

## **OVERVIEW.**

### **Science and Religion in Byzantium: a preliminary mapping of the field.**

The NARSES program, based on a collective and multidisciplinary research, focuses on the historical modifications of the boundary between secular knowledge and religious thought and beliefs in the field of the conception of Nature and Universe.

Without abolishing their distance, it aims to expose in a thematic data base (which will be accessible in the end of the project in November 2015) the common perspectives and the way the interface between Sciences and Religion in relevant periods

- contributed to the formation of mentalities and representations of Nature,
- reflected on the official institutions,
- influenced intellectual, spiritual and practical life,
- determined the way Man (individuals and groups) understood the articulation between self-knowledge, knowledge of the natural world and knowledge of God.

The present paper aims to provide an initial but illuminating account of the work already accomplished for the Byzantine period essentially between the 5<sup>th</sup> and 15<sup>th</sup> centuries.

After a preliminary presentation of our current progress until now (May 2014) and the general, conceptual framework of our research still in progress, we shall present in brief some remarks on texts and writers selected before closing with a thematic classification of the problematics and topics that we have already explored for the period below. The project is built around a specific periodization which aims mostly to delineate conceptual eras according to major turning points in the History of Religion and Ideas, and acts as a flexible framework.

## **OBJECTIVES AND METHOD.**

Our participation in the NARSES project began in March 2013. Until March 2013 our research had been concentrated on the following main directions.

First of all, we had to locate, collect and classify the primary Byzantine sources (mainly from 6<sup>th</sup> to 12<sup>th</sup> and from 14<sup>th</sup> to 15<sup>th</sup> c. AD) related to the core

concepts of the program and prepare a working-list of prosopographical entries, concerning the writers of texts and passages selected, which will be included in the data base under construction.

Our contact with Byzantine primary sources revealed us from the outset the wide range, the richness as well as the complexity of this research field. We had to deal with a very divergent entity, which requires time and effort to be adequately scrutinized and analyzed. Formed by texts originated from very different conceptual fields, various literate forms and unequal levels of analysis, the diversity of approaches draw a large perspective for further understanding of the plurality of the Byzantine Thought-World on Nature in the crossroad of natural sciences and Religion. It also underlines the immense research work that remains to be done in this direction, in an effort to elucidate not only the history of natural sciences in Byzantium but, in a boarder perspective, the character and goals of natural sciences in pre-modern societies.

The variety of texts selected until now and the different conceptual frameworks in which the interaction between Sciences and Religion took place in Byzantine thought made us clear that complementary work was necessary; a research on the evolution and the various significations of concepts and terms in diverse contexts and on the changing perspectives that arise across different centuries. We had to clarify *homonyms* in order to avoid crucial misunderstandings and several anachronisms.

For all these reasons, a main part of our research, within the texts located, was devoted to the selection and study of the secondary bibliography concerning

- specific concepts, topics and writers,
- the intellectual history of Byzantium in relation to the major turning points in the history of Religion,
- the institutions involved (political, religious and educational).

In the light of this work, we reappraised the selection criteria of texts and mapped in a more appropriate way the terminology, the concepts and the articulations between different periods, writers and contexts. Secondly, it helped us to deal with the topics in depth and introduce this material in the commentaries of the texts as data base metadata.

It helped us also to put our work in a broader perspective with the aim to demonstrate the contribution of Byzantium thought as a central pole of the intellectual, spiritual and scientific identity of Middle Age. Forming the link between Late antiquity and the new worldview of Christian Revelation, Byzantium did not constitute only the guardian and the transmitter of textual heritage of Hellenism but acted as a active filter, a permanent denominator of dynamic feedback between East and West.

## GENERAL CONCEPTUAL FRAMEWORK.

Starting our research on the relation between Sciences and Religion in Byzantine Thought we had to deal, first of all, with our modern conceptual prejudices on the basic concepts of the research field and their dynamic interaction: Science - Religion and Nature.

And this because it is difficult to apply terms from one culture to another, especially when those cultures are separated by time and by place. In fact, we had to identify modes of thought and discourses that could be associated with natural Sciences and to decode them in their own terms and within their proper historical contexts.

Thus, it was vital for the progress of our work to elucidate the fundamental, conceptual structure, the back drop of possible Byzantine discourses on Nature between Science and Religion.

As texts indicate, the concept of Sciences is not an immovable one or uniform in all Byzantine writers and contexts. However, it seems to be dependent principally of two conceptual traditions; Greek Philosophy and Christian doctrines.

At first sight, our exploration in Byzantine texts permits us to see that the concept of Sciences had a wider signification in Byzantine texts, than today. Byzantium has incorporated more or less transformed the philosophical heritage of Late Antiquity in its vision of Science.

The ancient concept of Sciences had acquired its basic meaning formed mainly by philosophers, especially Plato and Aristotle. Their conception of Science and especially natural Sciences was associated with the vision of a coherent Universe, a model of Perfection and Goodness serving as a guide to wisdom and happiness. The rational order of Cosmos had to be imitated and transformed in human experiences, self-knowledge and perfection. The way the World worked and the Meaning of Life, in all its expressions, were closely interconnected.

During Antiquity, Sciences were strictly linked to Philosophy and constituted a part of it. Therefore, the understanding of Nature had a more comprehensive character, which included metaphysical principles. Natural order was not conceived as separated from transcendent causes and formal principles. Consequently, natural sciences were related to areas of Knowledge and experiences (spiritual and metaphysical), which today are not conceived as strictly scientific. This conceptual relation between Nature and divine causes will persist, modified and associated with the Christian conception of God, in the Byzantine view of Nature as it intersects with Sciences.

