
Generate the World. Circulations of the Genesis Models of the Solar System from the 17th to the 19th Century

L'engendrement du monde. Circulations des modalités génésiques du système solaire du xvii^e au xix^e siècle

Jérôme Lamy

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OUTLINE

1. Descartes and the creation of the solar system
2. Cyrano interprets Descartes
3. Plan of the issue

TEXT

- 1 This issue continues the general design of a history of ways of conceiving the solar system as we have previously engaged it. After exploring the conditions for the emergence of a conceptualization of the solar system (2018) and then the historicity of the elements that constitutes the solar system (2019), the aim is to understand how cosmogony has gradually emerged as a rational domain of speculation¹.
- 2 The stakes are high because the progressive constitution of cosmogony as a legitimate scientific object presupposes a series of breaks with other narratives of world engendering, those linked to religious beliefs or myths.
- 3 This deep anchoring of cosmogonic discourses invites us to grasp them from an anthropological point of view, particularly for the modern period. This is, in our view, the best way to understand the transformations taking place, to understand their causes, modalities and effects on the various fields of human activity in which they are taking place.
- 4 In their *Dictionnaire critique de la mythologie*, Jean-Loïc Le Quellec and Bernard Sergent summarize the anthropological processes that govern the production of cosmogonies in the following way: “the

birth or creation and ordering of the Universe, either spontaneous or under the impulse of primordial beings, who may be divinities responsible for its creation, generally within a void, an original nothingness or a first chaos². Anthropologists identify “two types” of cosmogony: on the one hand, those that “go hand in hand with theogony, insofar as the phases of genesis are linked to successive generations of deities”, and on the other hand, those in which “the creator absolutely precedes his creation, as is the case in Biblical *Genesis*³”. The modern age corresponds to a progressive distancing of religious frameworks in scientific practice⁴, which is not without major tensions if we think of the condemnations of Giordano Bruno and Galileo in particular.

- 5 The scientific cosmogony as it emerged in the West from the 16th century onwards, because it questions the very foundations of beliefs linked to the Christian religion, constitutes the focus of multiple theoretical reflections. And these reflections can be seen in works of literature as well as in philosophical treatises. At a time when the fields of activity are not yet firmly closed, the history of the engendering of the world is of interest to many scholars. The circulations are therefore numerous, which show how an object previously monopolized by theology has been invested
- 6 The question is all the more complex because, in the continuation of our two previous studies during which we collectively tried to understand how the solar system had gradually been conceived as an object in its own right, the engendering of the solar system presupposes an effort to unify the observed world. Copernicus’ theory, Galileo’s observations, Newton’s physics, Herschel’s discoveries, and Laplace’s hypotheses mark the history of rational approaches to the generation of the solar system. In this perspective, what we wish to bring to light are all forms of discourse that lie at the crossroads of philosophical speculation and astronomy, in this uncertain space where possible configurations of the universe – which we gradually understand is not the universe as a whole – provide the elements for a reflection on the beginning.
- 7 In this introduction, I would like to set the terms of our problematic precisely by questioning these movements and shifts in cosmogonic questions that characterize scholarly modernity. The aim here, there-

fore, is not to depict the series of scholarly propositions on the reproductive forms of the solar system, but to describe specific forms of conceptual mobility; we will identify the essential attributes of what constitutes less a rupture than a slow process of distancing oneself from revealed truth. In the absence of direct experimental evidence on the origin of the solar system, it is the solidarity of cosmogonic arguments in various systems of enunciation that constitutes the most common form of argumentation. This slow separation in no way signifies a renunciation of religion or belief in God on the part of the scholars who were animated by engendering question. What is at stake is not so much the reversal of individual values linked to religious belief as the possibility of elaborating a well-founded scholarly reasoning that questions recourse to the divine.

