery they contain. For it is not said in vain in the praises of God: “You made all things in measure, and number, and weight”.

and further:

Through number, indeed, we are instructed in order not to be confounded. Take number from all things and all things perish. Take calculation from the world and all is enveloped in dark ignorance, nor can he who does not know the way to reckon be distinguished from the rest of the animals.

Through Isidore, the Middle Ages received the message that *all seven* liberal arts were important.

Bede the Venerable from Northumbria (672 to 735) wrote

- an *Ecclesiastical History of the English Nation* which is actually much more than a mere Church history;
- extensive Biblical commentaries;
- and several works on *computus*, i.e., on ecclesiastical calendar reckoning (in particular concerned with the determination of Easter).

He soon became known as *doctor modernus*, "the learned man of our own times", and is the first medieval scholar to look at his own world and not only at ancient writings.

The “Carolingian Renaissance”

That name was given in to him in “Carolingian” times.

Charlemagne took over power in the Frankish realm in 768 and died in 814 as the ruler of everything between Pamplona, Barcelona and Rome to the south, the Channel to the north-west, Hamburg to the north, and Magdeburg and Linz to the east; his spheres of influence extended even further.


Reich der Franken 768
Erwerbungen Karls d. Großen
Grenzmarken
Fränk. Einflußgebiete
Feldzüge
sächs. Burgen
Pfalzen
Handelsstädte für den Ostraum
Erzbistümer
wichtige Klöster
FRIESLAND
ABODRITEN
WILZEN
Bardowiek
Verden
SACHSEN (772—804)
Süntel 782
HEVELLER
Magdeburg
Werden
Nimwegen
Corvey
SORBEN
Köln
Erfurt
Hersfeld
Fulda
Hallstadt
Aachen
Stablo
Prüm
AUSTRIEN
Mainz
St. Riquier
Corbie
Echternach
St. Wandrille
Rouen
Quierzy
Attigny
Reims
Trier
Ingelheim
Lorsch
Diedenhofen
Forchheim
BÖHMEN
MÄHREN
805/06
Ellwangen
Regensburg
SLOWAKEN
BRETAGNE
Ponthion
Hirsau
BAYERN
(788)
Linz
Lorch
Mautern
NEUSTRIEN
Sens
ALAMANNIEN
Kremsmünster
BRETONISCHE MARK
Luxeuil
St. Trudpert
Reichenau
Tours
Fontenay
St. Gallen
Salzburg (798)
Bourges
Besançon
KÄRNTEN
AWAREN
BURGUND
St. Moritz
FRIAUL
Aquileia
AQUITANIEN
Lyon
Tarentaise
Mailand
Pavia
Vienne
Bordeaux
Bobbio
Ravenna
Embrun
KGR. ITALIEN
(Reich der Langobarden bis 774)
PATRIMONIUM
Arles
Aix
Aniane
Roncevalles 778
Pamplona
Narbonne
HZM. SPOLETO
PETRI
SPANISCHE MARK
KORSIKA
Rom
Cassino
Zaragoza
seit 812 fränk.
Barcelona 803
787
OMAIJADISCHES EMIRAT von CÓRDOBA
Tortosa 811
SARDINIEN
HZM. BENEVENT

Charlemagne tried to build up a centralized administration of this huge and disparate empire.

At first, the local bishops had to serve.

For the future, education of a larger number of clerks

The beginning: a royal circular directive *Admonitio generalis*, issued in 789.

all episcopal sees were obliged to organize a proper school for future clerics, who were also meant to serve the royal administration

The origin of the term “cathedral school”.

In principle, the curriculum consisted in the cursus of Liberal Arts.

But adequate books beyond were mostly not at hand.

A manuscript hunt in monastic libraries led to the discovery of ancient Roman handbooks, including Cassiodorus,

and of Boethius's translations of Nicomachos.

Fragments of his Euclid were combined with material from agrimensor treatises, as geometry.

Computus became the main part of astronomy.

Stop and go

External enemies and a population overstrained by military campaigns caused the collapse of the empire after Charlemagne's death.

The school development stopped, only to resume around 970.

In the meantime, a (very) small number of monastic scholars had continued work on the knowledge that had become available due to the Carolingian effort,

so the Liberal Arts, still the only foundation for a curriculum that could be imagined,could start from a better level.

At the same time, some rudimentary Arabic astrology had been borrowed, presumably from the contacts along the slave trade route through Lorraine, where cathedral schools first took off again.

Astrology had been condemned by the Fathers as “invention of the Fallen Angels and forbidden by God”.

In consequence, astrology had not been accepted so far by Christian culture as a legitimate part of its ancient heritage.

The prohibition had been efficient. Carolingian scholars only know about it from Isidore, the practice and beliefs had disappeared completely.

The first brief treatises on the topic were translated from the Arabic in the outgoing tenth and the 11th century.

Original Latin treatises were also composed already during this epoch.

Astrology, indeed, was a *natural* explanation, accessible in principle to everybody and not only to those with priestly patent on Divine knowledge.

The astrological endeavour pointed to the possibility for human beings to reach true knowledge on their own, without being dependent neither on Grace nor on the grace of authorities.

Astrology was a portent for what was to come much more forcefully, but the Cathedral schools already constituted a beginning.

The central figure is Gerbert of Aurillac (c. 945 to 1003)

head of the cathedral school in Rheims.

and later mentor of the future Emperor Otto III and eventually a Pope.

Gerbert wrote about the geometry of the sphere

and about a newly introduced abacus, with counters marked with "Hindu-Arabic" numerals (also learned from the slave traders).

A biography written by one of his students tells that after having taught the figures of rhetoric and dialectic, Gerbert handed the students over to a *sophista* who might train them in "controversy"

Correspondences between his former students, now teachers themselves or high Church dignitaries, show demonstrate vivid interest in mathematics and almost total ignorance of anything Euclidean.

Dialectic, with its load of metaphysics, soon became much more important.

Around 1050, dialectic was used by Bérenger of Tours to examine and criticize the doctrine of transubstantiation.

The argument had to do with the problem of *nominalism* versus *realism:* are general concepts mere *names* invented by us to cover a plurality of objects, or do they possess *real* existence, for example as Platonic ideas?

In the first case, something which is obviously *bread* can hardly be *flesh* according to some higher point of view.

In the second case, it was possible to maintain that what had retained the "accidents", the outer appearance of bread, had been changed into a different substance, namely flesh ("transubstantiation").

In a way, the dogma of transubstantiation *explained* the miracle of the Eucharist in terms of natural philosophy as known from Porphyry's *Introduction*.

Nominalism became a scandal because it made the Eucharist a *true miracle*, beyond human reason and perception.

Such miracles were not in favour among medieval theologians.

Bérenger was answered by the orthodox Lanfranc, abbot of Bec in Normandy, in a public dispute;

Bérenger was condemned and forced to abjure in 1050, 1059 and 1079,

none the less Bérenger's view spread – thus Lanfranc – to the whole of France, Germany and Italy.

Soon afterwards, Lanfranc's successor Anselm of Canterbury (1033 to 1109) tried to answer Bérenger fully on his own terms, defending orthodoxy *sola ratione*, "with reason alone" and without any use of Holy Scripture.

In this process, *theology* was created as an “academic” discipline.

As a rear-guard fight, the theologians introduced the principle that the only legitimate role for philosophy was to be the “handmaiden of theology”.

The theologians’ claim indeed had a hard time; scholarly discussion and dispute were much too attractive, and not for scholars alone, as the example of Bérenger show; in a moment the case of master Odo will show the same.

Because the argument was philosophical and the display of sacred relics was an inadequate answer to arguments, ignorant priests became a serious problem to the Church

(a reason that the Papacy backed the cathedral school movement).

The background to this was fundamental social change.

New, more efficient agricultural techniques, and gradual pacification and centralization of power in the hands of the Papacy and dukes (later princes and kings) allowed the growth of trade and craft production for trade.

Towns grew up, often as suburbs of bishops' sees, as centres for trade and craft production.

These towns were tense with discussion and democratic claiming the right to govern their own affairs without interference from the feudal Lord.

Similarly, the aspiration of single social groups (first neighbourhoods, later artisans' and merchants' guilds and similar professional organizations) was autonomy.

The root of the democratic aspirations was the closeness of primitive-democratic experience:

the structures of the urban fraternities were borrowed from the kinship- and village communities of the countryside and the organizations for mutual defence of the poor (free peasants and unfree alike) against the powerful.

In principle, the members of the fraternities were equals, and had to find their common aims through discussion.

In the new centralized and pacified social situation, education opened the way more broadly to a career, and students flocked to the schools in larger numbers.

Since towns would often grow up around bishops' sees, cathedral schools were typically located within the urban environment.

True, the Bishop himself would on most occasions be in conflict with the urban community – *he*, indeed, would be the feudal Lord from whose rule the town tried to free itself.

But the "cathedral school" would only be loosely connected to the See.

The *scholasticus*, an episcopal official, was responsible for the teaching; but other masters might teach too, in relative independence from the local ecclesiastical power;

masters lived from students' fees, and were not paid from the incomes of the See.

The town was thus a sounding board for the discussion in the school, and the school a resonator for the discussions and claims of the town.

The chronicler Hermann of Tournai tells us (in 1090) that the squares of his city were filled by curious crowds when Master Odo discussed philosophical questions with his students

(of which he had some 200, coming from as far away as Italy),

and that “the citizens left their various employments so that you might think them fully attached to philosophy”.

The late 11th-century pamphlet war between the Pope and the Emperor about who was the true sovereign of the Christian world (the "Investiture Conflict") appears to have reached this environment;

a favourite argument used on both sides was that the arguments of the other part were so poor that they were

heard everywhere in the streets and in the market-places and are gossiped over by the women in the weavers' shops

Such claims may not have been wholly untrue.

