

ISIDORE OF SEVILLE: COSMOLOGY AND SCIENCE

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Abstract. The cosmology of Isidore of Seville was for decades underestimated as poor science. In reality, the schoolmaster of the middle ages presented in his writings a coherent cosmology, of which atomism was a part. Although based on authorities, ideas were carefully evaluated and presented, often with alternatives. In his approach to cosmology one can perceive the beginnings of scientific systematization within the available framework. Compared to later writers (for example Rabanus Maurus), Isidore exhibits healthy scientific spirit and resorts to theological data only when other information is not available or the alternative explanation would involve superstition. Recent interest in the anthropic principle also justifies interest in older cosmologies, particularly that of Isidore of Seville.

1. INTRODUCTION

The role of Isidore of Seville (c.560-636) as transmitter of not very precise astronomical information from the antiquity to the middle ages is well known. I would like at present to explore the idea that he did in fact play a significant part in development of scientific thinking, especially in cosmology. I will also examine shortly Isidore of Seville's ideas about and his relation to the anthropic principle Barrow and Tipler call Final Anthropic Principle (FAP) (Barrow and Tipler 1986, p. 23).

Recent research tends to emphasize the low information level of Isidore's writings. Nevertheless it is a well documented fact that especially the cosmologically significant *De Natura Rerum* (On Nature of Things) and the *Etymologiarum libri XX* (Etimologies) were regularly printed up to and including the seventeenth century, not as a curiosity, but as a reference book. It would be rather naïve to suppose that these works had no influence whatsoever during the centuries they were copied and stored in practically all the libraries of Europe.

2. COSMOLOGY AND SCIENCE

The sources for Isidore's cosmology included Aratus and Hyginus, but also Lucretius and Virgil. His most reliable source, however, was St. Ambrose and his exposition on seven days of creation *Hexaemeron Libri Sex*. There are also references to some works of Cicero, while the role of Plato's Timaeus and Chalcidius is under investigation.

The encyclopedic work of Pliny, *Historia Naturalis*, is widely used throughout the *Etymologiarum*, although it seems not to have significant role in the parts dealing with cosmology and astronomy.

The sources themselves are not very impressive. Ambrose wrote a sermon and not a scientific treatise, Aratus and Hyginus do not offer very high level astronomy and especially Hyginus seems especially interested in mythology. Plato and his Timaeus were already hopelessly outdated even by the standards of antiquity. The data on cosmology in Isidore show all the limitations of a restless age when culture was in decline. Where, then, we can perceive the significance of the bishop of Seville for the history of natural sciences and cosmology? In his methods. Anyone objectively examining the writings will clearly perceive two facts. First, to judge the level of information in the works by the standards of any previous or subsequent age would be a gravely whiggish approach. Second, the works not only contain clear methodology, but are a cornerstone in the separation of philosophy (in this case mostly natural philosophy) and theology.

Isidore's basic method is clear. Through providing the etymology of a word he clearly perceived to gain insight into the nature, origin and essence of things. The method is present in the earlier *De Natura Rerum* written around 612, but it is developed fully in the *Etymologiarum Libri XX*. While admittedly fanciful and relying much on imagination, Isidore of Seville developed a full scale methodology out of a common tradition practiced in greater or lesser extent by many authors of antiquity. By modern or even later medieval standards the method does not satisfy the requirements of science, it is nevertheless a systematic inquiry. It remained in use in some universities in Europe as late as the seventeenth century (Kallinen 1995, p. 55).

Science and theology are surprisingly clearly separated, especially in *Etymologiarum*. In popular opinion, the Church has always been in a way or another contrary to science, against progress. In the case of Isidore, not only is such idea absurd, but on the contrary, he may have set a standard for future generations how to treat worldly wisdom in a progressive fashion. His sources and predecessors, both pagan and Christian, did not separate the two realms even remotely as clearly as the bishop of Seville. In the case of Ambrose, who wrote primarily a theological work, it is understandable to back up his theological ideas with appropriate examples from nature. Hyginus (c. 64 BC-17 AD), on the other hand, did nominally write an astronomical treatise (albeit a poetical one), nevertheless most of the work, two out of four books, deal with the constellations and the mythological explanation for them (*De Astronomia* II and III.). Although one can get detailed information on mythology from the work, the basic astronomical data are limited.

