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Science in Eighteenth-Century French Literary Fiction: A Step to Modern Science Fiction and a New Definition of the Human Being?

Arnaud Parent

Institute of Humanities
Mykolas Romeris University
Ateities g. 20
Vilnius LT-08303, Lithuania
Email: arnaudparent@hotmail.com

Abstract: In eighteenth-century France, scientific progress and its spreading met a growing interest among public, an enthusiasm that was to be reflected in literature. Fictional works including scientific knowledge in their narrative made their appearance, paving the ground for a genre promised to a growing success in the following centuries—science fiction. The article presents three eighteenth-century French literary works, each one centered on a different domain of science: Voltaire's *Micromégas* (1752), Charles-François Tiphaigne's *Amilec, or the Seeds of Mankind* (*Amilec, ou la graine d'hommes*, 1753) and François-Félix Nogaret's *The Mirror of Current Events, or Beauty to the Highest Bidder* (*Le miroir des événements actuels, ou la belle au plus offrant*, 1790). The first one, an iconic Enlightenment work that promotes critical thinking, relies on discoveries made in astronomy and optics. Tiphaigne de la Roche is far from sharing the fame of Voltaire, but his odd *Amilec* is noteworthy as it is possibly the very first science-fiction work in which biology is central. Written in the unique atmosphere of the French revolution, Nogaret's work *The Mirror of Current Events* depicts androids-like interacting with humans. Our purpose is to show that these works were a precursor (proto science fiction) of the science fiction genre in literature, to describe how and what science or technology was depicted in them, and how they influenced the view of Man (humans) in eighteenth-century France.

Keywords: *anthropocentrism, Enlightenment, French literature, science, science fiction*

"Science fiction is the most important literature in the history of the world, because it's the history of ideas, the history of our civilization birthing itself."

Ray Bradbury (1920–2012)

Introduction

In the 17th century, the renewal of scientific knowledge and its spreading met a growing interest among French public. The craze was such that Molière in his 1672 drama *Learned Ladies* (*Femmes savantes*) mocked the *Précieuses* who have telescopes at home. Enhanced with further scientific achievements and nurtured with the increasing number of related publications, this enthusiasm grew in the 18th century.[1] In this regard, particularly important is the Diderot and d'Alembert *Encyclopédie*, whose ambition was to make science available and understandable to anyone. In the field of life sciences, Buffon's[2] *Histoire naturelle* (Buffon, 1749–1767) played a similar role. Besides these encyclopedic works spread various handbooks such as Clairaut's *Eléments d'algèbre* (1746). Equally popular were public experiments. For instance, Abbot Nollet gathered 300 monks to hold hands and electrified them to show the conductivity of electricity (Viguerie, 2007, pp. 296–297).

Such enthusiasm for scientific development and its influence on society was to be reflected in literature. Scarce, and timidly in the beginning, books including scientific knowledge in their narrative made their appearance and progressively found their readership.[3] The trend became a genre itself in the 19th century, to be ultimately named 'science fiction', a term coined by Hugo Gernsback in the 1920s.

Naturally, definitions of science fiction are diverse, but science is a core element of it. *Encyclopaedia Britannica s*tates: "Science fiction [is] a form of fiction that deals principally with the impact of actual or imagined science upon society

[1] This scientific progress was also shared across the borders. Interesting in this regard is the case of correspondence between the French scientist Henri-Louis Duhamel du Monceau (1700–1782) and the Grand Marshal of the Crown (Poland) Bieliński (1683–1766). Bieliński with the relief of the French scientist undertook knowledge and agricultural equipment transfer to Poland leading to agricultural improvements there. (Durbas, 2020, pp. 128–143).

[2] Georges-Louis Leclerc, Comte de Buffon (1707–1788), a renowned French naturalist.