In the same time, Christian Revelation, Incarnation of Christ and God's Transcendence introduced crucial changes in the way natural Sciences were conceived in Byzantine Thought. The radical otherness established between

the *Created* and the *Uncreated* world allowed for a clear distinction between them. It shaped the proper distance so that Man could begin to question the physical world breaking the shell of holiness and magic that surrounded it and to gradually provide, not without regressions and gaps, a distinction between Natural from Supernatural by the rational search for physical causes.

The accent placed on the doctrine of God related to the World as Creator, on the History of Salvation and on a personal, suffering God (Christ) coming on earth and in time once and for all. The conceptual Heritage of Late Antiquity was transformed by the insertion of new conceptual categories and attitudes toward Nature reflected also on new literacy forms and discourses concerning it.

In contrast to ancient philosophy, Christianity placed Man in the center of the *Created* cosmos as its ultimate purpose. In consequence, we have a gradual transposition of the Cosmology into Anthropology related to Christology. The emphasis is very much on the strong interconnection between Sciences and Knowledge of God through Anthropology. In this perspective, Sciences can be considered as an appropriate path to ethical ordering in man's earthly existence and a kind of constructive mediation between Man and God Creator.

According to this, studying and practicing natural Sciences include not only cognitive and practical goals. Observing, understanding and transforming the natural world are also linked to existential purposes and eschatological challenges, to mystical views of Nature proposing to guide individuals to union with God and doxological attitudes toward Creation and Creator through Contemplation and Aesthetics.

So, it became rather obvious for us that when studying the Byzantine texts, we must face a multitude of stratifications, where different types of knowledge and rationality converge in the formation of the concepts of Nature, and where natural sciences intersect with the conception of God. In reality, we have to deal with a permanent, constitutive feature of the Byzantine Identity that takes the form of a tension between Hellenism and Christian Revelation and the religious reconstruction of ancient epistemology.

The doctrines and methodological tools of Greek philosophy have been widely employed by Byzantines in the formation of Dogma, in the cognitive dimension of Christian Religion (Theology) and in Spirituality. The appropriation of Greek wisdom, implicitly or not, passed through many filters. It survived transfigured in many versions, by different focalizations and orientations ducted by the intellectual or spiritual priorities of each writer but also by the political, ecclesiastical and educational circumstances of each epoch.

Yet the relation between Philosophy and Religion was not unidirectional. Christianity, as well, did not leave the notion and essence of Philosophy unaffected. It stretched it, starting with the Apologists of the 2<sup>nd</sup>

century, in order to incorporate the ideal of Christian ascetic life, conceived as the true philosophy that teaches man to become resemble God and to accept the divine plan of Revelation as the guide principle of its whole education and being.

Byzantines studied, read (manuals, anthologies and paraphrases rather than original texts), copied, summarized, commented, taught and transmitted Greek Literature and Thought. In assimilating Hellenism, they provided willing or unwilling misinterpretations, doctrinal distortions and eclectic use of Ancient Philosophy, mainly in order to harmonize it with the delicate dogmatic principles of Christianity. They also depended on Hellenism as a motive-force for proposing *rectifications* or *amplifications* of the dogmatic possibilities of Orthodoxy. However, this assimilation, which began with Clement of Alexandria and the Cappadocian Fathers of the 4<sup>th</sup> century, was not at all linear, monolithic, and not quite as creative.

From a first view, the interconnection between natural Sciences (under the auspices of Philosophy) and Religion in Byzantium seems to be evident, if we examine not only the educational institutions, manuals and the studying program in higher education institutions, especially from the 9<sup>th</sup> century, and if we also realize who the writers were; theologians and scholars who had studied, taught and practiced natural Sciences, a several number of who were statesmen, churchmen and monks.

It is evident that we are dealing with a minority of people found in the upper classes of social, ecclesiastical, educational and political hierarchy who had access to the culture transmitted in higher education, preserved in libraries and discussed in intellectuals groups; teachers and pupils of official institutions as well as privileged, single readers.

However, only this fact cannot explain or help us elucidate the complexity and plurality of the connection between Sciences and Religion. On the contrary, it may obscure the fact that this relation has not always been harmonious and peaceful, especially when philosophical and scientific doctrines intertwined delicate, dogmatic questions (concerning for example the Creation of the World *ex nihilo* or the notion of Providence) or proposed different methods of Knowledge and diverse approaches of reality and natural causes. If Medicine seems to have a more or less practical and neutral character, this is not equally valid for natural Philosophy, Meteorology, Mathematics, Astronomy, the Occult Sciences (Astrology and Alchemy) and Psychology as far as their conclusions could be seen as being alienated from the spiritual and intellectual heart of Christian dogma concerning Man and Cosmos.

Thus the relation between Sciences and Religion was much more ambiguous. It also gave birth to conflicts, polemics and ruptures that broke the symmetry between them, especially when Religion claimed the monopoly

of true wisdom. This fact had several consequences not only for the promotion of the rational understanding of Nature, the formation and the autonomy of a scientific culture in Byzantium but also for the consolidation of a total being and acting in the world and History conform to the Christian quest of being both worldly and divine.