The power structure against which the urban environment revolted was ruled by an alliance between the “warring” and the “praying” orders

Moreover, the obvious language in which to express moral protest was religious.

Urban discussion and urban political claims also gave rise to a specific urban piety, which was both socially critical and potentially heretic.

This environment had important consequences for the learning of the schools – most visibly in the increased importance of *dialectic*.

In the early 12th century, the process led to a culmination of indigenous Latin culture, that is represented by two schools and three scholars.

The first school is the Chartres cathedral school, the centre of a group of scholars (not all active in Chartres).

Its head from 1119 to 1126, Bernard of Chartres, is known for having formulated the idea of intellectual progress in the aphorism that we are like

> "dwarfs, perched on the shoulders of giants" and therefore able to "see more and farther than our predecessors, not because we have keener vision or greater height, but because we are lifted up and borne aloft on their gigantic stature".

The members of the group are known in particular to have engaged in natural philosophy;

one surviving work describes how God created the world and man in a natural process, and argues in that connection that “it is indeed not to be believed literally that God took a rib out of the first man’s side”.

The inspiration was

– Plato’s cosmological *Timaeus* – the only Platonic work at hand in (incomplete) Latin translation;
– Epicurean atomism as transmitted through Lucretius and reported by the Fathers and through the Arabs;
– and the doctrine of the Four Elements.

Aristotle's works on natural philosophy were as yet unavailable,

even the indirect presentation of his doctrines within Arabic astrological treatises had to wait a bit.

The other school to be mentioned is the open school of the Saint-Victor monastery in Paris

(that it was “open” means that the students were not future monks but drawn from local youth in general).

Its first head was a certain Hugh (c. 1096 to 1141), a deeply believing mystic and yet a rationalist engaged in the search for knowledge and in practical life.

In 1125 he wrote a *Didascalicon*, a general introduction to studies, covering the seven liberal arts and seven mechanical arts

(ranging from theatre performance to trade and textile production; borrowed from Isidore rather than describing Hugh's own world)

as well as Sacred Readings: the Bible, the Fathers, and ecclesiastical history.

During the treatment of this last subject it comes to his mind that one might question its utility.

The answer is that

> Some things are to be known for their own sakes, but others, although for their own sakes they do not seem worthy of our labour, nevertheless, because without them the former class of things cannot be known with complete clarity, must by no means be carelessly skipped. Learn everything; you will see afterwards that nothing is superfluous. A skimpy knowledge is not a pleasing thing.

The examples given are with his own boyhood experiments in geometry, arithmetic and acoustics and his keeping “watch outdoors through the winter nights like one of the fixed stars by which we measure time”.

That is, they encompass the whole of the quadrivium.

Among his works is a *Practica geometriae.*

The title itself is striking. The whole preceding tradition, when is was to distinguish a "pure" and an "applied" level of knowledge, would speak of the former as *speculativa* (from Greek "theoretical") and of the latter as *activa* ("acting").

Since Antiquity, the connotations of *activa* were always somewhat negative;

It repeated the ancient depreciation of the useful, and also hinted implicitly at the opposition between the "contemplative" life of monks and the less valuable "active" life of the laity).

Hugh instead makes use of the dichotomy *theorica / practica*, borrowed from the division of philosophy), where the "practical" (moral) was ranked at least at the same level as the "theoretical".

In this way, Hugh showed to value useful knowledge no less highly than "pure" insight

When looking for the background to Hugh's thought we should remember that the medieval scholars had always been involved in practical managerial tasks;

in the new ideological alliance with the most thrifty strata of the Paris population (burghers who sent their sons to study at the Saint-Victor school), this traditional link could unfold as the inspiration for new thinking.

Abelard (1079 to 1142), is the third of the three scholars

He is not associated with any specific school, even though he was driven out from several schools and contributed strongly to making Paris the paramount city of schools.

He was a famous and eminent teacher, known as the master of dialectic and as the creator of “the scholastic method”.

He can be claimed to have opened the way toward the modern (post-Hegelian) notion of “dialectic”: new knowledge or structures engendered from contradiction).

This was done in his *Sic et non* ("Thus and Not"), where apparently contradictory statements of the Bible, the Fathers, Ecclesiastical Councils and other authoritative authors on 158 questions regarding Christian faith and ethics are set forth,

without solution of the dilemmas but with methodical advice on what to do and a general exhortation to ask critical questions as the only way to truth:

By raising questions we begin to enquire, and by enquiring we attain the truth, and as Truth has in fact said, “Seek, and ye shall find; knock, and it shall be opened unto you”. He demonstrated this to us by His own moral example when he was found at the age of 12 “sitting in the midst of the doctors both hearing them and asking them questions”. He who is the Light itself, the full and perfect wisdom of God, desired by His questioning to give his disciples an example before He became a model for teachers in His preaching.

“Truth”, as a person, is Christ. The Scriptural passage “I am the truth” was very popular from the late 11th century onwards.

On the whole, Bernard of Chartres and the Chartres circle, Hugh and Abelard had built their intellectual innovations on the Latin material handed down through the ages, in combination with a new approach of their own making to the material;

they represent what turned out to be the final culmination of the autochthonous Latin tradition – characterized, as we have seen,

- by free naturalist speculation;
- by a high appreciation of practical knowledge;
- and by unlimited faith in human reason.

(A faith that was certainly not shared by everybody; not everybody participated in this (nor in any other) culmination.

New old input

The main reason that they became a final culmination is a new phenomenon that had begun in the late 11th century but attained its full strength in the times of Hugh and Abelard, and which interrupted the autonomous Latin development:

the "wave of translations".

Two main motives inspired this movement – often of course combined in the single translator.

The first can be illustrated by what a contemporary biography relates about the translator Gerard of Cremona: having been "educated from the cradle in the bosom of philosophy", i.e., in traditional Latin liberal arts, he became dissatisfied with the limits of Latin studies and therefore

> set out for Toledo" to get hold of the *Almagest*. Having arrived he stayed there translating the Arabic treasures until the end of life

becoming perhaps the most important of all translators.

Gerard as well as everybody else who had really digested Cassiodorus and Isidore would indeed have good reasons to become dissatisfied:

These venerated texts would tell them that the basic work in geometry was the *Elements*, that astronomy had to be founded upon Ptolemy, etc. – and all these Greek works were unavailable in Latin.

A similar story is told in the preface to a translation of the Greek *Almagest*:

the anonymous scholar who made it tells that he was pursuing medical studies in Salerno in central Italy when hearing that a Greek copy of the *Almagest* had arrived in Palermo.

In consequence he left for Sicily, and started preparing himself by studying some smaller Greek works.

Then he translated Ptolemy's *Great Composition* itself (and after that apparently the *Elements*).

It is no accident that both translators were interested precisely in the *Almagest*.

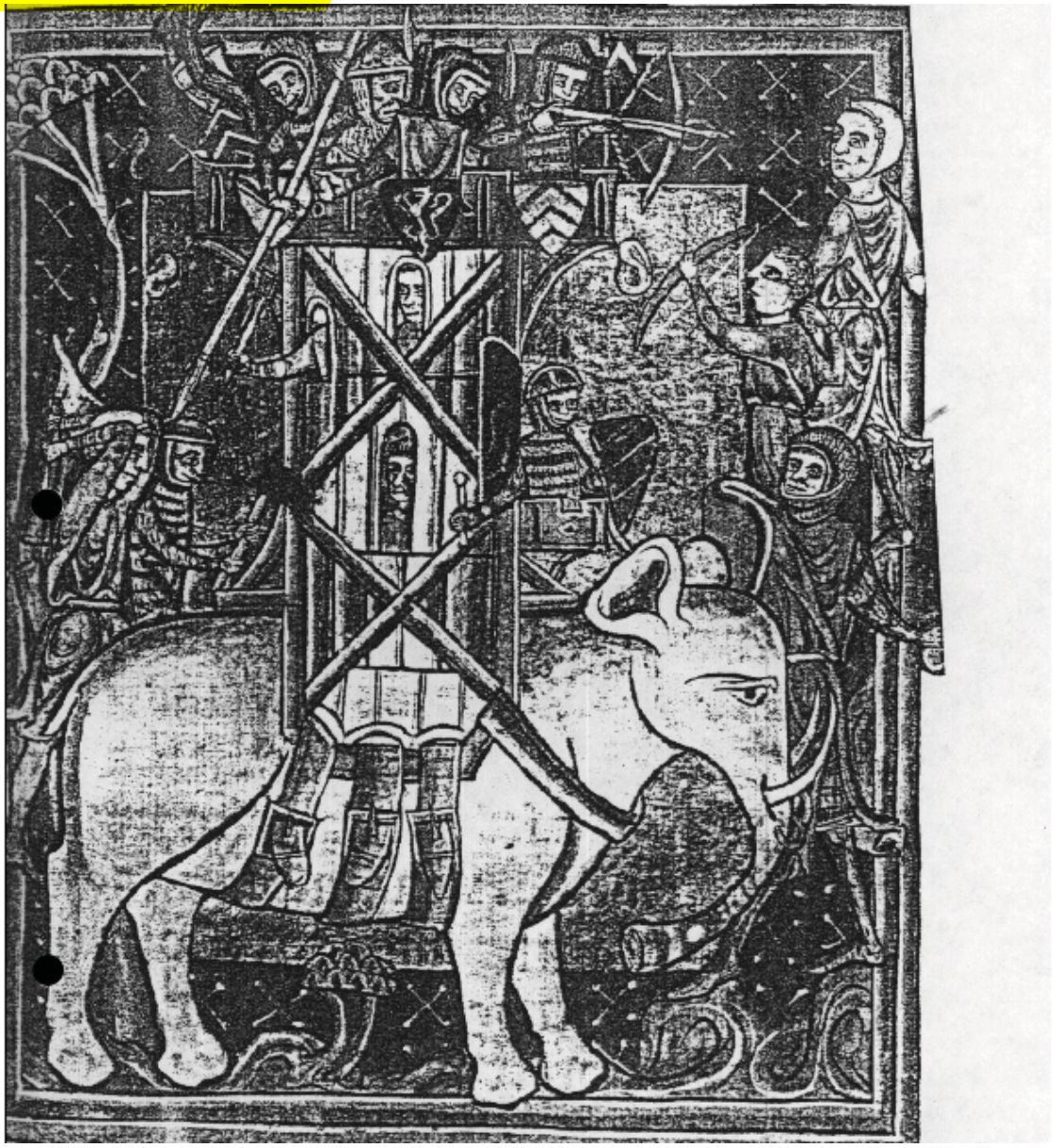
This has to do with *the other motive*, which can be described as *medico-astrological naturalism*, an interest in *nature* which was often coupled to medicine and astrology.