[3] For this reason, these stories differ from other fictions of the time, namely "imaginary travels" (v*oyages imaginaires*).

or individuals". The prominent twentieth-century author Isaac Asimov equally stressed the importance of science for the science fiction genre: "Science fiction can be defined as that branch of literature, which deals with the reaction of human beings to changes in science and technology (Down & Steinberg, 2020, p. 1479)". In France, Cyrano de Bergerac (1619–1655) with his *Comical History of the States and Empires of the Moon* (1657) and *Comical History of the States and Empires of the Sun* (1662), in which the narrator uses special devices to travel in space (namely spring-and-rocket machines and a solar-powered vessel), is perhaps the first French science-fiction author (Evans, 1989, p. 255).

We propose in this article to present three eighteenth-century French literary works, each one centered on a specific domain of science: Voltaire's *Micromégas* (1752), Charles-François Tiphaigne's *Amilec, or the Seeds of Mankind* (*Amilec, ou la graine d'hommes*, 1753) and François-Félix Nogaret's *The Mirror of Current Events, or Beauty to the Highest Bidder* (*Le miroir des événements actuels, ou la belle au plus offrant,* 1790). The first one, an iconic Enlightenment work that promotes critical thinking, relies on discoveries made in astronomy and optics. Tiphaigne de la Roche is far from sharing the fame of Voltaire, but his odd *Amilec* is noteworthy as it is possibly the very first science-fiction work in which biology is central. Written in the unique atmosphere of the French revolution, Nogaret's work *The Mirror of Current Events* depicts androids-like interacting with humans.

Our purpose is to show that these works were a precursor (proto science fiction) of the science fiction genre in literature, to describe how and what science or technology was depicted in them, and how they influenced the view of Man (humans) in eighteenth-century France. This study will also cast new light on how science was conceived in those times, and how it influenced the view on the human being. The plot of each story will be presented together with its scientific context. We will thereafter consider: I. *Micromégas* (1752); II. *Amilec, or the Seeds of Mankind* (1753); III. *The Mirror of Current Events, or Beauty to the Highest Bidder* (1790); followed by the discussion.

I *Micromégas* (1752)

Figure 1. Voltaire, an underrated science-fiction writer?

We begin our study with *Micromégas*, by Voltaire. Writer and philosopher Voltaire (real name François Arouet, 1694–1778) is a well-known outstanding figure of French Enlightenment. Simply recall that at the age or twenty-four he met success with his first tragedy *Œdipe* (1719). In the years 1726–1729 he stayed in England where he discovered the works of Newton, and in the years 1750–1753 sojourned in Berlin at the Court of King of Prussia Frederick II. Voltaire was involved in the denunciation of the miscarriages of justice, namely the "Calas affair" (1761–1765) and the "Sirven affair" (1762–1771). He left a generous legacy of works, such as plays (*Tancrède*, 1760), tales (*Candide*, 1759), historical works (*Le siècle de Louis XIV*, 1751), strictly speaking philosophical works (*Dictionnaire philosophique*, 1764), countless pamphlets against abuses of despotism and what he called "superstition" and "fanaticism" (*La canonisation de Saint Cucufin*), as well as immense correspondence (10,000 letters).

In his *Micromégas* ('Littlebig'), published in 1752, Voltaire (Fig. 1) makes extensive use of scientific knowledge to recount the voyages two aliens made that year to Earth. For instance, in the field of life science and optics, the story mentions Leeuwenhoek[4] and Hartsoeker[5], who in the 1670s improved microscopes and studied microscopic organisms (the "animalcules"). Equally, as Roger Pearson observed, Voltaire relied on the latest cosmology (Pearson, 1993, p. 59; Roberts,

[4] Antonie van Leeuwenhoek (1632–1723), a Dutch microscopist who was the first to observe bacteria and protozoa. His researches on lower animals refuted the doctrine of spontaneous generation. He is acknowledged as the father of microbiology.

[5] Nicolas Harsoeker (or Hartsoecker, 1656–1725), a Dutch mathematician and physicist who invented the screw-barrel simple microscope in circa 1694.

Figure 2. Fontenelle (1657–1757). His *Entretiens sur la pluralité des mondes* (1686), which raises the possibility of human life in outer space, paves the way for a new perception of a human's place in the universe.