- 8 In order not to extend the demonstration indefinitely, I will concentrate only on the 17th century, targeting more precisely the translations that took place between the works of Descartes and Cyrano de Bergerac. Between the philosopher and the libertine, the cosmogonic subject provides the opportunity for numerous comparisons. Let us begin by noting the main lines of the generation of the solar system in Descartes' work; I will then discuss the cosmogony presented in *États et Empires du Soleil* to better grasp this scholarly crystallization of a generation of the world. Finally, I will very briefly present the different papers of this publication.

1. Descartes and the creation of the solar system

- 9 In the fifth part of the *Discours de la méthode*, published in 1634, Descartes set out some elements on the cosmogony of the solar system. Beforehand, he seemed reluctant to engage in the discussions of his time on the subject:

It would now be necessary for me to speak of several questions, which are in controversy between the Doctes, with which I do not wish to be at odds, I think it would be better that I refrain from doing so; and that I say only in general what they are, in order to leave it to the wisest to judge whether it would be useful for the public to be more particularly informed. I have always kept the resolution that I

had taken, not to support any other principle than the one I have just used, to demonstrate the existence of God and the soul, and not to receive anything for true, which did not seem to me clearer and more certain than the demonstrations that the Geometricians had previously made.⁵

- 10 The philosopher, however, assured that he had understood that “certain Laws which God has so much established in nature and has impressed such notions upon our souls” that he cannot “doubt that they are exactly observed⁶” This set of laws makes it possible to advance “several truths more useful and more important than anything he has ever learned before⁷”. Descartes formulated what is akin to a thought experiment:

I resolved [...] to speak only of what was happening in a new one, if God now created somewhere in imaginary spaces enough matter to compose it, and that he stirred the various parts of this matter in various ways and without order, so that he would compose a Chaos as confused as the Poet could not ignore: And that then he would only lend his ordinary assistance to Nature, and would let her act according to the Laws he had established.⁸

- 11 Descartes evoked the divine creation of a primitive chaos, from a matter already there. It is then organized according to the laws of nature. It is a double cosmogonic sequence that the philosopher imagined: on the one hand a divine intervention capable of generating an inchoate substratum, on the other hand a regime of structuring the world that emerges from the laws of nature, itself inscribed in God’s plan. Precisely, in the Cartesian hypothesis of a world yet to be created – for here Descartes does not speak of the solar system, but of the generation of another world – it is a question of understanding how “the matter of this Chaos should then dispose of its laws and arrange itself in a way that makes it similar to our Heavens: How however some of its parts should compose an Earth and some of the Planets and the Comets, and some others a Sun, and the fixed Stars⁹”.
- 12 Descartes was aware that his reasoning on the double divine production of the world (i.e. chaos and then the laws of nature ordering the celestial bodies) was riddled with contradictions. In particular, it was incumbent upon him to explain why God intervenes directly in the

generation of the first disorder, and that it is the laws of nature that produce a certain order (the laws of nature being themselves the result of divine intention). So God intervenes directly in the first case and very indirectly in the second. The philosopher therefore added:

It is far more likely that from the beginning God [...] made [the world] as it was meant to be. But it is certain, and it is a commonly accepted opinion among theologians, that the action by which he now preserves it is the same as that by which he created it: In such a way that, even though he would not have given the beginning any other form than that of Chaos, as long as, having established the Laws of Nature, he lent his assistance to it to act as it is accustomed to do, it may be believed, without harming the miracle of creation, that only all things that are purely material could, in time, have reached it as we now see them. And their nature is much easier to conceive when we see them being born little by little in this way, than when we consider them to be ready-made.¹⁰

- 13 The role of the divine is unquestionably ambiguous: at the same time creator of the laws of nature and propagator of matter, his action lacks a unity that Descartes does not manage to restore completely. And the fact that “purely material things” should inevitably appear to us as they are now, largely relativizes the scope of the primordial gesture of God.
- 14 In his *Principes de la philosophie*, in 1644, Descartes further clarified his cosmogony in parallel with an initial distancing of theological principles:

And so far from it that I want people to believe all the things that I will write, that even I pretend to propose here some of them that I absolutely believe to be false: namely, I have no doubt that the world was created in the beginning with as much perfection as it has; that the sun, the earth, the moon and the stars were from then on; and that the earth did not have only in itself the seeds of plants, but that plants covered part of it; and that Adam and Eve were not created as children, but as perfect men. The Christian religion wants us to believe this, and natural reason persuades us entirely of this truth: for if we consider the omnipotence of God, we must judge that everything he did had from the beginning all the perfection it was meant to have. But nevertheless, how much better we would know what the

nature of Adam and the trees of paradise was if we had examined how children are formed little by little in the sale of their mothers, and how plants come out of their seeds, than if we had only considered what they were when God created them: all the same, we would be able to make better the general nature of all the things in the world if we could imagine some principles which are very intelligible and very simple, from which we could make it clear that the stars and the earth, and finally all this visible world could have been produced as well as some seeds (although we know that it was not produced in this way), than if we describe it only as it is, or as we believe it was created. And because I think I have found such principles, I will try to explain them here.¹¹

- 15 Descartes tried to reconcile the principles of a beginning of the world aligned with the necessary perfection of God and the evolutionary principles of a progressive constitution of the universe. The same tension runs in this text as in the *Discours de la méthode*: Christian theology is put in competition with the principles of experimental philosophy (i.e. the observation of the trees of paradise gives more information on their genesis than the mere belief in a divine act of princeps).
- 16 How does this complex corpus of ideas about the foundation of the world circulate? We must not only question the means by which the principles of a history of origins move, but understand what the transfer does to the discourse of Descartes himself.

2. Cyrano interprets Descartes

- 17 That Savinien Cyrano de Bergerac was Cartesian has already been amply demonstrated by numerous works¹². That his novels were a means of making known ideas inscribed in the libertine movement, the thing is not very doubtful¹³. His works were also a way of discussing the philosophical theses of his time, of appropriating them by interpreting them.
- 18 In the *États et Empires du Soleil*, published in 1662, Cyrano staged the ascent of the hero Dyrcona, with the help of a machine he had built, to the Sun. During his journey, he detailed the plan of the solar system, noted that the planets do not produce light and distinguished

their natural satellites¹⁴. He then briefly explains a cosmogonic hypothesis:

Dreaming since then about the causes of the construction of this great Universe, I have imagined that when Chaos was unraveled, after God created matter, similar bodies joined together by this unknown principle of love, with which we experience that everything seeks its equal.¹⁵

- 19 The Cartesian dilemma of double intervention (i.e. directly in the inchoate formation of matter, then indirectly through the laws of nature) is here simply ignored. Certainly, as Madeleine Alcover points out, the initial “chaos” of which Cyrano speaks “is one of the principles of ancient atomism and of Gassendi¹⁶”, but the formulation of a primordial phase of inorganisation of matter before its progressive structuring follows the Cartesian scheme. What catches Cyrano’s attention is the logic of the pairing of matter: “particles formed in a certain way came together, and that made the air. Others, to whom the figure gave possible circular movement, composed by binding together the globes called stars¹⁷”. Here we find echoes of Descartes’ proposals on the formation of “the matter of which the world is composed [...] divided into several equal parts [which] could not at first be all round¹⁸”. The philosopher was looking for a generic principle of constitution of the celestial spheres, where the libertine retained a possible principle of constitution. The partial transfer of Cartesian explanatory principles into Cyrano’s novels takes place through the greater distance that the author of *États et Empires du Soleil* takes with the search for a global coherence specific to the philosopher.
- 20 Further on, Cyrano de Bergerac imagined that the planets could be ancient suns whose heat had been exhausted by the continuous emission of light¹⁹. He therefore suggested that “these spots in the Sun” could correspond to “a crust forming on its surface²⁰” announcing a cooling in progress. As Madeleine Alcover pointed out, “this idea Descartes put forward in his *Meteors* and reaffirmed in his *Principles*²¹”. Indeed, in this last work, the philosopher assured that “the earth where we are was once a star composed of the matter of the first pure element [...] so that it was no different from the sun, except that it was smaller²²”. However, “the less subtle parts of its matter, attached to one another, were assembled on its surface²³”. To the

point where it sometimes forms an inlay on the surface of the sun. The Earth, for its part, has seen the formation of “dark bodies” on its “surface” which “have gradually covered and offended it all²⁴”.