In this general perspective and with the purpose to highlight the integrative power of Byzantine thought and the dynamics of the two intellectual and spiritual traditions converging in the conceptual field of our research, we deemed necessary to indicate the importance of the two groups of texts which we will incorporate in the data base:



*The Church Fathers*, an 11th-century Kievan miniature from Svyatoslav's Miscellany

- The first includes texts and writers from the **Patristic tradition** (especially from the 4<sup>th</sup> to 8<sup>th</sup> centuries). Patristic thought inaugurated the synthesis between Greek natural philosophy and medieval faith in the field of the conceptualization of Nature and the *Created* cosmos and established new doctrinal axes relating to Christology, Anthropology and the Knowledge of the Universe in the view of the transition to the Christian *weltanschauung*. Forming the hard core of Eastern Christianity, its impact on

intellectual and spiritual life of Byzantium remained across the centuries; a solid and timeless point of reference for Byzantine scholars and writers and perhaps even the rule for the evaluation of Orthodoxy of spiritual, theological and philosophical interpretations expressed.

- The second, concerns **Neoplatonic authors and commentators of Aristotle** (from 3<sup>rd</sup> to 7<sup>th</sup> centuries), pagan (Iamblichus, Hierocles, Priscianus, Syrianus, Proclus, Damascius, Olympiodorus and Simplicius) and Christians (Synesius of Cyrene, Aineas of Gaza, Zacharias of Mytilene, John Philoponus, Elias and David). On this, we need to make a brief digression on Neoplatonism in order to justify our selection of their texts, because they cannot be considered as strictly Byzantine.



Christians and Neo-Platonists lived in interaction, in an ambiguous, rather fragile and complex relationship that almost took the form of Polemics. Neoplatonic doctrines throughout the entire Byzantine period (4th to 15th centuries) contributed to the development of Christian doctrines. On the other hand, they provided a rival worldview that was also perceived by a number of Christian thinkers as a menacing deviation from their own intellectual and spiritual identity. Despite their differences, expressed in refutations by the Church, Christians and Neo-Platonists shared many concepts within Theology and Spirituality. If Plotinus and Porphyry had influenced Patristic Thought and the Spirituality of the 4<sup>th</sup> century, the impact of Proclus remained active but veiled through the works of pseudo-Dionysius, and Maximus the Confessor, as well as the theologians influenced by him.

Neoplatonism – especially in its later version after Iamblichus and especially with Proclus and his successors in the philosophical schools of Athens and Alexandria – represented the most synthetic form of Hellenic Philosophy in Late Antiquity. Based on the golden rule of *harmony* (the famous *συμφωνία*) between Plato and Aristotle but also on the harmonization of Orphic, Pythagorean and Chaldean Theology with Platonic Theology, Neoplatonism incorporated not only a panorama of earlier Greek philosophers by using and reformulating their doctrines. Placing the contemplation of the *Ineffable* as its ultimate purpose beyond reasoning, it associated Philosophy to Spirituality. By this way, it contributed not only to the intellectual but also to the spiritual formation of two Monotheisms, Christianity and Islam. Transmitted in the Middle East and then within the Islamic world, mainly *via* the 9<sup>th</sup> and 10<sup>th</sup> century translation movement of Byzantine manuscripts from Greek into Arabic, Neoplatonism returned transformed to Byzantium, through the Islamic and Latin influence, sustaining the scientific movement of the Palaiologian *Renaissance*.

With its pyramidal structure, the neoplatonic view of reality offered a broad spectrum of interpretative possibilities in the view of divergent focalizations on different levels of representing different modes of living.

So, it fed the – rather hostile to rational Knowledge and sciences most radical Byzantine Mysticism – rejecting any discursive mediation between God and Man.

On the other side, when Christianity became dominant, especially after the second half of 9<sup>th</sup> century, having established and even rigidified its religious framework of belief, alternative systems of thought and sensibilities sprang, related to the reactivation of Hellenic philosophical heritage, making possible -not without reactions by the official Church - the opening of faith, through syncretism, to rationality, tolerance and plurality. Eminent scholars and great scientists of Byzantium draw mainly from neoplatonic doctrines and adopted critically its exegetical tools and demonstrative methods in their understanding of Nature and material world providing the idea that natural

sciences could be a path to the divine wisdom manifest in the *Created* world, compatible to Christian doctrines.

We must underline that especially for the pagan Neoplatonists commentators of Aristotle, natural sciences are considered as a preliminary but indispensable stage for self perfection and Knowledge of God. Closely related to the discursive methods of Mathematics, they prepare the access to a superior level of reasoning beyond senses, which culminates to the science of the divine, thus establishing the anagogic movement from Knowledge of the physical world to Metaphysics, Contemplation and finally intuitive Union with the First Principle.

In addition to all these, we must note the exegetical and scholastic dimension of Neoplatonic Thought taking almost the character of a spiritual exercise or of a prayer. The exegetical tradition of the philosophical Commentary marked the transition from Antiquity to Medieval Thought.

The philosophical commentary will be adapted by Byzantine scholars (such as Michael Psellos, John Italos, Nicephorus Blemmydes, Eustratios of Nicaea, Michael of Ephesus, George Pachymeres, Maximus Planudes, Theodore Metochites and George Gemistos Pletho), especially after the 11th century, when the revival of the critical interest in Plato and Aristotle coincided with the request of a sophisticated exegetical activity appropriate to provide rational research of physical causes. Between tradition and innovation, by a selective use and critical interpretations, they reshaped its form (in *epitomes*, *paraphraseis*, compilations, collections) and contents in order to serve their own speculative goals and hermeneutical priorities conforming to the context (educational, spiritual and political) of their exegetical work.