2016, p. 73). Influential were Huygens's[6] *Systema saturnium* (1659), *Cosmetheoros* (1698), and especially Newton's groundbreaking discoveries. In 1687, the latter had published his *Mathematical Principles of Natural Philosophy* (*Philosophiae naturalis principia mathematica*), in which he exposed the universal law of gravitation, giving birth to a new conception of physics. Actually Voltaire was so impressed by Newtons's works, that in 1738 he published his *Elements of the Philosophy of Newton* (*Eléments de la philosophie de Newton*). Equally influential was Fontenelle's[7] *Conversations on Plurality of Worlds* (*Entretiens sur la pluralité des mondes*, 1686) in which the author considered there was a reason-based

[6] Christiaan Huygens (or Huyghens, 1629–1695) a Dutch mathematician, astronomer and physicist, who founded the wave theory of light, discovered the true shape of the rings of Saturn, and made original contributions to the science of dynamics. He patented the first pendulum clock, which greatly increased the accuracy of measuring time.

[7] Bernard le Bovier de Fontenelle (1657–1757), a French mathematician who wrote the history of mathematics and the philosophy of mathematics and science.

possibility of human life in places other than Earth, opening the way to a new perception of the place of humans in the universe (Fig. 2). According to the author Chevalier de Béthunes, Fontenelle's idea was well-spread in the society in the middle of the century (Béthunes de, 1750, p. iv).

Let us now have a look at the story of *Micromégas*. The main characters are two aliens, one of whom is Micromégas and comes from one of the planets that orbit the star named Sirius. He is eight leagues tall, or 24,000 geometric paces of five feet each (which is equivalent to 120,000 feet—5 km) and he has almost 1,000 senses. Life expectancy on Sirius is 10,500,000 years. Not only is Micromégas a "spirited young man" but he has "a good heart." He is eminently cultivated and has invented various things. He was not even 250 years old when he managed to figure out more than 50 of Euclid's propositions. Towards his 450th year, "near the end of his infancy," he dissected many small insects no more than 100 feet in diameter, which would evade ordinary microscopes. He wrote a book about these experimentations, which did not please the authorities and was sentenced to banishment from the Sirius court for a duration of 800 years. The name of the other alien is not given, but we know he is from Saturn, where life expectancy is about 15,000 years. He has 72 senses and is about a thousand fathoms (about 6,000 feet) tall. For this reason he is just mentioned as "the dwarf".

The two aliens travel together in space, with the company of their servants who transport scientific instruments. Being "very familiar with the laws of gravity", the two companions use them together with rays of sunlight and comets to jump from a planet to another "like a bird vaulting itself from branch to branch". En route they perceive a small light: the Earth. Taking benefit of a comet and an aurora borealis, they land on the northern coast of the Baltic Sea on 5 July 1737. Using a makeshift microscope, made by the dwarf, they discover a vessel, on board of which were scientists coming back from the Arctic Circle, where they had made some astronomical observations[8] (Fig. 3). Voltaire names the passengers of the ship "atoms", and compares their discovery by Micromégas and the Saturnian as the one made by Dutch scientists Leuwenhoek and Hartsoeker when they observed microorganisms in their microscopes.

The aliens and the humans then strike up a conversation. Before leaving, Micromégas offers the earthlings a book, revealing "all that can be known of the ultimate essence of things". The scientists then carry the book to the

[8] In 1736 and 1737, an expedition commissioned by the French Academy of Sciences traveled to Lapland to confirm Newton's deductions that the Earth is flattened on the poles (Viguerie, 2007, pp. 1172–1273).

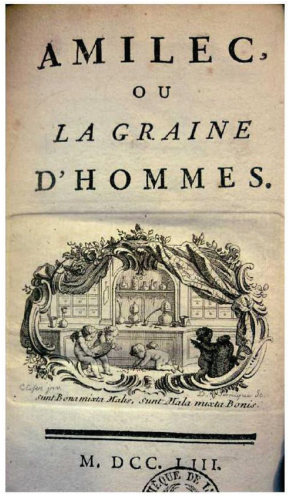
Figure 3. Illustration for Voltaire's *Micromégas* (1752).