- 21 Whereas Cyrano favoured an explanation related to the decreasing heat of the stars, Descartes was mainly interested in understanding the similar physical mechanisms that govern the life of celestial globes – whether or not they are stars.
- 22 What can we learn from this little introductory exercise on the circulation of cosmogonic patterns in the 17th century? First of all, we see that in this highly speculative field of the ways in which the world is generated, fiction seeks no less than philosophical treatise to produce rational explanations. Above all, Cyrano was hardly bothered by the complex principles that Descartes used to reconcile the divine act with the logic of the constitution of matter. If God remains present in the author of the *États et Empires du Soleil*, he did not envisage indirect action by the laws of nature. Nor did Cyrano seek to make the spherical formation of the stars coherent – he was just formulating a plausible hypothesis, where Descartes conceived a genesis capable of grasping the whole grain of reality. Finally, Cyrano promoted above all a thermal explanation of the same nature of the stars, when Descartes imagined physical processes.
- 23 It is undeniable that Cyrano de Bergerac drew on Cartesian speculative material to nourish his novel; however, he probably felt less constrained by the global logic of an absolutely coherent understanding of the engendering of the world. The spread of a philosophy of genesis, shaped by the place of the divine and its ambivalence in the nascent modernity, configured by highly speculative attempts to interpret the first matter formations of the solar system, suggests a complex process of appropriation of cosmogonic ideas. Something is at play in the rapprochement of distant physical phenomena – in time and space – which participates in a secularization of ways of considering the solar system and its genesis. Between Descartes and Cyrano, the anthropological space of questions about our world as it has become has thus opened up to interpretative plurality.

3. Plan of the issue

- 24 The issue focuses on plural approaches to scientific conceptions of the genesis of the world from the early modern period to the end of the 18th century. The intertwining of Newtonian theory and the place of religion, the philosophical speculations of Leibniz and Kant (disseminating a more general anthropology of the place of human beings), the questioning of plural forms of life, the progressive formalization of a physics and mathematics of genesis, as well as all literary attempts to account for the origin of the solar system may constitute entry points for this publication.
- 25 In his article Florent Libral discusses the relationship of Christian astronomers to heliocentrism and the implications of this question for the Church. Then Didier Foucault questions the way Descartes conceived the history of planetary systems and its whirling mechanisms. Maria de Jesus Espada explores the effects of Chinese cosmogonies in the philosophy of Leibniz. Jean-Christophe Sanchez is interested, in connection with Newton and universal gravitation, in the consequences of this new way of considering celestial mechanics on cosmogonic ideas.
- 26 We have chosen to combine synthesis articles (which give an account of all the developments in the history of science in the field of cosmogony) and more specific case studies (which show particular aspects of the cosmogonic problem). The aim is to provide the basis for an ongoing research program on the different ways of understanding the structures of the world since the beginning of the modern era.

NOTES

- 1 See FOUCAULT Didier (dir.), « *L'invention du système solaire (xvi^e-xviii^e siècles)* / The invention of the solar system (16th-18th centuries) », *Nacelles*, numéro/issue: 4, printemps/Spring 2018, <<https://interfas.univ-tlse2.fr/nacelles/384>>; LAMY Jérôme (dir.), « *Faire système. Planètes, satellites, comètes, astéroïdes, xvi^e-xix^e siècles* / Construction of the Planetary System. Planets, Satellites, Comets, Asteroids, 16th-19th Centuries », *Nacelles*,

numéro/issue : 7, automne/Autumn 2019, <<https://interfas.univ-tlse2.fr/nouvelles/799>>.