For all these reasons, we estimate that this group of texts (as, for example, selective passages of the Neo-Platonist commentators to the four physical treatises of Aristotle related to the Philosophy of Nature (*Physics*, *De caelo*, *De generatione et corruptione*, *Meteorologica*, of Proclus' commentaries *On Timaeus* and *On the Elements of Euclide*, as well as of the *De communi mathematica scientia* and *De Mysteriis* of Iamblichus) could offer crucial conceptual keys for a proper understanding of Byzantine developments concerning Nature and Knowledge of the natural world. It could allow us to identify and illuminate some still unexplored fields of Byzantine scholarship connected to natural Sciences but also to bring up parallels between pagan and Christian thought and new focalizations on a variety of subjects (such as the conceptions on Nature and its explanatory principles, the formal and material causation of the physical world, the concept and goals of natural contemplation/φυσική θεωρία but also several historical information on scientists and doctrines).



## INDICATIVE CLASSIFICATION OF PROBLEMATICS AND TOPICS IN BYZANTINE SOURCES CONCERNING THE RELATION OF SCIENCES AND RELIGION ON THE CONCEPTUALIZATION OF NATURE.



Illumination from the ms of the "De animalium proprietate" of Manuel Philes, Paris, 1564, f. 13r.

The textual material selected during our research, covering almost a thousand years of intellectual production, is too large and various to fit into modern conceptual categories and rigorous demarcations.

First of all, we had to cope with the constant interconnection between different conceptual fields that seems incompatible to modern representations. So, for example, a treatise on cosmology could be closely related to psychological doctrines (as in writings of Anastasios of Sinai), or the symbolic description of an animal compounded to the dogma of the Saint Trinity (*Physiologus*).

This fact can be in part explained, as we have already mentioned, by the plurality of intellectual identities of Byzantine authors; a Theologian could give explanations on natural phenomena as the earthquakes (Ephraem Syrus - 4<sup>th</sup> c.), a Philosopher can write poems on the creation of the world or describe in medical terms the process of an illness (Michael Psellos – 11<sup>th</sup> c.), a doctor-philosopher a poetic exhortation to the sciences of the *quadrivium* (Joseph the Philosopher), a Historian poems with astronomical contents (Constantinos Manasses – 12<sup>th</sup> c.) and an Emperor a public defense of Astrology (Manuel Comnenos – 12<sup>th</sup> c.) or a demonstration on the Heaven and the stars in relation to human psychology (Theodorus II Ducas Laskaris – 13<sup>th</sup> c.).



Lion of the *Physiologus*, 16<sup>th</sup> century, Austrian National Library, Cod. Phil. Gr. 290.

Medieval authors were moving comfortably among different disciplines of knowledge. This proves to be a more holistic and plural understanding of the relation between sciences and religion in the way Man is related to Nature and natural phenomena, in a way that demands a modern appreciation for interdisciplinary approaches of these topics.

This variety of discourses on Nature (intersected with sciences and religion) is also reflected on the diversity of the literary genres in which they can be detected. During the localization and selection of passages and texts, which we will include in the data base, we had to research:

- philosophical commentaries, compilations and texts in dialogue form,
- catenae of biblical (literal and allegorical) interpretations,
- collections of exegetical extracts on patristic literature,
- spiritual homilies for educational and apologetic purposes,
- theological texts,
- scientific treatises,
- *Paradoxography*: descriptions of *mirabilia*, marvelous or miraculous objects and Phenomena of the natural world connected to their incomprehensibility,
- encyclopedias, *Lexica*, Anthologies and *Florilegia*
- poems and rhetorical descriptions of places, buildings, objects and natural phenomena (*ekphraseis*),
- Chronicles
- Manuals for War and Army,
- Hagiographical texts,
- text books for Teaching and Acting,
- Polemics and Refutations,
- decisions of Ecumenical Councils and Synodical texts, as well as official condemnations by the Church,
- Laws,
- anthropological treatises,
- Letters and Autobiographies,
- Narrations about natural and supernatural experiences,
- Verse romances,
- dream books,
- alchemical, astrological, apocrypha and magical texts.



*Ouroboros*, from a Byzantine Greek alchemical manuscript, Par.gr. 2327 (Chandax, 1478).

Even if it is too risky to systematize the enormous quantity of texts to be evaluated and introduced in our data base, we propose:

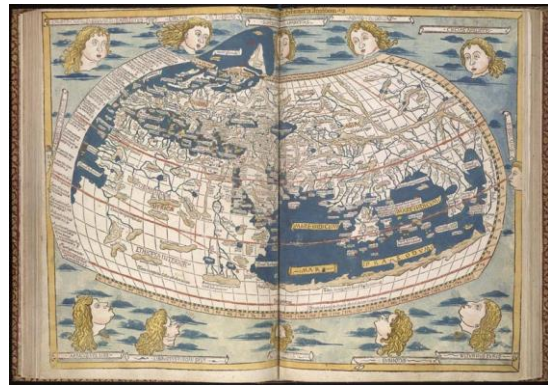
- an indicative classification, based on the conceptual areas formed by the cardinal notions of *NARSES* Program: Nature - Science(s) - Religion within their interrelations, associated with
- a number of concrete examples of texts and authors, selected until now.