Academy of Sciences in Paris. But when the book is opened, it appears that all the pages are blank. This white book is clearly an allusion to John Locke's *An Essay Concerning Human Understanding* (1689), in which the philosopher expresses the idea that at birth the human mind is like a blank page that has to be filled in with knowledge gained by sensory experience. Such conception, the cornerstone of modern empiricism, deeply influenced Voltaire's understandings and philosophy.

It appears that *Micromégas*, embodied by the title character, is a praise of reason, a criticism of preconceived ideas. Basically, this philosophical tale deals with the end of anthropocentrism. As Adam Roberts observed, with aliens coming and visiting the Earth, instead of travelers from the Earth visiting outer worlds, Voltaire inverted the prevalent seventeenth-century scheme (Roberts, 2016, p. 73). Since the Earth is not to be considered anymore as the epicenter of the universe, mankind cannot be considered the focus of philosophy or theology, making the microscopic earthlings insignificant. Since metaphysics is vain and divides humans, it is up to science to unite humans.

II *Amilec, or the Seeds of Mankind* (1753)

After *Micromégas*, the second work presented in our survey is *Amilec*, *or the Seeds of Mankind*, by Charles-François Tiphaigne de La Roche (1722–1774). Since Tiphaigne is a little-known author, we must specify that he lived in Montebourg, Normandy. He studied medicine at the Caen Faculty, where he defended his



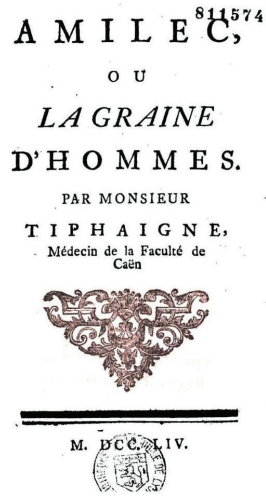


Figure 4. Title pages of the 1753 and 1754 releases of Tiphaigne de la Roche's *Amilec*.

thesis about the nervous system in 1748 (Sempère, 2015, p. 136), but was close to Montpellier's university medical vitalism (Citton, 2019). Nevertheless, Tiphaigne did not work regularly as a physician. We know that he was elected member of the Academies of Caen and Rouen. Malesherbes, director of the *Librairie* (royal administration entrusted with the task to regulate the publication and the traffic of books), ordered him to write an essay on the history of Fishing: *Essay on Economic History of France's Western Seas* (Tiphaigne, 1760a). Thereafter scientist Duhamel du Monceau used it for his *General Treaty on Fishing* (1769–1782). Tiphaigne also wrote fictional works such as *Giphantie* (1760b); *L'Empire des Zaziris sur les humains ou la Zazirocratie* (1761); and *Histoire des Galligènes, ou Mémoires de Duncan* (1765) that were released several times and translated into foreign languages (English, German, and Dutch) (Tiphaigne, 1761a; 1761b; 1761c).

This was the case with *Amilec, ou la graine d'hommes*, first released in 1753 (with four subsequent releases) (Horlacher, 1994, p. 62), which was translated and published the same year in English as *Amilec, or the Seeds of Mankind* (Fig. 4). The *Monthly Review*, in its September 1754 issue, describes *Amilec* as "An ingenious philosophico-satyrical romance, couched under the disguise of a vision", which affords "a kind of micrographical and satirical exhibition of mankind: a much better-natured and pleasanter scheme than that of Gulliver, in his description of the Yahoos; tho' alas! Not executed by such a genius as the inimitable Swift" (*The Monthly Review*, 1754, p. 228).

The main topic of *Amilec* is the reproduction "generation", as it was called then. A term that may take on several meanings: genesis of life, fecundation, formation