The phenomenon, as indicated by the name I give to it, is composite but not neatly separable into constituents.

Firstly, there is evidence of *guileless direct interest in*, and even infatuation with, the *wonder of the natural world;*

the young Hugh's keeping "watch outdoors through the winter nights" is one example.

Another example is the popularity of bestiaries – treatises which tell about the various marvellous animals of this world, always with a moral or theological point but no doubt suddenly popular because these animals *were* marvellous.



Secondly, this interest might shift from *the wonder of* to *the wonders worked by* nature, i.e., toward natural magic; this theme, though often veiled, seems to run through many of the works of Adelard of Bath, another one of the great translators from the Arabic.

At one point, Adelard discusses a water-filled kettle “with many holes in the bottom” and two on top. As long as a servant closed the latter with his thumbs, no water ran out – but when the upper holes were opened, water began to flow out.

Adelard, “very much interested in enchantments”, explains that

> if it was magic, it was nature’s, rather than any power of the water-carrier. For since the four elements make up this natural world, and they are joined together by natural love in such a way that no one of them wishes to exist without the others, no place either is or can be empty of them. Whence it happens that immediately when one of them gives up its place, another occupies it without any time intervening. [...] Therefore, when the succession of the second elements is prevented, the exit for the water to run out will be opened in vain.

So, natural magic was explanation of an unexpected phenomenon by means of natural philosophy.

Evidently, awe of this kind might easily blend with the will to *use* the occult powers of nature, or with more generic interest in the occult and magical.

It is noteworthy that *not everybody interested in the occult would keep it "occult"*, that is, hidden to the profane eye.

With reference to an ancient story about a certain Numenius who had revealed the mysteries of Eleusis and then in a dream saw the goddesses of the mysteries dressed as prostitutes, Robert of Chester, yet another one of the major translators from Arabic of the 12th century, was worried;

but then he had a dream himself in which Minerva reassured him that *her* gifts suffer no debasement by being made freely available.

Thirdly, naturalism might lean toward astrology, in search for natural explanations that could keep direct Divine intervention at some distance.

Fourthly, astrology might be studied because of its utility in medicine, a major (and practical at least as much as theoretical) concern of its own since the beginning of the translation wave in the late 11th century.

There is little doubt that the *combination of astrology and medicine* was the *strongest single motive* behind the translations;

characteristically, Aristotelian natural philosophy became known first through its repercussions in Arabic astrology, and directly only some decades later.

Whatever their motives, the heroic efforts of these and other scholars gave access to most of the works known only by name and fame from the Latin handbooks, and to a good deal more:

Euclid's *Elements,* Ptolemy's *Almagest* and astrological works, Galen's medical treatises,

Arabic algebra and "Hindu calculation" (with what *we* call "Arabic" numerals),

and – not least – a fairly complete Aristotle, including his large epistemological works, the *Metaphysics* and the books on natural philosophy and natural history.

Together with these works a large collection of Arabic works serving as explanation, commentary and expansion.

Gerard of Cremona's translations

These are the titles of the books translated by master Gerard of Cremona, at Toledo:

On Dialectic

[1] Aristotle, *Posterior Analytics*

[2] Themistios, *Commentary on the Posterior Analytics*

[3] Al-Fārābī, *On the Syllogism* (*Liber Alfarabii de syllogismo*)

On Geometry

[4] Euclid, The Fifteen Books [of the *Elements*] (*Liber Euclidis tractatus* XV)

[5] Theodosios, Three Books *On the Sphere*

[6] Archimedes, [*On the Measurement of the Circle*]

[7] [Aḥmad ibn Yūsuf], *On Similar Arcs* (*De similibus arcubus*)

[8] Mileus [i.e., Menelaos], Three Books [on Spherical Figures]

[9] Thābit [ibn Qurrah], *On the Divided Figure* (*De figura alchata*)

[10] Banū Mūsā [i.e., the Three Sons of Moses or the Three Brothers], [*On Geometry*]

[11] Aḥmad ibn Yūsuf, [Letter] *on Ratio and Proportion* (*Liber Hameti de proportione et proportionalitate*)

[12] [Abū Uthmān or Muḥammad ibn Abd al-Bāqī], *The Book of the Jew on the Tenth Book of Euclid*

[13] Al-Khwārizmī, *On Algebra and Almucabalah*

[14] *Book of Applied* [or Practical] *Geometry* [Abū Bakr, *Liber mensurationum* / JH]

[15] Anaritius [i.e., al-Nayrīzī], [*Commentary*] *on* [*the Elements of*] *Euclid*

[16] Euclid, *Data*

[17] Tideus [i.e., Diocles], *On* [*Burning*] *Mirrors*

[18] Al-Kindī, *On Optics* (*De aspectibus*)

[19] *Book of Divisions* (*Liber divisionum*)

[20] [Thābit ibn Qurrah], *Book of the Roman Balance* (*Liber Karastonis)*

On Astronomy

[21] Alfraganus [i.e., al-Farghānī], The Book Containing XXX Chapters

[22] [Ptolemy], The Thirteen Books of the *Almagest*

[23] [Geminos of Rhodes], *Introduction to the Spherical Method of Ptolemy* (*Liber introductorius Ptolomei ad artem spericam*)

[24] Geber [i.e., Jābir ibn Aflāḥ], *Nine Books* [*on the Flowers from the Almagest*]

[25] Messehala [Māšā᾽allaḥ], *On the Science of the Motion of the [Celestial] Orb* (*De orbe*)

[26] Theodosios, *On Habitable Places* (*De locis habitabilibus*)

[27] Hypsicles, [*On the Rising of the Signs* (*De ascensionibus signorum*)]

[28] Thābit [ibn Qurrah], *On the Exposition of Terms in the Almagest*

(*Liber Thebit de expositione nominum Almagesti)*

[29] Thābit [ibn Qurrah], *On the Forward and Backward Motion* (*De motu accessionis et recessionis*)

[30] Autolycos, *On the Moving Sphere* (*De spera mota*)

[31] Book of the Tables of Jaen with Its Rules (*Liber tabularum iahen cum regulis suis*)

[32] [Abū Abdallah Muḥammad ibn Muadh], *On the Dawn* (*De crepusculis*, on refraction at the horizon)

On Philosophy

[33] Aristotle, *On the Exposition of Pure Goodness* (*De expositione bonitatis pure*; ps.-Aristotle, extracts from Plotinus)

[34] Aristotle, *Physics* (*De naturali auditu*)

[35] Aristotle, Four Books *On the Heavens and World* (*Celi et mundi tr.* IV)

[36] Aristotle, *On the Causes of Properties and the Four Elements*,

Book I (*Liber Aristotelis de causis proprietatum et elementorum primus*); he did not translate the second treatise of this work, because he could find only a little bit of its ending in Arabic (ps.-Aristotle, Arabic Neoplatonism).

[37] Aristotle, *On Generation and Corruption*

[38] Aristotle, *Meteorology*, Books I-III; the fourth he did not translate, since it was already translated.

[39] Alexander of Aphrodisias, *On Time* (*De tempore*), *On the Senses* (*De sensu*), and another *That Augment and Increase Occur in Form, Not in Matter* (*Quod augmentum et incrementum fuit in forma et non in yle*)

[40] Al-Fārābī, *Commentary on Aristotle's Physics* (*Distinctio Alfarabii super librum Aristotelis de naturali auditu*)

[41] Al-Kindī, *On the Five Essences* (*De quinque essentiis*)

[42] Al-Fārābī, *On the Sciences*

[43] Al-Kindī, *On Sleep and Vision*

On Medicine (*De fisica*)

[44] Galen, *On the Elements*

[45] Galen, *Commentary on Hippocrates' Treatment of Acute Diseases*

[46] [pseudo-] Galen, *Secrets* [*of Medicine*] (*De secretis*)

[47] Galen, *On the Temperaments* (*De complexionibus*)

[48] Galen, *On the Evils of an Unbalanced Temperament* (*De malicia complexionis diverse*)

[49] Galen, *On Simple Medicines*, Books I-V (*Liber Gal. de simplici medicina tr. V*)

[50] Galen, *On Critical Days*

[51] Galen, *On Crises*

[52] Galen, *Commentary on Hippocrates Prognostics*

153] [pseudo-]Hippocrates, *Book of the Truth* (*Liber veritatis*)

[54] Isaac [Isḥāq al-Isrāʾīlī], *On the Elements*

[55] Isaac [Ishāq al-Isrāʾīlī], *On the Description of Things and Their Definitions* (*De descriptione rerum et diffinitionibus earum*)

[56] Rhazes [i.e., al-Rāzī], *The Book of Almansor* (Liber Albubatri rasis qui dicitur *Almansorius* tr. X)

[57] [Rhazes], *The Book of Divisions*, containing CLIIII chapters

[58] [Rhazes], *Short Introduction to Medicine* (*Liber ... introductorius in medicina parrus*)

[59] Abenguefit [i.e., Abu al-Mutarrif Abd al-Rahmān ibn al-Wāfid], *Book of Simple Medicines and Foods*, in part (*Pars libri Abenguefiti medicinarum simplicium et ciborum*)

[60] John Serapion [i.e., Yahya ibn Sarāfyūn], *Breviary* (*Breviarium*)

[61] Azaragui [i.e., Abū'l-Qāsim al-Zahrāwī], *Surgery*

[62] Jacob Alkindi, *On Degrees* [*of Compound Medicines*]

[63] Avicenna, *Canon*

[64] Galen, *Tegni*, with the commentary by Ali ab Rodohan [i.e.,

Alī ibn Ridwān]

On Alchemy

[65] [Jābir ibn Ḥayyān, attrib.], *Book of Divinity of LXX* (*Liber divinitatis de LXX*)

[66] [pseudo-Rhazes], *On Alumens and Salts*

[67] [pseudo-Rhazes], *The Light of Lights* (*Liber luminis luminum*)

On Geomancy

[68] A book on geomancy concerning the divining arts, beginning "Estimaverunt indi"

[69] Alfadhol [de Merengi], [*Book of Judgments and Advice*] (Liber Alfadhol id est arab de bachi)

[70] *Book on Accidents* (*Liber de accidentibus alfel*)

[71] [Ḥārib ibn Zaid, Calendar] (*Liber anoe*)

At first, few scholars could do much with anything but the most elementary part of this huge meal.