## I. NATURE

**1. Cosmogonies and cosmographic texts (full or in passages)** concerning mainly the creation by God and the rational organization of the *Cosmos*.

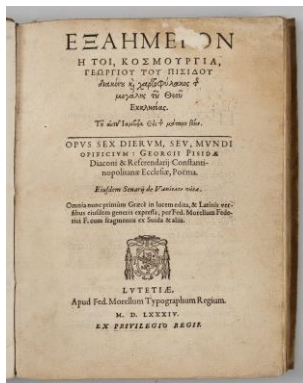
In this category, we have located descriptions, narrations, poems, homilies and treatises on the coming on Being of the whole sensible Universe, the operations of its fabrication and its structure, as well as the divisions and the different regions of the inhabited land (*Oikoumène*), covering a spectrum of approaches embracing mythic, symbolic, scientific and religious elements.

Among them, the corpus of *Hexaemera* occupies a primordial place. The interpretations and commentaries of the book of *Genesis*, started with apologists and Theologians of the first centuries of Christianity (as Justin, Irenaeus, Origen, Ephraem, Diodorus of Tarsos, Cyrillus of Alexandria, Saint Athanase, and others), became a proper Christian literacy genre with the Cappadocian Fathers. St Basil of Caesarea and St Gregory of Nyssa, commenting on the six days of Creation as described in *Gen. 1:1-26*, provided systematic interpretation of Christian cosmogony elaborated in philosophical terms borrowed from Greek philosophy (Aristotelian cosmology) and scientific knowledge (Ptolemaic astronomy) of their time, with the aim to elucidate the didactic and ethical character of Nature and natural phenomena edifying man in the Christian conception of the created world as a *Book* provided by God for human salvation. The tradition of the *Hexaemera*, or more precisely of their main topics, continued more or less transformed in form and content (Procopius of Gaza, Eustathius of Antioch) and culminated with John Philoponus, *De opificio mundi*. Standing in the tradition of the *Hexaemera*, Philoponus discussed the biblical text in relation to philosophers



Claudius Ptolemy, *Cosmographia*, Ulm, 1482, Library of Congress.

like Aristotle, Plato and Ptolemy as well as to St. Basil the Great, whose treatise on the creation served him as inspiration. This text is considered by modern scholars to be the first scientific commentary on the six days of creation, elaborating the synthesis between biblical cosmology and pagan scientific knowledge.



The emergence of the *Hexaemera's* issues was constant across the centuries in Byzantine literature (for example in the work of George of Pisidia and

Michael Psellos), reshaped in various genres, reanimated by new focalizations and doctrinal extensions, including classical natural science, biblical text commentaries, spiritual allegory, Patristics, Christology and echoes of Late Antiquity's conception on the *World Soul*. Its transformations were closely linked to several turning points of the intellectual and religious history of the Empire, as the Iconoclasm or the reactivation of Greek Philosophy.

The corpus of the *Hexaemera*, assimilating the Christian worldview of *Genesis* and the conception of the Demiurge in Plato's *Timaeus*, shaped the dogmatic framework in which Christian natural philosophy and cosmology were to be elaborated in the following centuries in relation to the spiritual conception of the physical universe's participation in the history of Salvation and Redemption. By its constitutive character, it traced the contours of Christian worldview's particularity not only against the rival pagan Emanationism (considering the creation of the World as an unwilled, necessary and spontaneous outflow of descending perfection from an infinite, unchanged and transcendent first Principle) but also against the heretical views of the Gnostics and the dualistic heresies flourishing in the Later Roman Empire.

On this point, and in parallel with the *Hexaemera*, we found necessary to incorporate into the database a number of texts and passages originating from the anti-Manichaean Literature of Christian authors (as Alexander of Lycopolis, Cyrillus of Jerusalem, Epiphanius of Salamis, John of Damascus, Photius, and Georges Monachus) offering relevant expositions and refutations of *heretical* cosmogony related to physical categories as Matter, Time and Light.

We must remind that Manichaeism, in its multi-fold character manifested in Byzantium through diverse heretical dualistic movements, was considered by the Byzantines as a *barbarian* menace to their spiritual identity and was regularly attributed as an accusation against dissident religious groups professing different conceptions of God and of subsequent worldviews (against Manichaean, Ophite, Marcionite, Arianist, Monophysite, Monothelite, Paulician, Bogomile heresies, as well as for the Iconoclasts emperors and the Arabs).

2. **Cosmological issues** linked to astronomy: narrations, observations and explanations about the substance, the movement, the function and the finality of the celestial world and phenomena (planets, stars and comets, the theory of the four constitutive elements of the universe) and about Earth.

3. Descriptions and explanations of **physical and meteorological phenomena** (floods, overflows, tides, winds, rain, thunders, earthquakes) and

reports on **natural catastrophes**, extending from scientific explanations of natural philosophy on lyrical approaches and from the occult on purely theological interpretations.

4. **Major notions of natural philosophy** as Matter, Time and Eternity, Place, Vacuum, Light, Change, Progress and Finality of the natural world, Infinity.

5. **Descriptions and rational explanations of miracles, marvels and dreams related to the natural world:** between rational investigation, scientific demonstrations and supernatural interpretations. On this section, the Lives of Saints offers us a large spectrum of material on medicine and magic practices. (St Cosmas and Damianus).