2 LE QUELLEC Jean-Noël and SERGENT Bernard, *Dictionnaire critique de mythologie*, Paris, CNRS éditions, 2017, p. 234, article « Cosmogonie ».

3 *Ibidem*.

4 MAZAURIC Simone, *Histoire des sciences à l'époque moderne*, Paris, Armand Colin, 2009, p. 194-207.

5 DESCARTES René, *Discours de la méthode*, in *Œuvres*, éd. Charles Adam et Paul Tannery, Paris, Léopold Cerf, t. VI, 1902, p. 40-41 (translation J. L.)

6 *Ibid.*, p. 41.

7 *Ibid. supra*.

8 *Ibid.*, p. 42.

9 *Ibid.*, p. 43.

10 *Ibid.*, p. 45.

11 DESCARTES René, *Les principes de la philosophie*, l. III, § 45, traduction de l'abbé Picot, in, *Œuvres*, op. cit., t. IX, 1904, p. 123-124.

12 GENGOUS Nicolas, « Cyrano de Bergerac, ou être cartésien, c'est raconter des fables », in KOLESNIK-ANTOINE Delphine (dir.), *Qu'est-ce qu'être cartésien ?*, Lyon, ENS éditions, 2013, p. 95-116. In *États et empires du Soleil (In the States and Empires of the Sun)*, Cyrano evoked the discovery of "the Physics of Mr. Descartes" which contained "the circles by which this philosopher distinguished the movement of each planet" (CYRANO DE BERGERAC Savinien, *Les États et Empires du Soleil*, in *L'Autre Monde*, Paris, Gallimard, 2004 [1662], p. 179).

13 TORERA-IBAD Alexandra, *Libertinage, science et philosophie dans le matérialisme de Cyrano de Bergerac*, Paris, Honoré Champion, 2009.

14 CYRANO DE BERGERAC Savinien, *Les États et Empires du Soleil*, in *L'Autre Monde*, op. cit., p. 200-201.

15 *Ibid.*, p. 201.

16 ALCOVER Madeleine, *La pensée philosophique et scientifique de Cyrano de Bergerac*, Paris, Genève, Droz, 1970, p. 101.

17 CYRANO DE BERGERAC Savinien, *Les États et Empires du Soleil*, op. cit., p. 201.

18 DESCARTES René, *Les principes de la philosophie*, III, § 48, op. cit., p. 201-202.

19 CYRANO DE BERGERAC Savinien, *Les États et Empires du Soleil*, op. cit., p. 201-202.

20 *Ibid.*, p. 202.

21 ALCOVER Madeleine, *La pensée philosophique et scientifique de Cyrano de Bergerac*, op. cit., p. 102.

22 DESCARTES René, *Les principes de la philosophie*, op. cit., IV, § 2, p. 201-202.

23 *Ibid.*, p. 203.

24 *Ibid. supra.*

ABSTRACTS

English

Cosmogony was first taken up by religious approaches. The seventeenth century marked a break: the literary field as well as the scientific field were the scene of a rational reappropriation of the history of the creation of the Universe. Descartes thus introduced a tension between the idea of a creation of the world that would follow the divine principles of perfection and the progressive evolution of the Universe. Cyrano de Bergerac seemed to have freed himself from religious requirements to imagine a new cosmogony. The seventeenth century thus saw a pluralisation of interpretations of the origin of the solar system.

Français

La cosmogonie a d'abord été investie par les approches religieuses. Le ^{xvii}^e siècle constitue une rupture : le champ littéraire comme le champ scientifique sont le théâtre d'une réappropriation rationnelle de l'histoire de la création de l'Univers. Descartes introduit ainsi une tension entre l'idée d'une création du monde qui suivrait les principes divins de perfection et l'évolution progressive de l'Univers. Cyrano de Bergerac, quant à lui, semble s'être affranchi des exigences religieuses pour imaginer une cosmogonie nouvelle. Le ^{xvii}^e siècle engage donc une pluralisation des interprétations sur l'origine du système solaire.

INDEX

Mots-clés

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AUTHOR

Jérôme Lamy