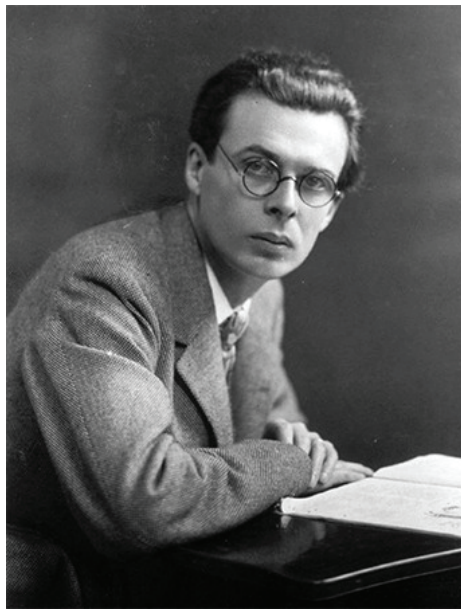


Figure 5. Aldous Huxley, a remote successor of Tiphaigne de la Roche's genetic engineering story *Amilec*.

and development of a new individual. Actually the origin and development of life is one of the biggest controversies in the life sciences in the 18th century, opposing proponents of various theories. Supporters of preformationism considered that a living being is already formed in a seed of semen, and that its development is nothing more than its change in size. Proponents of epigenetics considered that embryo resulted from the progressive formation of the organs from an undifferentiated material. Animalculists considered that the being was already preformed in organisms present in the male semen. Ovists considered that the being was present in the egg of the female. (Roger, 1993, pp. 256, 326; Viguerie, 2007, p. 293; Vincent, 2009, p. 107).

The story begins when the narrator falls asleep after having read treaties about generation. He then begins dreaming and Amilec, the grandmaster of a group of geniuses who have the task to collect human seeds ("*graines d'hommes*") to operate the reproduction of mankind, appears to him, pretending to give convincing explanations about generation.

The first theory given by the genius Amilec uses the two variants of preformationism, interlocking and dissemination, as they were defined by Charles Bonnet.[9] For the Swiss naturalist, interlocking supposed that germs were created at the beginning of the world and were contained in every vegetal or animal. Dissemination theory considered that germs spread in the atmosphere and could develop when they found a favorable place. (Vincent, 2009, p. 109)

[9] Charles Bonnet (1720–1793), a Swiss naturalist and philosophical writer who discovered parthenogenesis (reproduction without fertilization). He wrote: *Researches on the Use of Leaves in Plants* (*Recherches sur l'usage des feuilles dans les plantes*; Bonnet, 1754b). His *Essay on Psychology* (*Essai de psychologie*, 1754a) and *Analytical Essay on the Powers of the Soul* (*Essai analytique sur les facultés de l'âme*, 1760) anticipated physiological psychology.

Similarly to Charles Bonnet, the genius Amilec assimilates generation of plants to that of animals and humans:

> like humans and animals, plants are born, live, die. Like them, they grow and multiply. All of that is common to the ones and the others. All of that therefore must comply with some general rules, to which the variations raise no doubt. Thus, when it will be known how the generation of plants happens, we will approximately know how that of animals and humans happens. Given that, in general, plants come from seeds, it must be the case too for humans and animals.[10]

Amilec further stresses that:

> What we say about animals in general must apply in particular to the human species. In the human body, there are germs, seeds, rudiments of humans. There are some in the reservoir that is intended for them in both sexes. There are others that escape through the pores of the skin.[11]

The Grand-Master of the geniuses then specifies that the germs of the plants reside in two places: some kinds of reservoirs are located in flowers, and void places between the plant and the bark. The reservoirs give seeds, the void places give offsprings:

> The seeds of vegetables are mainly noticeable in two kinds of places: in the flowers or in the parts where the fruiting takes place, the latter being like their reservoirs, and in small cavities, small voids, that are between the body of the plant and its bark. Those located in flowers are fecundated there, grow there, ripen there, and subsequently fall off or are picked by humans. Those located in the small cavities on the surface of the plant make more progress. They develop there and soon give birth to other small plants, forming in some way some offshoots from the first plant. Around these offshoots, and by the same working, others will be born, and so on.