6. **Animate and inanimate sensible universe as the vegetative and animal world** (plants, trees, animals, birds and fishes) but also **stones**. We intend to present them not only in their physical reality (treated in the framework of botany or zoology) as such or as objects of medical material but also in their symbolic dimension underling the cosmic sympathy (George of Pisidia: *Hexaemeron*, Iamblichus: *De mysteriis*) that penetrates the whole Creation, the analogies and the affinities between different forms of living. The natural world, as a symbol related to spirituality (*Quaestiones et dubia* of Maximus de Confessor), ethics and occultism (as in *Physiologus*) became a *program* to be realized according to the universal *sympathy* and the imitation and reproduction of the creative action of God in the level of human live and physical reality.

Equally, we have analyses and interpretations in the opposite direction, aiming to demystify the physical phenomena (as in John of Damascus and in Psellos) with the purpose to avoid the confusion between Magic and religious or to provide rationality as the only appropriate manner to penetrate physical laws and causes of natural phenomena.

7. **Natural environment and spiritual ecology:** descriptions of the Earth, rivers, mountains and the climate. We located diverse points of view standing between scientific descriptions and a kind of spiritual ecology towards Nature - a doxology of the world especially in Patristic and spiritual writings.



Two Partridges from a 4<sup>th</sup> c. Mosaic Floor in the crypt of the Aquileia Basilica.



Illustration from a Byzantine manuscript Bible.

8. In the light of the previous classifications, we aim to describe the fundamental **concept of Nature**. Nature and natural are conceived as the large living mainly related to a prime level of reality concerning bodies (Plotinus, *Enn.* IV. 4. 18. 1ff.) and sensibility, material world and natural environment. Nature is also defined:

- as the principle of generation and change of natural phenomena,
- as the inner source of motion and rest of beings,
- as the activity which specifies the singularity of each being,
- as irrational formal principle,
- as the *ultimate life* giving birth to natural beings, unifying and activating them,
- as the *logoi* of beings, their invisible and spiritual reality beyond senses,
- as the cosmic laws, according to which the universe functions.
- as the reservoir containing hidden the totality of *seminal reasons* of all beings.

Nature is furthermore considered to be involved in the same adventure of Salvation with Man (Maximus the Confessor, *Mystagogy*) conforming to which everything natural participates in a process of perfection. It is also conceived as the “*hand of God*” (Michael Psellos, *Omnifaria Doctrina*) or as “*the Book*” (Origen) supporting Man to decorticate it and participate in the knowledge of the created beings. The contemplation of Nature and the interpretation of the Scripture are conceived as the two royal paths to the knowledge of God Creator. In this framework, Nature is not only the object of observation and rational investigation requiring the material causality of its phenomena, but also the sphere of *hidden, essential reality* of each being and the space of God’s manifestation (Anastasios of Sinai, *Questiones et responsiones*).

9. The concept of Nature leads us to the major topics of **Physiology - discourse on Nature (φυσιολογία) and Physical Contemplation (φυσική θεωρία)**. These topics, originated from the ancient philosophy of Nature (Proclus, Simplicius, Philoponus, Psellos, Nicephorus Blemmydes) and reshaped in the perspective of biblical Revelation, bring together philosophical and scientific views on natural phenomena with religious premises and beliefs concerning the existence of the world and its teleological order (Clement of Alexandria: *Stromata*, Olympiodorus Diaconus: *Commentarii in Ecclesiasten*, Cyrillus of Alexandria: *Collectio dictorum veteris testamenti*, Evagrius: *Practicus –Capita centrum*).

10. **Macrocosm and microcosm:** the anthropological premises of the junction between sciences and religion in the understanding of Nature.



Creation of Adam, Capella Palatina, Palermo, 12<sup>th</sup> c.

In Byzantine texts, the speculation on Nature involves the discourse on Anthropology. Man is not simply conceived as *a world in small*, having the role of *Mediator* between natural and divine. In the framework of the personal conception of Creation, established by the Cappadocian Cosmology, Man is the recapitulation and the very reason of the existence of the universe by attributing it its Meaning, in order for Cosmology and *Physiology* to not be considered independently of Anthropology. The wise man (σοφός), scholar or spiritual, ask and experience the physical world through Knowledge or/and faith and contribute by reasoning and acting to its finality and perfectibility. Created *in the image and likeness of God*, Man had to explore the Unknown Whole decoding the plurality of its laws, working analogies between the different parts of it and, being engaged in the process of their mutual perfection beyond senses (Paul, *Rm.* 8 and 11, 2).

For these reasons, we estimate necessary to include a number of texts on human Nature (body and mind) [as for example: the *De natura homini* of Nemesius of Emesa, the *De opificio hominis* of Gregory of Nyssa and the *De nature hominis* of Meletius but also the small treatises on Soul of Psellos and the second section of the *Κοσμικὴ Δήλωσις* – entitled *On Heaven* – of Theodorus II Ducas Laskaris] forming the anthropological conditions on which the conceptions of rational Knowledge and sciences of Nature have been developed.

These conditions have not remained uniform and unmovable across the centuries. In a rather flexible framework, diverse focalisations and transformations of the *imago hominis* took place according to the major turning points of the history of ideas and Religion in Byzantium.

In fact, the conceptions on human Knowledge reflect the plurality of views and even the conflicts between Byzantine authors concerning the possibilities, the modes but also the limits of human understanding of Nature and God – what Man could and must investigate, know and do within physical reality and in which way, as well as if the comprehensibility of this reality was considered as open to Man or belonged to God alone.