The translators did not in general select works to be translated from specific importance.

They rushed at whatever important came within their reach, and could hardly have done otherwise: the choice may not have been too varied in a place like Toledo after the Christian reconquest.

Few if any translators, furthermore, had received an education which permitted them to fathom the depths of the texts they translated.

Twisting a Carolingian expression we may say that the Middle Ages were held in the combined spell of Athens and Jerusalem.

Even the "12th-century Renaissance" – whose background was social renewal and a non-derivative intellectual revolution – ended in the main, we may say,

– by merely shifting the emphasis from Jerusalem toward Athens,

– and by combining *Athens* (i.e., Greek natural philosophy and mathematics) with *Rome* (Latin grammar, rhetoric and the Latin Fathers), which until c. 1100 had been the actual perspective on ancient learning.

The promises of a Hugh and an Abelard could not be immediately fulfilled by a scholarly world that was stuck in the task of appropriating the translated knowledge
(other reasons may have played their role).

Some branches of knowledge were not affected, however.

Arabic poetry may have inspired the troubadours of Provence, but it had no influence on the teaching of liberal-arts grammar and rhetoric, which also encompassed Latin poetry and literature.

In certain centres (best known among which is probably Orléans), scholarship in this field reached heights in the 12th century that had not been equalled since Antiquity.

Another field that remained “Latin” is *law*, which is probably better considered two fields. One is Roman law, the other is Canon law.

Urban and commercial life had never been as fully interrupted in Italy as elsewhere, and some secular teaching of law is likely to have taken place in all epochs.

In Northern Italy, the commercial revolution of the High Middle Ages had begun earlier and developed further than anywhere else, and the towns had gained not only a limited autonomy but practical independence from feudal overlords.

Cities like Florence, Bologna and Siena were effectively independent commercial city republics governed by the more wealthy guilds, and constituted the cradle of commercial capitalism.

In the 12th century, the needs created both by commercial life and by republican statehood itself led to the instauration of systematic teaching based on the complete corpus of Roman Law as compiled by Justinian in 533–34.

Once the institutions were there, the legal schools also provided Roman jurists for the German Emperor and who else might need them.

Canon Law represented an equally continuous tradition.

The Western Church was structured juridically since late Antiquity;

not only rules for the conduct of priests and laymen and for the management of ecclesiastical property were termed legally,

even questions of faith (including the *Credo*) were fixed juridically by episcopal synods.

The result as it presented itself in the 12th century, however, was as catastrophic as could be expected when provincial synods could fix the rules independently of each other (but often in agreement with the political needs of local power).

The field was therefore ripe for thorough cleaning and indeed underwent an intellectual revolution when Magister Gratian from Bologna (b. late 11th c., d. before 1159) wrote his *Decretum* or *Concordia discordantium canonum* (c. 1140).

This was a large textbook that harmonized some 4000 single texts by means of Abelardian methods.

Combining the inspiration from Abelard and Gratian, Petrus Lombardus (c. 1100 to 1160) then approached theology in the same way, writing a systematic theology, the *Sentences*

> In ecclesiastical context, a *sentence* is a statement of recognized validity concerning doctrine or dogma.

It consisted of four books of *quaestiones*, discussions of critical problems.

In the 13th century, the *quaestio* would become a literary form emulating the university disputation, with initial statement, arguments, objections to these, objections to objections, etc., and a final “determination”.

Petrus Lombardus offers nothing similar, he eliminates possible misunderstandings or errors instead of discussing and refuting objections.

So, here as in philosophy, the promises of the early century were betrayed: Abelard had challenged the world by presenting contradictions and general methodological advice;

Petrus Lombardus took care to draw the (accepted) conclusions in his *Sentences*, leaving no ambiguity for the reader to resolve.

In Charles Homer Haskins' words:

> Whereas Abelard emphasized the contradictions between his authorities, the Lombard's temperament was conservative and harmonizing, eschewing the "garrulities of the dialecticians", and softening and reconciling the differences and disagreements that made the "Magister Sententiarum" the standard authority for many centuries to come [...]. They were the textbook for two years of the course in theology, indeed the usual library for a student in theology, when he could afford a library, became the Bible and these *Sentences*.

The rise of universities

In the later 12th century, the enthusiasm for knowledge found its main expression in enthusiasm for the reconquered fundament of ancient learning, Petrus Lombardus notwithstanding.

Conservative theologians in the beginning of the century had condemned Gothic cathedrals and Abelardean dialectic as exhibitions of human vanity and arrogance,

those of the outgoing century aimed their spear at new enemies.

One of them, Étienne de Tournais, complained that many Christians (and even monks and canons) endangered their salvation by studying

> poetical figments, philosophical opinions, the [grammatical] rules of Priscian, the Laws of Justinian [Roman Law], the doctrine of Galen, the speeches of the rhetors, the ambiguities of Aristotle, the theorems of Euclid, and the conjectures of Ptolemy. Indeed, the so-called liberal arts are valuable for sharpening the genius and for understanding the Scriptures; but together with the Philosopher [i.e., Aristotle] they are to be saluted from the doorstep only.

Many Christians, indeed, would rather risk their salvation than stay at the doorstep.

The flow of students to the schools, in particular the most famous schools, continued to grow.

So did the number of masters, living from fees paid by their students (or, at times, from ecclesiastical incomes from elsewhere) and only marginally submitted to the authority of the chancellor of the episcopal see.

Not only *professional intellectuals*, they were also in practice *free intellectuals* – a rare situation in history.

Nominally, though, being a scholar implied membership of the Ecclesiastical Order).

The most famous schools were those of Paris, Oxford and Bologna, together with the medical schools in Salerno and Montpellier.

Those of Paris and Oxford had grown out of the traditional cathedral school system with its emphasis on the liberal arts.

Those of Bologna were originally law-schools (but soon also medical schools).

In all three cases, the name *universitas* was used from around 1200.

The term is *Latin for "guild"*, and in *Paris and Oxford* the name denoted the guild-like organization *which* *students and masters* formed together in order to protect their interests and safety.

In Bologna, where the teacher's were regular citizens of the city and only the students came from abroad, the *university* was at first *the student union.*

The early history of the universities shows that scholars might well need guild protection.

It also shows that this protection could be effectual.

The main weapons were *strikes* and *emigration*. Students, in fact, brought their money from home. If they left a city like Paris, where they may have made up some 10% of the population, the commercial life of the city was severely hit.

This was often realized by authorities, who therefore protected the scholars and gave way to many of their claims. In other cases they did not, with the result that scholars left and settled elsewhere.

Cambridge is probably the result of an early emigration from Oxford.

Padua got its university modelled on Bologna when students left the latter city in 1222.

Both Angers and Toulouse owed their universities to an emigration from Paris in 1229. Others could be mentioned, most of them short-lived.

Toulouse, it is true, was not a spontaneous settlement of Parisian scholars.

It was, instead, established by the Dominican Order (on which soon), which took advantage of the occasion when Paris was deserted.

It is thus a representative of a third type of university: those *founded as universities* by some authority.

Others belonging to that category are Naples, founded by the Emperor Frederick II in 1224; Palencia, founded by Alfonso VIII in 1212–14; and the Papal University founded in 1244/45.

It would seem paradoxical that authorities should found organizations meant to protect against authorities.

In fact they did not. Soon after 1200 the term came to mean something more and something different.

This is a process which can best be followed at Paris, the model of most later universities and even a model which Italian universities gradually came to approach.

Around 1200, the interests of Parisian scholars agree fairly well with the description quoted from Étienne de Tournais above.

Most portentous were the "philosophical opinions" and the "ambiguities of Aristotle"

– phrases that refer to interest in the metaphysics and the natural philosophy of Aristotle and to the steadily growing interest in dialectic.

These interests led a number of scholars into what seems to have been a pantheist heresy, giving rise in 1210 to a process and several executions at the stake.

A synod of local bishops then banned lectures on Aristotle's natural philosophy, which may indeed have been part of the inspiration.

Possibly, the problem had to do with the doctrines about the soul as set forth in Aristotle's *On the Soul*.

This, and other conflicts, made the university appeal repeatedly to the Pope.

Still plagued by the problem of ignorant priests, the Pope accepted the role as protector of the university while at the same time imposing adequate regulations in a number of decrees

These decrees are in fact our main sources for curricula and university organization.

A *university* hence became a body with a specific set of privileges, especially concerning the right of the masters to confer the *license to teach* at all similar institutions, and certain obligations.

In Paris (and to a greater or lesser extent elsewhere) the studies were organized in a sequence of faculties.

Students started studies at the age of 14 at the “Arts Faculty”, where for six or seven years they pursued introductory studies;

Actually, some of these might have been spent at other schools.