Pliny the Elder (23-79 AD), who was famous for his encyclopedic work *Naturalis Historia*, provided more accurate information for those interested in astronomy. In cosmology, however, he was far from encouraging inquiring. In fact Pliny called attempts to measure the world and publish the results of the attempts madness. For him, the world itself is a deity (*Pliny Naturalis Historia* II, p. 1). He also perceived that the constellations are real figures impressed on the heaven (*Naturalis Historia* II, 3.).

Isidore corrected most of the shortcomings in his own writings. His treatment was a very clear, large and crucial step towards the development of scientific approach leading eventually to modern science. The significance of this fact was unfortunately so far mostly neglected. Modern research, starting with Duhem, although nominally acknowledging the intrinsic value of early medieval works, concentrated too much on evaluation of technical details. In that light, Isidore's work, but also the work of other early medieval scholars seem indeed insignificant for the development of science. Notable exception is the Venerable Bede, the favorite of historians for technical accuracy. In reality, the work of the really remarkably talented monk from Yarrow owes much to Isidore. True, Isidore, just like Hyginus, devoted relatively much space for explanations about the names of constellations and stars. Nevertheless he did this in complete accordance with the methodology of providing etymological explanations. Moreover while Hyginus showed no sign of criticism about mythological explanations, Isidore, naturally under the influence of his monotheistic Christian beliefs, dismissed these speculations as superstition and even stupidity (*Etymologarum* III, 71, 21-40.). Whereas for Pliny the figures of animals "impressed" in heavens were real, Isidore wrote:

Amazing is the insanity of the pagans, who transfer to heavens not only fishes, but also rams and goats and bulls, bears and hounds...¹

Although both Pliny and Isidore explained the origin of the word *heavens*, *caelum*, to come from *caelo*, to engrave, the bishop explains carefully that only stars and constellations can be found in heavens (*Etymologiarum* III, 31.), not animals. Pliny's use of words is completely different and he wrote about figures *of animals and all kind of objects*. There is indication in the text, that Pliny believed monstrous births to be the result of the seeds of various bodies from heavens falling to the earth (*Naturalis Historia* II, 3). Isidore had clear aversion to attributing effects on earth to celestial influence. In the earlier work, the bishop still described two possible solutions for the cause of tides in the oceans, but in *Etymologiarum* he dispensed the alternative attributing the tides to the attraction of the moon and left only the explanation of underwater vents (*De Natura Rerum* XL; *Etymologarum* XIII, 15.). He wrote explicitly about the difference between astronomy and astrology and condemned the later insofar as it is aimed at predicting individual characteristics of men or making conclusions about the state of their bodies and souls. In fact, he may be the very first author to make the distinction. I have no information of any earlier author and Tester claims Isidor to be *one of the first writers* without giving an example of others (Tester 1987, p.19.). Interestingly, what stimulated the writing of *De Natura Rerum* was the solar eclipse visible in Spain 612 and the desire to point out the natural causes of the phenomenon (McCluskey 1998, p.124.).

The separation between theology and natural philosophy is not perfect, but rather clear, less so in *De Natura Rerum* and more in *Etymologarum*. On the other hand one is looking in vain for perfect absence of theological terms or subjects from works

¹Et miranda dementia gentilium, qui non solum pisces, sed etiam arietes et hircos et tauros, ursas et canes...in caelum transulerunt. *Etymologiarum* III, 71, 32.

describing the realm of nature before the modern times and it seems that the works and approach of Isidore did set up a standard for tendency to separate the two fields. Naturally, if the separation would mean complete silence about God not only Isidore would fall short of the criterion but also the vast majority of more recent philosophers and scientists, including Newton, Kant and Hegel. The distinction of theology and philosophy is actually in recognition of the fact that the two fields start out with different premises; one is using revelation as a starting point while the other reason and the adjacent human faculties. The two can have common object, but their starting points differ (Copleston 1993, p.313.). The distinction is very clear in Isidore's *Etymologiarum* and after his time in most serious scientific and philosophical writings. In cosmology, this means giving natural explanations for the structure and working of the universe, and the most reliable account available.