## II. SCIENCE



*God the Geometer*,  
Manuscript illustration.  
Miniature from a  
moralized Bible of "God  
as architect of the world",  
folio I verso, Paris ca.  
1220–1230.  
Osterreichische  
Nationalbibliothek,  
Vienna.

1. **Definitions, variations and transformations of the concept of Sciences** in Byzantine texts across the centuries.
2. The *mathemata* of the *Quadrivium* (ἀριθμητικὴν, μουσικὴν, ἀστρονομίαν, γεωμετρίαν) and natural sciences: goals and purposes (research of causality, educational value, practical needs and soteriological perspectives).
3. **Classifications of sciences, objectives and methods:**
  - **Mathematics, especially Astronomy, Geometry and Numerology.**

Mathematics as an alternative method of access to the *bodiless* dimension of the physical world and their formative and propaedeutic value for Theology and spirituality (as for example in Michael Psellos, *Answer designated for the emperor Andronicus asking what is the purpose of the science of geometry* and in Nicephorus Gregoras, *Letter 42 To Helen Catakuzini Paleologina*).

The *demiurgical* powers of Numbers (as in Nicolaus Mesarites, *Epitaphius in Joannem Mesaritem*)

- **Physics.** Definitions, goals, methods and grade in the hierarchy of Knowledge. The relations between Physics and Mathematics.

- **Astrology** related to practical applications (army, education, government, navigation etc) and other fields of Knowledge and practice, as Geometry, Medicine, Alchemy, Numerology and Magic.

Similarities and differences between Astronomy and Astrology (as in the *Autobiography* of Nicephorus Blemmydes) but also between Mathematics and Astrology. The ambivalent status of Astrology; a discipline under question (Saint Basil, *In Hexaemeron* [Homely 1]), rejection (Theodorus Meliteniotes's *De astronomia libri III* [Libri 1], Michael Glykas's *Versus in Manuelem Comnenum*) and total (John Camaterus's *De zodiaco* and *Introduction in astronomy*) or moderate acceptance (Psellos, *Chronography*).

- **Meteorology.**

- **Medicine** as *science* and *art* and its relation to miraculous healing. Besides the medical texts, a number of passages from *Lives of Saints* offered us a



precious material for the intersection between science and faith in the field of sickness and health concerning not only the causes and the process of therapy but also the intellectual and spiritual/supernatural equipment of the therapist (as in Sophronius' *Narratio miraculorum sanctorum Cyri et Joannis*).

- **The sacred art of Alchemy:** Theory and methods of material transmutation. Using the occult forces of Nature, based on the doctrine of cosmic sympathy of natural phenomena and beings, related to the theory of the four basic elements of the Universe (fire, air, water and earth), alchemy through its operational and speculative dimensions was not reduced to an external transformation of matter but implied also a kind of *spiritual exercise* that engaged the Man as a whole in the process of a conversion, of a metamorphosis including material and sensible world.



Manuscript illustration, 12th c., Florence. Laurentian Library.

As a digital archive concerning Alchemy in Byzantium and in Greek speaking communities of the ottoman Empire is still in progress, in the framework of the DACALBO project, by the department of History, Philosophy and Didactics of Science (HPDST) of the Institute for Historical Research of the National Hellenic Research Foundation in collaboration with the Laboratory of Science, Education, Epistemology and Educational Technology of the University of Athens, we will rather focus on the theoretical than on technical dimension of Alchemy. We will insist on its philosophical, contemplative and mathematical background and on the psychological premises involved in the transformations of physical matter.



Hermes Mercurius Trismegiste. Mosaic from the Cathedral of Siena, 1488

4. **Sciences in lower and higher Education** : textbooks, teaching manuals, programs of studies (as the *Quadrivium* of the unknown writer of 1008, the *Omnifaria Doctrina* of Psellos, the *Epitome physica* of Nicephorus Blemmydes and the *Quadrivium* of George Pachymeres) and list of disciplines (as in *Vita Joannis Psychaitae*).
5. **Applications of Science** in practical, material and liturgical life: eclipses, description of clocks (as these of Procopius of Gaza and Constantinus Manasses' *Breviarium Chronicum*) and astrolabes, mechanics (as the *Parangelmata Poliorcetica* of the Anon. Byz.), automata, architecture and art influenced by (sacred) geometry, previsions (astrological *seismologia* and *brontologia*), calendars and definition of the date of Easter (by Psellos and Nicephorus Gregoras).
6. The concept of **Scientists (ἐπιστήμονες)** in Byzantine sources:



George Pachymeres, miniature from a 14<sup>th</sup> c manuscript, Munich, Bayerische Staatsbibliothek.

- The notion of **Mathematicians** (μαθηματικοί), **Geometers** (γεωμέτραι), **Astronomers** (οἱ τῆς σφαιρικῆς ἐπιστήμονες) and **Physicians or Naturalists** (φυσικοί or φυσιολογούντες) in Byzantine texts and the **changing figure of scholar** across the centuries.

- **Their self-consciousness** as scholars and authors, and their relationship to the intellectual dimension of faith and religious beliefs especially in relation to the understanding of Nature.

- **Their formation:**

- **institutional education** related to the official stand of the scholars and to the educational ideology And politic towards sciences or/and

- **individual training:** circulation of books, libraries, circles of scholars, place of intellectual fermentation, audience of scholars, academic pilgrimage and scientific exchanges outside Byzantine Empire. Travelling in East and West, missions and emigrations.