The first years were dedicated to the liberal arts in general, the last increasingly to dialectic and natural philosophy.

After having received a license in the arts students might continue studies at one of the “lucrative faculties” (Canon Law or Medicine)

while teaching themselves as masters at the Arts Faculty (only a minority continued beyond the license – actually, most are likely to have stopped before getting a degree).

Studies at the Theological Faculty (also “lucrative”) might follow and be financed by the teaching of Medicine or Canon Law.

Aristotelianism

Étienne de Tournais had considered Euclid, Ptolemy and Aristotle equally dangerous.

In 1210, however, only Aristotle's natural philosophy was condemned, which we may take as an indication that too eager study of Euclid and Ptolemy could perhaps jeopardize the salvation of individuals but was not likely to disturb the worldly tranquillity of authorities.

There were good reasons for this. Then as now, only a minority would find it attractive to invest more labour than required by the syllabus in mathematical studies (and Ptolemy's astronomy is no less demanding in this respect than Euclid).

Aristotle, on the other hand, promised much more direct and all-encompassing insight into the workings of the world through his natural philosophy and his metaphysics.

Both because of the way they were formulated and because his teachings constituted a relatively coherent *system*, Aristotle's works corresponded better to the deeply dialectical mood of 12th- and 13th-century learning than any potential competitor could do.

Even the traces we have of mathematics teaching beyond what was needed for astronomy concern the *philosophy* of mathematics.

Speaking of Aristotelianism as a *system* without competitors presupposes that we count as variants and not as competitors the interpretations of Aristotle which Avicenna (the Latin name of ibn Sīnā) and Averroës (the Latinized ibn Rušd) had produced.

Avicennism and Averroism, indeed, were *systems* to a higher degree than the original.

In consequence, Aristotelianism was first received in the Neoplatonically tainted form of Avicennism, and later as Averroism.

Ibn Sīnā's version of Aristotelianism is likely to be the form that was involved in the 1210 heresy.

Ibn Rušd, soon to be known simply as "the Commentator", was important for controversies of the 1260s and 1270s – not least because of a further consequence which he (or rather the Latin Averroists, ibn Rušd knew Aristotle better) drew from Aristotle's view of the soul.

Early 13th-century university scholarship was thus drawn irresistibly toward Aristotelianism, in spite of (in some cases no doubt because of) its inherent challenges to Christian doctrines

> for instance that it excluded that the World could have a beginning and an end, thus denying the Creation as well as the Day of Judgement.

The prohibition of 1210 was repeated in 1215 by a papal representative

(as it were, a local university theologian nominated Papal legate for the purpose),

and extended on that occasion to lecturing on the *Metaphysics*.

In 1231, the Pope repeated the prohibition once again, ordering on the same occasion that those who had trespassed should be absolved – a double indication that the ban had not been very effective.

Also in 1231, moreover, a committee was ordered to prepare an inoffensive edition of Aristotle's books on nature:

> [...] since, as we have learned, the books on nature which were prohibited at Paris [...] are said to contain both useful and useless matter, lest the useful be vitiated by the useless, we command [...] that, examining the same books as it is convenient subtly and prudently, you entirely exclude what you shall find there erroneous or likely to give scandal or offense to readers, so that, what are suspect being removed, the rest may be studied without delay and without offense.

Since the chairman of the committee died, it never set its pen to paper, and nothing came out of the initiative.

In the 1230s, however, the situation became untenable for the conservatives, as even their own theological treatises were fully permeated by Aristotelian metaphysical concepts.

In this way not only we but also contemporaries could clearly see that the Aristotelian system was *necessary*.

The university environment could not do without the intellectual coherence that was offered by Aristotle but by no other system.

At the same time, the triumph of Aristotle was a symptom that *university learning was becoming specialized*, and that its close interaction with general currents was in decay.

Only within the professional environment of university masters could a climate of dialogue and controversy be regulated by the strait-jacket of scholarly *dialectic*,

and nowhere else could the quest for intellectual coherence and system become paramount.

Already during the conflicts of the early 13th century, the university environment was thus preparing its eventual integration into the mid-century synthesis or compromise, to which I shall return.

Other social groups had gone the opposite way. Already during the second half of the 12th century, the specific urban piety gave rise to authentically heretical movements which, in particular from the early 13th century onwards, were submitted to large-scale persecution.

The origin of the mendicant orders is to be sought in this context.

In 1208, Francis of Assisi (a layman with no ecclesiastical credentials) had begun preaching Apostolic humility and poverty, thus pursuing the same road as some of the late 12th-century heretics;

in 1209, however, his groups of followers was recognized by the Pope as a regular monastic order (the Franciscans or Friars Minor), with ensuing regulations on doctrine and activity.

In 1215, St Dominic received a similar approval for his "Order of Preachers" (better known as "Dominicans"), whose members were to "fight heresy by means of sword as well as fire as well as tongue".

For tactical-propagandistic, not for ideal reasons, even the Dominicans were to live in Apostolic poverty.

But the Dominican were also founded as a *learned order*, and from the beginning almost half of St Dominic's followers were sent to Paris "in order to study".

The original aim of Dominican studies was theology, and as late as 1228 it was ordered in the statutes of the Order that Dominican students

> should not study the books of the pagans and the philosophers, even though they may inspect them when appropriate. They should not learn the secular sciences, nor the so-called liberal arts, unless some master of the Order or the General Chapter should dispose otherwise.

Although that had never been the aim of St Francis, the Franciscans developed in the same direction.

Soon both orders received as recruits many university scholars who would rather pursue study as friars than turn to trite clerical work.

Two eminent Dominican friars who were active in Paris accomplished what the committee of 1231 had been unable to effectuate.

Around 1250, Albertus Magnus (Albert "the Great", 1193 or possibly 1206/07 to 1280) wrote a large commentary to Aristotle's *Physics*, the first volume on natural philosophy, telling in the preface that he did so

> in order to satisfy the brethren of our Order, who now for several years have asked us to compose a book on physics in which they might have the perfect science of Nature, and which would enable them to understand Aristotle's books".

After this beginning, Albert continued through most of the Aristotelian corpus, and even supplemented it with books on missing subjects (one of these, *Book of Minerals*, was used as a practical handbook for centuries).

Obviously, the statutes from 1228 were long forgotten.

From 1250 onwards, St Thomas (Aquinas) (1225 to 1274), also a Dominican, built up a complete philosophical system in agreement with Christian Faith but on Aristotelian foundations in partially Neoplatonic interpretation:

the "Thomist synthesis", which was a no less systematic interpretation of Aristotle than those of Avicenna and Averroës, and which managed to reconcile both the Unmoved Mover (Aristotle's god who only moves by being loved) and Aristotle's understanding of the soul as a form with Christian doctrines.

An oft-quoted *dictum* sums up the core of the Thomist doctrine: "Grace does not abolish nature but brings it to perfection".

The implication is that (Aristotelian) natural philosophy is considered valid, and is allowed to explain as much as it can; "Grace" (i.e., Divine intervention and explanation) only enters as a complement and where natural explanation fails.

Even though the precise words are not those of the Latin Bible, the dictum is a close and probably intentional parallel to Matthew 5:17,

> Think not that I am come to destroy the law, or the prophets: I am not come to destroy, but to fulfil.

"Nature" / Aristotle is thus intimated to be one of two equally important carrying pillars for faith, the other being the Old Testament.

Similarly, the principles of "natural law" – those principles which can be derived from Aristotle's political philosophy as understood at the time – are accepted as valid in any society, Christian as well as non-Christian;

Revealed truth (the teachings of the Bible) can only specify and complement them, but cannot abolish them.

Thomas' *dictum* was not a mere philosophical principle. It was also a rationalization of the division of the university into faculties and of the autonomy of the Arts and Medical Faculties (and, where it existed, of the faculty of Secular Law):

> in these, the study of natural philosophy and of presumed natural law should be allowed without constant policing on the part of the theologians.

Another feature of the Thomist system had similar implications: its emphasis on the Aristotelian division of knowledge into separate domains, each derived from its own specific set of principles or axioms.

Once again, this agrees with the compartmentalization of university knowledge into the domains of separate faculties, each governed by its own principles and not supposed to encroach upon the territories of the others.

Obviously, one exception to the general principle of mutual autonomy should be remembered: the teachings of other faculties were ultimately to be completed by (and hence also to be compatible with) "Grace", i.e., theology and its basis in revealed truth.

A document from the Arts Faculty in Paris from 1255 tells the curriculum for the coming academic year in terms that presuppose the topics to be already current practice but the lectures often too superficial in view of the difficulty of the texts.

Apparently only the mature level is concerned, and the list may not be complete.

Aristotle overshadows everything else, being accompanied in the document only by a few Boethian commentaries to his logic and some texts on grammar.

We, *all and each, masters of arts by our common assent, no one contradicting,* because of the new and incalculable peril which threatens in our faculty some masters hurrying to finish their lectures sooner than the length and difficulty of the texts permits, [...] have decreed and ordained [...] that all and single masters of our faculty in the future shall be required to finish the texts which they shall have begun on the feast of St. Remy at the times below noted, not before.

The Old Logic, namely the book of Porphyry, the *Categories*, *On interpretation*, *Divisions* and *Topics* of Boethius, except the fourth, on the feast of the Annunciation of the blessed Virgin [...]. *Priscian minor* and *major* [advanced grammar], *Topics* and *Elenchi*, *Prior* and *Posterior Analytics* they must finish in the said or equal time. The *Ethics* through four books in twelve weeks, if they are read with another text; if per se, not with another, in half that time.