[10] "*comme les hommes & les animaux, les plantes naissent, vivent, meurent ; comme eux, elles croissent et multiplient ; tout cela est commun aux uns et aux autres, tout cela doit donc suivre certaines règles générales, dont les variations ne sont pas un objet. Ainsi, quand on sçaura comment s'exécute la génération des plantes, on sçaura à peu de choses près, comment s'opère celle des hommes et des animaux. En général les plantes viennent de graines, les hommes et les animaux doivent en venir aussi.*" (Tiphaigne, 1753, p. 5)

[11] "*Ce que nous disons en général des animaux, doit s'entendre en particulier de l'espèce humaine. Il se trouve dans le corps humain des germes, des graines, des rudimens d'homme. Il y en a dans le réservoir qui leur est destiné dans les deux sexes : il y en a d'autres qui s'échappent par les pores de la peau.*" (Tiphaigne, 1753, p. 8)

> As a result, one may see that what we call a tree, an oak for instance, is not a single oak but a pile of several oaks stacked on top of the others. This is the progress of vegetation. This is the destiny of seeds in plants.[12]

The second theory of generation in the story is given by Zamar, a genius in charge of populating the Moon. As Philippe Vincent observes, if it is still possible to accept an interpretation based on the preformationist theory of dissemination, one nevertheless may already discern epigenetics theory. Zamar's explanation is a transition between the two explanations given by Amilec himself. (Vincent, 2009, p. 111)

> These seeds, by their analogy with the air of the Moon, were fertilized there, united there, accumulated there, and made various clusters on the surface of this planet. A sunbeam favorable to incubation seems to have occurred. And here are germs opening, men developing, inhabitants spreading everywhere.[13]

The second explanation provided by the great genius Amilec is clearly an epigenetics one. Tiphaigne here develops a theory relying on vegetable tubules, which in fact are hollow cylinders, or moodles, in which new ones appear. It implies the formation and the development of vegetable tubules from an undifferentiated material, the male providing male tubules, and the female providing feminine tubules. The female remains the sole depositary of the germs (Tiphaigne, 1753a, p. 130). Amilec specifies that plants and animals grow up thanks to the addition of organic molecules, which enter the moodle proper to their species:

> The germs of plants, trees, animals, even men, at first were nothing more than a small cylinder […]. Sometimes these cylinders have been taken

[12] "*Les graines des végétaux se font principalement remarquer dans deux sortes d'endroits. Dans les fleurs ou les parties de la fructification qui en sont comme le réservoir, et dans de petites cavités, de petits vuides qui se rencontrent entre le corps de la plante et son écorce. Celles qui se trouvent dans les fleurs y sont fécondées, y croissent, y mûrissent, et tombent ensuite, ou sont cueillies par les hommes. Celles qui se trouvent dans les petites cavités à la surface de la plante, font plus de progrès, elles s'y développent et donnent bientôt naissance à d'autres petites plantes écussonnées en quelque sorte sur la première, & qu'on appelle rejettons. Autour de ces rejettons et par la même méchanique, il en naitra plusieurs autres, & ainsi successivement. On voit par-là que ce qu'on nomme un arbre, un chêne, par exemple, n'est pas un chêne unique, mais un amas de plusieurs chênes entassés les uns sur les autres. Tel est le progrès de la végétation, telle est dans les plantes la destination des graines.*" (Tiphaigne, 1753, pp. 5–6)

[13] "*ces graines, par leur analogie avec l'air de la Lune, s'y sont fécondées, s'y sont unies, s'y sont accumulées, & ont formé différens amas sur la surface de cette planette. Un coup de soleil favorable à l'incubation, est, sans doute, survenu ; & voilà des germes qui s'ouvrent, des hommes qui se développent, des habitans qui se répandent de toute part*" (Tiphaigne, 1753, p. 40).

> for rudiments of plants, animals, or worms, quite recently they have been taken for organic molecules. But actually they are nothing but vegetable tubules, either that we consider them in plants or animals. The vegetable tubules principally differ in their shape, the number of lateral openings, and in the proportional distances between these openings. This shape, these openings, these proportional distances are so well entrenched in the tubules of the plants, that there is nowhere any obstacle capable of preventing their continuous development and growth.[14]

The old tubules give place to the new ones:

> If no internal disintegration occurred, a germ placed on any point of your globe could develop, grow, extend, and finally form a tree capable of shading half the earth. But that does not happen, because as new tubules form and arrange themselves, the primitives tubules age, spoil, corrupt, liquor transport is stopped, the tree perishes. He barely had time to languidly grow a few shoots.[15]