Isidore resorts surprisingly seldom to explanations involving Christian theology or God. In *De Natura Rerum* there is still some symbolic interpretation of cosmological terms significant for theology, but much less in the *Etymologiarum*. Almost entirely absent from both works are cosmological explanations based on revelation. One notable exception is the dating of the creation of the world, but even that is due more to scientific authority than theology. Isidore had a very high esteem for Egyptian science and wrote about Egyptian origins of astronomy (*Etymologiarum* III, p. 24). In this, he was simply continuing the respectable tradition of the ancient Greeks. Pythagoras was said to have traveled to Egypt (Diogenes Laertius III.), although how much the account is reliable remains questionable. Plato claimed Egyptian origins for some of his cosmological ideas (*Timaeus*) and Herodotus advanced a theory about Egyptian origin of Greek religion and civilization. According to the Old Testament, Moses, who was considered personally responsible for the account of the creation, grew up in Egypt. One of the principal sources of Isidore, St. Ambrose, explained that Moses, who lived in the royal court as adopted son of the princess, was trained in all the wisdom of Egyptians (*Hexaemeron* I, 2.). Thus the biblical description of creation received double authority, both according to sacred and secular standards. Even later authors, such as Rhabanus Maurus had some difficulties separating the two realms. Matters based purely on revelation or pertaining to the domain of theology Isidore clearly treated in different works.

3. ANTHROPIC PRINCIPLE

Barrow and Tipler (1986) described several different variants of the anthropic cosmological principle, one of those being the Final Anthropic Principle, FAP. According to the principle, intelligent information processing will never become extinct. After reaching the Omega Point after billions of years, life will have control over all the existing universes and will have stored all bits of information possible. In other words, life will become omnipotent, omnipresent and omniscient (Barrow and Tipler 1986, pp. 677, 682.).

Isidore's *Sententiarum* is a purely theological work and as such, it deals with eschatology, the end of times. After their dead, the faithful are liberated from their bodies (they really wait for that moment) and live as pure souls with God for some time. At

the end humans, at least the fortunate elect, will in the resurrection exchange their corruptible body for incorruptible permanently and will enjoy the presence of God, omnipotent omnipresent and omniscient forever. The saints will be taken up to heavens, that is leave the sublunary realm behind. The hole world below the heavens was created for humans, but after the resurrection and judgment humanity will spread beyond the original boundaries and exist where Christ dwells (*Sententiarum* I.).

Even such simplified comparison brings out the striking similarities between the two ideas. Barrow and Tipler concentrate on physics to direct the reader towards the conclusion but lack coherent theory of consciousness, take granted that consciousness is based on structure rather than matter (cf. Dyson, 1979, p. 453.). They also assume that the Turing test can be performed satisfactorily and thus implicitly that conscious thinking is performed algorithmically. Isidore is weaker on the side of physics, but correspondingly have much more coherent theory of consciousness, at his time accepted by the vast majority of educated people. Both theories have in common implicit Platonism, the view that human consciousness can be separated from the body and stored elsewhere without any discomfort or disadvantage for the individual. They also have in common the realization of the fact that the ideas can not be maintained on purely scientific grounds, but require faith of one kind or another. Isidore, as we have seen, wrote or compiled a completely separate book and did not include ideas about resurrection in his cosmological texts. Barrow and Tipler remarked and stressed that the ideas of Strong and Final Anthropic Principles are speculations and should not be regarded as established facts (Barrow and Tipler 1986, p. 23.). Thus the standard was set in the seventh century and followed in the twentieth. We do hope the trend to continue and things pertaining exclusively to faith will not be mixed with science proper.

Isidore of Seville did have in *Etymologiarum* a remark reminiscent of the anthropic principle called the observation selection effect. Writing about the effects of the sun, he observes that God made the course of the sun over the earth diverse, lest the sun consume all vapor by passing through the same region every day (*Etymologiarum* III, 51. and more strongly in *De Natura Rerum* XVII, 3.) Again, we can not expect the seventh century bishop using modern terminology, but he can well be interpreted to say that if the course of the Sun (or, for hopelessly modern minded, the Earth) would be different, we would not be here to think about it.

4. CONCLUSION

Technical details of the cosmological texts written by Isidore, bishop of Seville are indeed of low informative level compared to later times, but not in any way strikingly primitive in their own temporal context. What was so far overlooked is the probable influence they exercised on subsequent generations as an example of clear methodology and separation of philosophy and theology and sound evaluation of what belongs to natural sciences. If works would be influential only because of their technical accuracy, much of the works of previous centuries would go out to become recycled paper.

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