Three short texts, namely Sex *principia*, *Barbarismus*, *Priscian* on accent, if read together and nothing else with them, in six weeks. The *Physics* of Aristotle, *Metaphysics*, and *De animalibus* on the feast of St. John the Baptist; *On heaven and Earth*, first book of *Meteorology* with the fourth [...]; *De anima* [...]; *On generation and corruption* [...]; *De causis* (ps-Aristotle) [...]; *De sensu et sensato* [...]; *De somno et vigilia* [...]; *De plantis* [...]; *De memoria et reminiscentia* [...]; *De differentia spiritus et animae* [...]; *De morte et vita*.

Aristotelianism had thus won the day.

It would be mistaken, however, to see the outcome of the process as a victory for the radical thinkers of 1210.

What won the day was an Aristotelianism that had been moulded by the “repressive tolerance” of the Albertine-Thomist synthesis, and the environment in which it won was no longer a major threat to social and intellectual stability.

In 1210, in connection with the ban on Aristotle's natural philosophy and the condemnation of the heretical priests, the diffusion of theological treatises in the vernacular had been strictly forbidden;

mid-13th-century university annals offer no similar evidence of interaction between scholarship and lay religious fervour (or other lay movements).

The compromise

The transformation of Aristotelianism exemplifies a general trend of the mid-to-late 13th century toward "balance" or "compromise".

Balance was a general social phenomenon: for a while – namely as long as moderate economic expansion continued – open fighting between Papacy, secular rulers, nobility, and commercial towns had declined or ceased;

large-scale revolts in towns and in the countryside were phenomena belonging to the past (and, as it turned out, to the near future).

Within the university, the masters of arts had become a semi-autonomous but also an isolated professional group.

This is appropriately demonstrated by one of the condemnations of supposedly heretical scholars which *did* take place.

The scholar in question is Boetius de Dacia (*fl*. c. 1275), who was accused of being an Averroist, and thus a proponent of an Aristotelian system which had not gone through the Thomist domestication.

In a treatise *On the Eternity of the World* he distinguishes,

– on one hand, "the truth of [Aristotelian] philosophy", which claims this eternity,
– and on the other, "the truth of Christian Faith, which is absolute truth", which denies it.

The style of the work leaves no doubt in me that Boetius is sincere in equating the truth of Faith with genuine truth.

The truth of philosophy – thus Boetius's solution to the dilemma – was only *established* as a consequence of the Creation of the physical world, and it will be abolished at the Last Judgement;

between these two limits neither beginning nor end of the World can obviously take place.

As a master at the Arts Faculty, i.e. as *a philosopher* (no longer, we observe, a teacher of the liberal arts), none the less, Boetius explains it to be his duty to pursue *the truth of philosophy*.

The underlying inclination toward mysticism goes against Thomas's belief that Reason and Faith can be harmonically combined.

The proclamation of an autonomous sphere of knowledge which the philosopher should pursue, however, is in line with the Thomist programme even if it goes beyond the limit which Thomas found acceptable.

That Thomas's as well as Boetius's stance is to be explained with reference to the sociology of institutions, not epistemology alone, is indicated by the failure of attempts to secure autonomy for domains *within* the complete range of subjects covered by the masters of arts.

The domain which achieved epistemological autonomy was thus not defined by epistemological criteria, that is, by shared methods or by the subject-matter to be dealt with: it was demarcated by a purely social institution.

Autonomous knowing could be accorded to *people who ran an autonomous institution*, and who knew to do this without disturbing the compromise which this institution had made with stronger powers.

Along with listening to lectures (and taking as many notes as the often slow speed of the lecturer allowed), students participated in *disputations* according to rules that became fixated during the 13th century (Abelard's method was the background).

Here, any thesis could be proposed, and then arguments and counterarguments followed. The last part was the "determination", in which the master summed up the arguments and drew the conclusion.

Whereas participants were normally allowed much freedom in the discussion, the master was obliged to determine in a way that did not contradict faith.

However, in 1277, a synod of the bishops in the Paris region, through the pen of the Paris bishop, made a list of 219 thesis which it would henceforth be forbidden to propose.

The condemnation of Boethius de Dacia took place in this context. After that, he fled to the Papal court.

A selection:
6. That when all celestial bodies have returned to the same point – which will happen in 36,000 years – the same effects now in operation will be repeated.
9. That there was no first man, nor will there be a last; on the contrary, there always was and always will be generation of man from man.

21. That nothing happens by chance, but all things occur from necessity and that all future things that will be will be of necessity, and those that will not be it is impossible for them to be; and that upon considering all causes, [it will be seen that] nothing happens contingently. [This is an] error because by definition a concourse of causes occurs by chance, as Boethius says in his book *On Consolation* [*of Philosophy*].

34. That the first cause could not make several worlds.

35. That without a proper agent, as a father and a man, a man could not be made by God [alone].

37. That nothing should be believed unless it is self-evident or could be asserted from things that are self-evident.

38. That God could not have made prime matter without the mediation of a celestial body.

52. That that which is self-determined, as God either always acts or never acts; and that many things are eternal.

66. That there are several first movers.

87. That the world is eternal as to all the species contained in it; and that time is eternal, as are motion, matter, agent, and recipient; and because the world is [derived] from the infinite power of God, it is impossible that there be novelty in an effect without novelty in the cause.

88. That nothing could be new unless the sky were varied with respect to the matter of generable things.

100. That theologians who say that the sky [or heavens] sometimes rests argue from a false assumption; and that to say that the sky exists and is not moved is to utter contradictories.

143. That from the different [zodiacal] signs of the sky diverse

conditions are assigned in men both with respect to spiritual gifts and temporal things.

145. That no question is disputable by reason which a philosopher ought not to dispute and determine, since arguments (*rationes*) are taken from [or based on] things. Moreover, philosophy has to consider all things according to its diverse parts.

147. That the absolutely impossible cannot be done by God or another agent. – An error, if impossible is understood according to nature.

150. That on any question, a man ought not to be satisfied with certitude based upon authority.

151. That for a man to have certitude of any conclusion, it is necessary that he found it on self-evident principles. – An error, because it speaks in a general way about both certitude of understanding and [certitude of] adhesion (*adhesionis*).

152. That theological discussions are based on fables.

153. That nothing is known better because of knowing theology.

154. That the only wise men of the world are philosophers.

161. That the effects of the stars on free will are hidden.

162. That our will is subject to the power of the celestial bodies.

Within some 30 years the condemnation was forgotten. When it was appealed to in the 14th century, it was by philosophers who used it against more orthodox Aristotelians, not by authorities against scholars.

after all, there turned out to be nothing dangerous in these disputations.

The effects of the professionalization of university teaching thus merged with those of the violent suppression of heretic movements and of the primitive-democratic tendencies of towns for which ecclesiastical and royal authorities were responsible:

the connection between universitarian and popular politico-religious discourse became tenuous and mostly non-existent.

Only toward the very end of the 14th century was this dialogue to be revived sporadically,

and with consequence only in the Hussite movement and the early Reformation of the 15th and early 16th centuries.

One particular development should be mentioned which contributed to severing the ties between scholarly and popular discourse, since it also changed the character of universities as seen from within and eventually undermined the autonomy of the “artists”:

the masters of arts were gradually loosing their position as free intellectuals.

One reason for this change of condition is that specific *chairs* were established, often at colleges supported by an endowment.

Another reason, for a while more important, is that an increasing number of teachers were Dominicans or Franciscans.

These were *members of their order* and not of the university understood as a guild.

They would therefore not be solidary during strikes, and could be suspected of being more loyal to Church and "Grace" than to their fellow masters and to "Nature".

Initially, the Friars were therefore met with strong resistance by other masters. In the end, however, they had to be accepted, among other things because universities needed the Papacy as an ally against local authorities.

Certain decrees censuring the behaviour of scholars belonging to the mendicant orders tell us that some of them were actually more interested in “Nature” than in “Grace”.

In 1323, for instance, a general chapter of the Dominican order complained that

> the art called alchemy has been strictly prohibited in many general chapters under heavy penalties, and still in various parts of the order perilous scandals have arisen from this,

threatening harsh punishment for future transgressors.

As I have already said, entry into a friars’ learned order could indeed be a way for scholars to remain scholars instead of leaving the intellectual environment of the university.

The 14th century

The multi-level balance reached around the mid-13th century did not last long.

When seen in the context of demography and economic history it can in fact be understood as the brief interlude between the crisis of growth of the early High Middle Ages and the late medieval crisis of decline.

The cultural bloom of the late 11th and the 12th century had grown out of demographic expansion based on improved agricultural methods and of that rise of towns and commercial economy which it made possible.

By the outgoing 13th century, the new techniques and the higher population pressure had exhausted the soil in many areas, and population growth stopped.

To make things worse, the climate began deteriorating.

In the 1320s, protracted warfare between England and France set in (the "Hundred Years' War", which went on with interruptions until the 1450s).

It was followed by bankruptcies among the largest North Italian bankers, who had invested in quick victories.

Worst of all was probably the Plague (the “Black Death”), which swept over Europe in the end of the 1340s and cut the badly fed population by some 35% in the average.

In many commercial towns, violent rebellions and civil war between the mercantile patricians and poor artisans and workers followed.

The population decline in the countryside created a shortage of manpower, thus leading to a reduction of the value of landed property.

Attempts to increase the exploitation of feudal peasants only resulted in rebellions, which at least in England and France were far more successful than those of the working population of the towns.

The Church, the largest landowner of all, was significantly impoverished;

enforced political submission of the Papacy to the French King led to conflicts with other secular rulers

and in the end to the schism of 1378 to 1417, where two (for a short while even three) rival Popes tried to rule the Church.

These political and economic turmoils affected the universities and university learning in several ways.

First of all, recruitment changed, and became increasingly dominated by the upper social levels;

gifted peasant's sons became rare again – after having been visible enough during the late 12th and the 13th century to call forth complaints about this

undue appropriation by "the ignominious and degenerate sons of serfs which we call peasants" of those arts which are rightfully "the sword of the powerful.