The Grand-Master states that if the scientists "have noticed [microscopic bodies] in infusions made of plants, leafs, flowers, seeds, as well as animal material" that is because "these different bodies are composed of tubules, whose part has gone to the liquor of the infusion".[16] Still according to Philippe Vincent, Amilec here alludes to experiments that Buffon and British John Needham[17] carried out together (Roger, 1999, pp. 194–195; Vincent, 2009, p. 112). The British

[14] "*les germes des plantes, des arbres, des animaux, des hommes même, ne sont ou n'ont d'abord été chacun autre chose qu'un petit cylindre […]. Tantôt on a pris ces cilindres pour des rudimens de plantes et d'animaux, tantôt pour des vers, tout récemment on les a pris pour des molécules organiques. Mais au vrai ce ne sont que des tubules végétables, […] soit que nous les considérions dans les plantes, soit que nous les considèrerons dans les animaux. Les tubules végétables diffèrent principalement par leur figure, par le nombre des ouvertures latérales, par les distances proportionnelles qui se trouvent entre ces ouvertures. Cette figure, ces ouvertures, ces distances proportionnelles sont tellement disposées dans les tubules des plantes, qu'il ne s'offre nulle part aucun obstacle capable d'empêcher le développement et l'accroissement continuel.*" (Tiphaigne, 1753, pp. 75–76).

[15] "*S'il ne survenoit point de corruption interne, un germe placé sur un point quelconque de votre globe, pourroit se développer, s'élever, s'étendre, et enfin former un arbre capable de mettre à l'ombre la moitié de la terre. Mais cela n'arrive point, parce que tandis que de nouveaux tubules se forment et s'arrangent, les tubules primitifs vieillissent, se gâtent, se corrompent, le transport des liqueurs est intercepté, l'arbre périt. A peine a–t-il eu le temps de pousser languissamment quelques rameaux.*" (Tiphaigne, 1753a, pp. 76–77)

[16] "*Ils en ont remarqué [des corps microscopiques] dans des infusions de plantes, de feuilles, de fleurs, de semences, aussi bien que dans celles des matières animales; c'est que ces différents corps sont composés de tubules dont une partie a passé dans la liqueur de l'infusion.*" (Tiphaigne, 1753a, p. 86)

[17] John Tuberville Needham (1713–1781) was an English naturalist. He was a staunch advocate of the theories of spontaneous generation.

abbot made more than sixty experiments on plants and animals he described in his *Account of Some New Microscopical Discoveries* (1745). Moreover, when Amilec recalls that "sometimes these cylinders [tubules] have been taken for the rudiments of plants and animals, sometimes for worms, quite recently they have been taken for organic molecules".[18] The Grand-Master here refers to preformationists, namely to Nicolas Andry[19], who a few years before had released his renowned *An Account of the Breeding of Worms in Human Bodies*.[20]

As we can see, Tiphaigne de la Roche strongly assimilates the physiology of plants to that or humans. Actually, animal and plant organisms both emerged from a common evolution that lasted 3 billion years and separated only 700 million years ago. (Schaefer, 2015, p. 63), but what is noteworthy is that Tiphaigne's view on similitude between vegetals and humans is not unusual in the 18th century. Remind that, for instance, Julien Offray de la Mettrie (1709–1751) in his *Man a Plant* (*L'homme-plante*, 1748) recapitulates all the physiological analogies he found between plants and man.[21] In *Amilec, or the Seed of Man*, Tiphaigne evocates different contemporary reproduction theories. Nevertheless, no definite answer is given. The author just wishes to arise the interest of his reader on this issue while entertaining him.