- **Famous masters and pupils in the field of the sciences of Nature.**

A group of autobiographical texts (as for example a number of writings of Psellos, the *prooimion* of *Alexiad* of Anna Comnene and the *Autobiography* of

Georges of Cyprus), letters (as these of Synesios of Cyrene to Hypatia, of Nicephorus Gregoras to Theodorus Metochites) and passages of *Chronics* (as this of Theophanes Continuatus concerning Leo the Philosopher) provide us a detailed overview of the intellectual paths of prominent personalities in the field of Sciences and of the way scientific knowledge was produced and diffused in Byzantium, especially after 9<sup>th</sup> century.

**7. Science and society:** the social opinion and debates about scientific Knowledge (goals and methods) and scholarship ranged from admiration, acceptance or tolerance to criticism or controversy and reached sometimes the rejection of sciences. Accusations and exclusion of persons practicing them.



George Metochites, detail from a mosaic in the narthex of the Chora Monastery in Constantinople, 14<sup>th</sup> c.

### III. RELIGION

**1. Official ideology and public stand of the Byzantine Church and State** towards natural and occult sciences, practices and *Scientists* and Naturalists (mainly astrologers and magicians). **Interdictions and condemnations imposed by the imperial legislation and the canon laws of the Church:** for example in canon 36 of the Synod of Laodicea, canons 91, 61 and 65 of the Synod in Trullo, canon 24 of the Synod of Ankara, in the *Novelles* of Leo VI the Wise, the Justinian and Theodosian Codes, the *Eclogae* of Isaurus and in the *Synodikon* of Orthodoxy.

**2. Orthodox Theology and Spirituality: between tolerance, acceptance and refutation of natural sciences:**

- possibilities and limits of human rationality and scientific knowledge in the understanding of Nature and Cosmos,
- the educational value of sciences corresponding to an intermediary stage of knowledge culminating to the Knowledge of God,
- acceptance of the technical applications of sciences for the general good and the material needs,

- sciences considered as *a vain study* associated to the risk of alienation because of the relativity and the endless process of sciences which could separate man from real spiritual life,
- sciences could make man a prisoner of the limits of the natural order and of the sensible and material world, if they are closed on themselves,
- sciences could product illusions if they don't link Knowledge and faith in the Divine Providence and Revelation,
- sciences must embrace reason, faith and grace in the research of the natural causes beyond senses.

### 3. Religious-minded Byzantine beliefs and superstitions linked to natural phenomena. The Magic and the Occult.

In the borderline between rational and irrational, considered rather as a deviation both from authentic religiosity and from scientific Knowledge, Magic had a great impact on the everyday life of Byzantines, despite the official interdictions, persecutions and penalizations provided by the Official Church and the Intelligentsia.

Magic, however, represented also a form of *scientia experimentalis* combining the investigation of Nature's secrets and observation with the discovery of occult process enabling to act on nature and on the divine powers of cosmos.

Magic kept under control the anxiety of the Unknown linked to the secret powers of Nature and destiny.

Rituals of divinization, incantations, invocation of demons, receipts, sacred objects and magical images, names, words and place-names, numbers, shapes, animals, plants and planetary signs connected to occult properties, were blended with spiritual and physical concepts (coming mainly from the hermetic, neoplatonic and pseudo-Pythagorean literacy tradition), experimental operations and symbols borrowed from astrology, cosmology,

theurgy, demonology, medicine and pharmacology. By a syncretic fusion based on the central idea of the universal *sympathy* which made Magic possible, the Magician acts as a mediator in order to attract cosmic and divine powers which influence animate and inanimate world.



Coptic magic papyrus with a sketch of the Crucifixion, 6<sup>th</sup> century, British Library, Oriental Manuscript 6796



Bronze amulet against the evil eye, 5<sup>th</sup> - 7<sup>th</sup> c, Private collection.

A group of texts and extracts originated not only from:

- the magic literature (compilations and technical manuals, as the *Papyri magicae* [fragmenta Christiana] and the *Cyranides*), but also
- from the Hagiographic corpus (as for example, John Stavrakios's *Miracles of St Demetrius*, *The life of St Andrew the Fool*, *Life of St Hilarion*) containing narrations on miracles, on *possessed* men and exorcisms of demons,
- from verse romances (*Kallimachos and Chrysorrhoe*, *Libistros and Rodamne*) as well as
- from *Chronics*

procured us important data for the history of Magic and its connection to science and religious beliefs, illuminating in parallel the ambivalent, changing and plural figure of Magician conceived almost as a Saint in action, healer but also impostor. It is characteristic that the accusation against a *Magician* as a defamatory practice, addressed towards different persons (among clergymen, monks, Naturalists and intellectuals, as John Grammatikos and Photius) was frequent in Byzantium.

In addition, as we have already mentioned below, we localized texts and extracts expressing the critical reaction of *Physicians*, *Intellectuals* and *Theologians* towards Magic. With the intention to draw conceptual boundaries between Magic, Science and Religion, they used sophisticated arguments and rational explanations drawn from natural sciences in order to demystify the terrifying side of Nature (as in Psellos's *De Gillo*) and to reveal the natural causes of phenomena and marvels. We have also detected a more erudite and personal approach of Magic working through elaborated interpretations the transition from the supernatural to the symbolic meaning of it (as for example in Psellos's texts concerning the Chaldean doctrines and practices).

Eudoxie Delli