The reduction of ecclesiastical income from landed property after the Plague also affected the universities directly, since the Church (and local churches) had financed much of what went on in universities:

not only colleges but also students going to the higher faculties and possibly teaching the arts on the same occasion.

Both the level and the status of university activity was lowered in this process; a reform edict from Paris from 1366 shows this quite clearly in its attempt to repair some of the damages.

It also ordained that the

> scholars hearing their lectures in the [Arts] Faculty sit on the ground before their masters, not on seats or benches raised above the ground, as was the custom when the studies of the said faculty were more flourishing, so that occasion of pride may be removed from the young.

In the end, this development killed much of the intellectual creativity of the university environment.

Yet during the decades of incipient crisis, i.e., until the impact of the Plague was fully felt, certain developments took place which are not only interesting in themselves but also illustrative of the interaction between institutional environment and style of thought.

Some of the philosophical developments and some of the conflicts between different philosophical schools were superficially mixed up with the political conflicts of the day – but that *is* surface.

Instead, a new, highly original approach to the problems of language and meaning and an unprecedented attempt at mathematization of natural philosophy resulted from internal drives.

On the whole, these were not meant as investigations of practical discourse or of real nature; we should rather see them as *testing and display of the key professional tools and disciplines of the masters of arts:* logic and natural philosophy.

Structurally, this runs parallel to processes taking place in many environments populated by professional intellectuals.

The exceptional sophistication of the 14th century developments and their isolation from common sense and from all everyday concerns were only possible because the masters of arts as a group were highly specialized and professionalized,

and because their professional activity (as long as they stayed masters of arts) was itself disconnected from everyday intellectual practice (be it administration, juridical practice, secretarial functions for rulers, or preaching).

Contemporaries were quite aware that something new was produced. They spoke of a *via moderna* in philosophy, a opposed to the *via antiqua*.

The latter term covered not ancient philosophy in general but the kind of Aristotelianism that had established itself during the 13th century – not least as embodied by Albert and Thomas (but Latin Averroism was also included).

Like Aristotle, the *via antiqua* was "moderately realist", i.e., it held that "universals" are real but only exist as partaking in individuals (THE DOG as a species, for instance, is no free invention but the shared "form" of all single dogs).

The *via moderna*, on the contrary, was mostly nominalist and proto-positivist. "The Dog" is nothing but "a puff of the voice", to quote a favourite expression,

much effort was invested in exploring the relation of language and logic to reality.

The *via moderna* was thus built on Aristotelian concepts, and it investigated problems arising within Aristotelian logic and Aristotelian natural philosophy.

But it did not feel obliged to take these concepts as Aristotle or the commentators of the *via antiqua* had interpreted them.

The backbone of the mathematization of natural philosophy, for instance, was the idea that the Aristotelian *qualities* could be varied continuously in numerical degree.

Such qualities could be cold, heat, moisture and dryness – the qualities which were bound up with the doctrine of the four elements and with humoral medicine.

According to Aristotle these may well "admit of variation by degree", but it would be as meaningless to ascribe numbers to the degrees of cold as to the degrees of justice or health.

The suggested numerical degrees were "according to hypothesis" – the idea of *measurement* did not intervene.

14th-century "quantification of qualities" was in the style of "twice as cold" or "three times as healthy", which we will probably find just as absurd as did the adherents of the *via antiqua*.

In spite of its Aristotelian fundament, the approach of the *via moderna*, and even its way to *discover problems*, was hence quite new.

So new in fact, and so different from anything which had come before, that many aspects of 14th-century philosophy were not understood during the Early Modern period

but only on the background of 20th-century semantical theory and abstract algebra (and even then not by all historians of science).

That is, when seen in the perspective of disciplines which themselves are products of highly specialized and professionalized academic environments.

Some broad features of the development from c. 1150 to c. 1400 can be summed up as follows:

Scholasticism, which literally means nothing but the *learning of (medieval) schools* from 1050 onwards, ripened into the particular style of the "mature" medieval university.

12th- and early 13th-century university learning was somehow part of a general quest for enlightenment (whence the enormous enthusiasm for the new learning),

the corresponding "external purpose" of late 13th- and 14th-century university learning was rather to legitimize and support status consciousness.

Through the reconquest of ancient *philosophy* (as opposed to the remainders of polished Roman *culture*), the 12th and earlier 13th century had reached that "Athens" which medieval scholars had only dreamt and spoken of until then.

Truly, this Athens still clung to the *texts* of Antiquity, using the Abelardian (so-called "Scholastic") method to make them agree;

but through the sophisticated innovations in semantics and logic and through the quantification of qualities, university scholars none the less produced something *new*, starting from but not really identical with Aristotle.

On the other hand, a scholarly culture had been created which seemed increasingly irrelevant even to educated people outside the university sphere.

Toward the very end of the 14th century, Chaucer has the miller of the "Reeve's Tale" express the attitude when addressing two clerks that have asked for accomodation for the night:

> Myn hous is streit, but ye han learned art,
> Ye konne by arguments make a place
> A myle broad of twenty foot of space.

Only the medico-astrological counter-current seemed to carry a relevant message.

14th-century Scholasticism was, on the whole, a brilliant but late intellectual afterglow of a general social compromise between conflicting forces

– a compromise which had since long ceased to be tenable.

The post-medieval university

As this anachronistic orientation joined with the consequences of impoverishment in the late 14th century, a genuine intellectual decay process set in.

Already in the outgoing 14th century, university learning is no longer adequately described as oriented toward sophisticated logic, semantics and (bookish or speculative) natural philosophy.

It was oriented *toward the sophistication of the earlier 14th century*, i.e., toward what had been created and canonized before 1350–60 (we may speak of “Aristotelianism by inertia”).

New works were still written, but mainly compendia introducing to the original thinking of the earlier 14th century. Very broadly speaking, the decay process accelerated after 1400.

The "new" books (i.e., books not written during classical Antiquity) which were printed in university towns around 1480 would mostly either be compendia written a hundred years before or original treatises written between 1200 and 1350. Exceptions exist, but they remain exceptions.

Grosso modo, universities had become fossilized and dogmatic schools for administrators, physicians, lawyers, and priests – and most of them retained that character until 1800 or later.

This does not imply that nothing new entered university learning for 400 years, nor that innovative scholars had not mostly received a university education, mostly in medicine or law, or never lived from teaching at a university.

But curricular novelties entering a university during these centuries would mostly be a hundred years old or more, except in cases where it was the result of a reform guaranteed and enforced by higher outside authorities;

those scholars who produced the new science had to make something very different both from what they had been taught and from what they were teaching at university.

To mention but one famous example, Newton's infinitesimal calculus (created in the late 17th century) only entered the curriculum of his own university (Cambridge) during the 1820s.

In contrast, Thierry of Chartres had used books for his teaching in Paris in 1145 that had been translated no earlier than 1140 in Toledo (this was 300 years before the invention of printing!),

Hugh of Saint-Victor's notion of the "practical" was used within some twenty years as a matter of course by Gundisalvi when he translated al-Fārābī.

In brief, universities had become enclaves isolated from the social life and the living culture of their period, to be ridiculed and parodied by Rabelais, Thomas More and Molière.

That was to change after c. 1800.

The background was the rise of the modern state and of modern society as they resulted from the technological and political revolutions of the late 18th and early 19th centuries.

This gave rise to a need for *manpower* able to carry responsibility for working the new technical and administrative machinery, and thus for educational institutions where this key personnel could be trained.

The first of these was the French École Polytechnique from 1794.

It was founded in order to provide future civil and military engineers with fundamental scientific training – in fact two years basic mathematics taught by the best mathematicians of France.

After two years the students were transferred to other institutions where they would specialize in mining, in road- and bridge-building, etc.

One reason for the historical importance of the École Polytechnique is that it represents the first appearance of the *engineer in the modern sense:*

a practitioner trained in the scientific knowledge of his own days, and not just in the ways of other practitioners combined with third-hand-knowledge of scientific results and methods created a hundred years or more ago.

Another reason for the significance of the school was a consequence of the historical context within which it was created:

the Revolutionary identification of public utility, scientific rationality and utopian reason.

The teachers were obliged to publish their courses in print in order to make this supposedly useful learning available to everybody.

As a result, the school became a centre of mathematical *research* – not least because the teachers were recruited among the best mathematicians at hand, who used the opportunity to teach and publish their own results.

The original design survived not only the transfer of the school to the Ministry of War in 1804 but also the Restoration.

Only around 1830 was it becoming clear that the highbrow research orientation of the École Polytechnique might not be the best way to train engineers for practical work.

The École Polytechnique was not meant to be a research university, only circumstances caused to be one (or almost).

The development that was emulated worldwide took place in Prussia.

At the surface of historical events, the explicit integration of teaching and research took its beginnings with the Prussian reform of 1809.

An important element of the immediate inspiration for this reform were the events of the Napoleonic wars:

in the battle of Jena (1806), the Prussian and Saxon armies had been beaten decisively;

as a result, Prussia was reduced to half its former size.

In the context of a still feudally coloured and absolutist Prussia, whose most progressive element was a "bourgeoisie of officials" rather than an industrial or mercantile bourgeoisie, the response to this "Sputnik-shock" was a claim for *spiritual renewal*.

The response of the *polytechnicien* Sadi Carnot to the French defeat a few years later may be mentioned as an illuminating contrast:

he argues that England owed its strength to its *industry*

> deprive England of its steam engines, [...] it would destroy this gigantic power. The destruction of its navy, which it considers its most certain support, might be less destructive.

The fundamental need for France was therefore *more steam engines, and more efficient steam engines.*

(This is said in the preface to the treatise which became the beginning of thermodynamics)

Another reason for the Prussian claim for renewal was evidently the existence of the Romantic movement, and in particular the Romantic response to the French Revolution.

(The two explanations are not independent, since the orientation of the German Romantic movement was itself correlated with the social composition of the German educated elite).

Behind the immediate inspiration provided by military developments, however, less accidental and more durable factors were in play.

New standards for the education of higher officials in Prussia had indeed been formulated in 1806, just before the military catastrophe.

Beyond the traditional administrative sciences ("*Kameralwissenschaften*" – themselves an innovation of the 18th century) and law, candidates should now be trained in a number of auxiliary disciplines

- from philosophy (logic, natural law, general constitutional principles),
- mathematics (pure as well as applied),
- natural sciences (botanics, mineralogy, zoology, physics, chemistry)
- and history (national history and statistics).

The university reform was set in motion when the new Friedrich-Wilhelm Universität of Berlin was founded in 1809 under the auspices of the linguist Wilhelm von Humboldt (1767 to 1835), elder brother of Alexander von Humboldt.

Its central idea was that the members of the German elite needed to be freed from that sluggishness which resulted from their education in dogmatic and fossilized universities

and – before they got so far – in a secondary school whose teachers were no better, themselves coming from the universities.

Therefore the quality of the teachers of the *Gymnasium* had to be raised, morally as well as regarding their scholarly level.

This should be done by improving their level in the *Geisteswissenschaften* (the “sciences of the spirit”)

considered identical with the *Altertumswissenschaften*, the “sciences about Antiquity”: Hebrew, Greek and Latin philology, history, and mathematics.

The name of the programme is *Neohumanism;* it was, in fact, close to the Renaissance interpretation of Antiquity, and even closer to German post-Reformation Humanism as molded by Melanchton.

In spite of many changes in the contents of *Gymnasium* teaching it remained the ideological backbone of German secondary education until 1933,

and it was eventually resurrected in both Germanies (East and West) between 1945 and 1960.

The only place where future *Gymnasium* teachers could be taught the *Geisteswissenschaften* was in the Arts Faculties of universities.

Since the Middle Ages these had been the prep school of universities whose main task was to train priests, lawyers and physicians;

and in the post-medieval period the Arts Faculties had lost and never regained that central intellectual position which had been theirs during the 13th and 14th centuries

a the frequent renaming as “philosophical faculties” from the 15th century onward should not mislead us.

Now, however, they were given the status of “lucrative faculties”, as it had been called in the Middle Ages, and students were to receive a complete education at the “Arts” or “Philosophical Faculty”.

The final level of students should be one of independent research, reflected in a dissertation

and in order to make sure that the quality of university professors was sufficient to bring the students to this level they would have to be appointed on the basis of their own scientific work,

not according to family relationships or sociability as judged by future colleagues from other disciplines

since there was in principle only one professor from each discipline, future colleagues from the same institution would normally be unable to make a scientific evaluation).

The aspiration was not only to provide the *Gymnasium* with a staff whose members had once made one piece of independent research. *Gymnasium* teachers were also expected to use part of their time on research;

articles in the yearbooks of many gymnasia (often still valuable) shows that quite a few teachers actually did so.

Research was not meant as an aim in itself.

The overall purpose of the enterprise was moral improvement as provided by the *unified humanities* – in agreement with Neohumanist ideology and with the integrative and organic world-view of the Romantic movement.

But the undertaking was so efficient in creating new knowledge that unification became more impossible than ever.

The hoped-for totality of humanities was soon splitting up into disciplines, and these into subdisciplines,

> each possessing greater and greater knowledge of its own domain but also less and less understanding of neighbouring areas.

The Prussian research-oriented university model spread quickly to other countries, and it was soon regarded as self-evident.

Even in Germany, the Battle of Jena and the ensuing quest for national moral resurrection are likely to represent nothing but the surface of historical events and the occasion that shaped their details.

The underlying cause of what happened was the general socio-economic transformation of Europe

(and the United States, and soon Japan, followed in the 20th century by China and India),

which gave rise to an increasing demand for efficient and well-trained officials, administrators, technicians, and teachers, in a society in constant change.

If this need had not been urgent, the German reform would probably have been abortive – if only for the reason that the Prussian government would not have been willing to pay for the many new positions needed for its realization

(any erection of a new chair asked for extensive argumentation, as sources show).

Elsewhere, too, it was the demand for manpower (which was largely the demand of the state, either directly or via deliberate technology policies) that convinced public authorities to implement and finance educational reforms in agreement with a model which had proved successful.

General public needs, however, even if a necessary background, do not provide the complete explanation.

The process soon became self-accelerating in all fields where the research orientation became effective:

systematic work created new results and new understanding, which

- either (in the natural and technical sciences) increased the utility of (and hence the demand for) scientifically trained manpower,
- or (in the case of the humanities) opened the way to a specialized and technical approach to the intellectual realm which then came to be seen as a necessary qualification.

and then, any environment of “intellectuals by profession” to connect status awareness (and pride!) with the probing of professional tools.

Finally, the culturally dominant strata of the second half of the century ("the Victorian Era") came to see its scientific, technical and industrial triumphs as all of one piece,

and as the supreme expression of the superiority of the age (as expressed also in the World Exhibitions, the first of which was organized in London in 1851, and which continued until the First World War).

Not only the need for manpower and for results but also reasons of national prestige would therefore prompt the states to finance activity in the natural sciences.

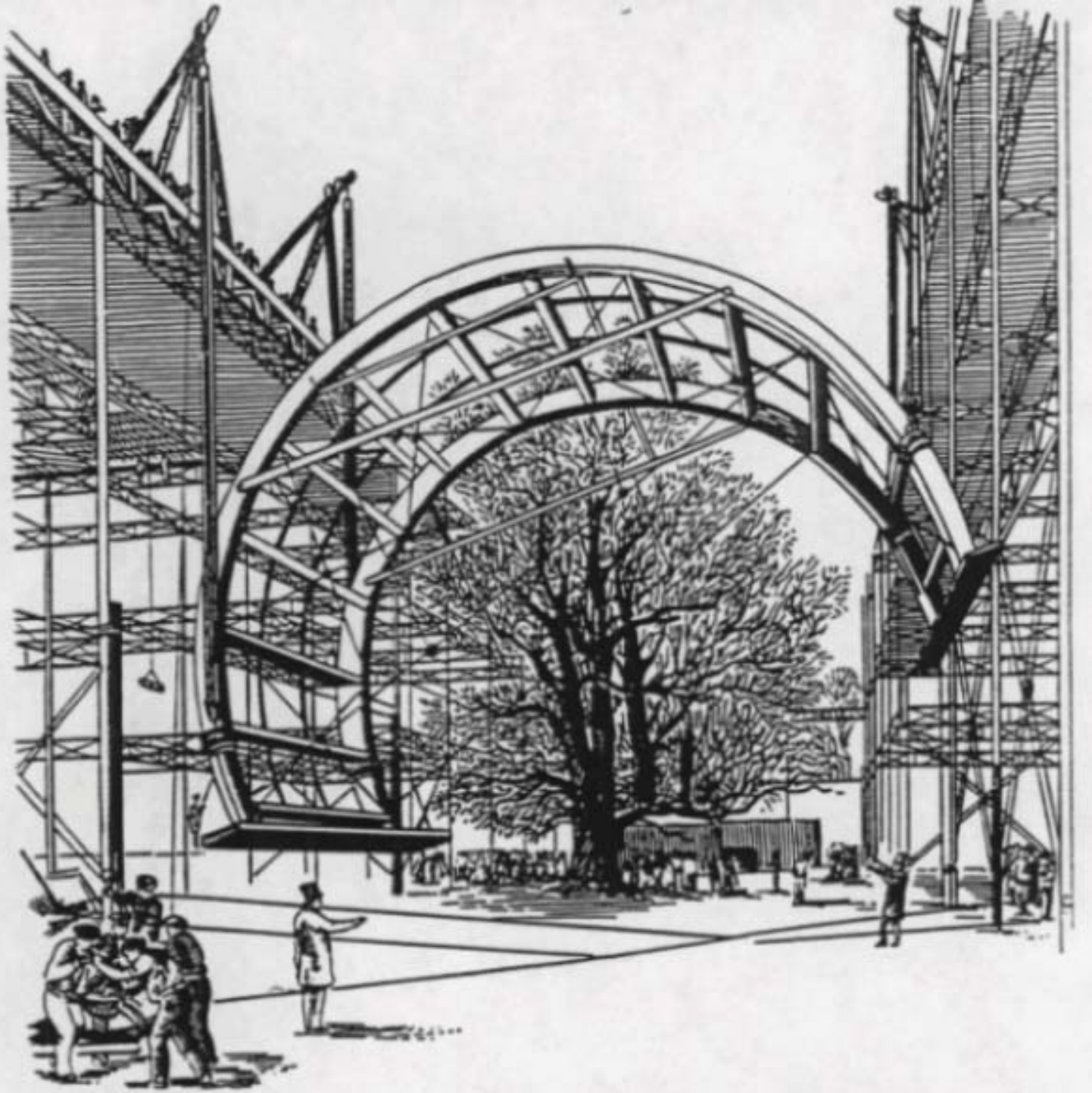


FIG. 202. Raising the first ribs of the transept roof of the Crystal Palace, 1850

This was also an epoch whose intellectuals saw it (with pride) as that of “imperialism”:

> The age in which the major European powers (and, from c. 1900, the United States) divided up the rest of the world the best they could as colonies.

Even in this context, the scientific and technological triumphs were seen as proof of “Western” superiority and hence as legitimization of the imperialist undertaking –

most strongly perhaps in the Anglo-Saxon countries

– those very countries where scientific rationality (be it Darwin, be it Assyriological discoveries about the Near East) encountered the strongest opposition when it came into conflict with fundamentalist readings of the bible.

So, when early Chinese Universities were founded under American inspiration and protection, this may have been part of the agenda of the Christian American partners.

But, in a saying from my country,

Man predicts
God decides

(mennesket spår, men Gud rå'r)

At least, a certain library assistant at Peking University with given name Zedong, former student of another Normal School, does not seem to have taken over this part of the agenda.