III *The Mirror of Current Events, or Beauty to the Highest Bidder* (1790)

Among the numerous inventions that spread in the 18th century, some of the most amazing to the contemporaries were the automata. This craze lasted all over the century and did not fade in its last years. In the 1790s in Paris, in spite of the turmoil of the Revolution, performances using such devices were not uncommon, as shows the announcement made in 1792 in *Journal de Paris*:

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18 "*Tantôt on a pris ces cylindres pour des rudimens de plantes et d'animaux, tantôt pour des vers, tout récemment on les a pris pour des molécules organiques*." (Tiphaigne, 1753a, p. 75)

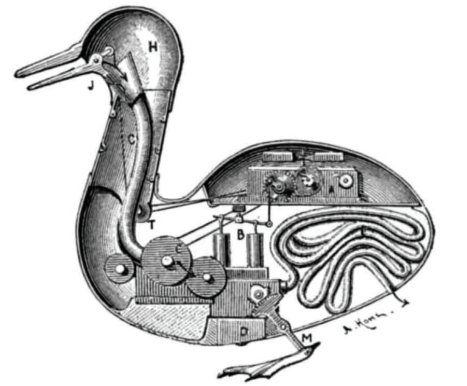
19 Nicolas Andry de Boisregard (1658–1742), a French physician who played a significant role in parasitology and orthopedics. He coined the word 'orthopedics' ("*orthopédie*") in the work *Orthopédie, ou l'Art de prévenir et de corriger dans les enfants les difformités du corps* (Andry, 1741).

20 (*De la génération des vers dans le corps de l'homme*). This work, published in 1700, met a tremendous success, was reedited in 1715, 1741 and 1750, and translated in foreign languages. (Dupouy-Carnet, 2019, pp. 4–21)

21 Humoristically, passionate in botany, Rousseau wrote to a correspondent: "I will become a plant myself" ("*Je vais devenir plante moi-même*"). See Rousseau, J.-J., *Lettre à Jean-André Deluc*, Môtiers, 1er août 1765, 4555. (Rousseau, 1965–1998; Schaefer, 2015, p. 61).

> Physical amusements and new skill tricks. Mister Perrin, mechanic, engineer and demonstrator of amusing physics, will give today, at 6 o'clock, at the theater of Mister Moreau, at Palais Royal no. 101, the Oracle of Calcas, an automaton who does the most extraordinary things; the single inkwell, which, completely isolated, supplies ink of all kind at will, without being touched by anyone; the great trick of the dove, which brings back a ring that has been put in a pistol and shot through a window, and many other tricks.[22]

The most remarkable automata crafters of the time were Jacques de Vaucanson, Pierre Jaquet-Droz and Abbot Mical. *Encyclopedia Britannica* defines Jacques de Vaucanson (1709–1782) as a "prolific inventor of robot devices of significance for modern industry". Vaucanson showed interest in machinery at an early age, in 1738 he constructed an automaton "The Flute Player". In 1739, he completed "The Tambourine Player" and "The Duck". The latter, which was presented as being able to move, drink, eat and even digest as a real duck, gained great fame (Fig. 6).



INTERIOR OF VAUCANSON'S AUTOMATIC DUCK.
A, clockwork; *B*, pump; *C*, mill for grinding grain; *F*, intestinal tube; *J*, bill; *H*, head; *M*, feet.

Figure 6. A fantastical depiction of Vaucanson's "The Duck" (*Scientific American*, 1899, p. 42)

The Swiss Pierre Jaquet-Droz (1721–1790) was born in a well-to-do family of "peasants-watchmakers". He began to work at watchmaking in the 1740s, but quickly turned to the designing of mechanisms for automata and specialized in their production. His research lead him to the creation of humanoids. From 1767 to 1774, he supervised the construction of three extremely complex androids: "The Musician", "The Designer" and "The Writer". (Droz, Faessler & Guye, 1971; Perret & Thomann, 1965; Van den Berghe, 1996)

[22] "*Le Sr Perrin, mécanicien, ingénieur et démonstrateur de physique amusante, donnera aujourd'hui, à 6 heures, au théâtre ci-devant du Sr Moreau, au Palais Royal, n. 101, l'Oracle de Calcas, automate qui fait les choses les plus extraordinaires ; l'encrier unique, qui, parfaitement isolé, fournit l'encre de toutes sortes de couleurs, à volonté, sans être touché par personne ; le grand tour de la colombe, qui rapporte une bague qui a été mise dans un pistolet tiré par une fenêtre, et quantité d'autres tours.*" (*Journal de Paris*, 1792)

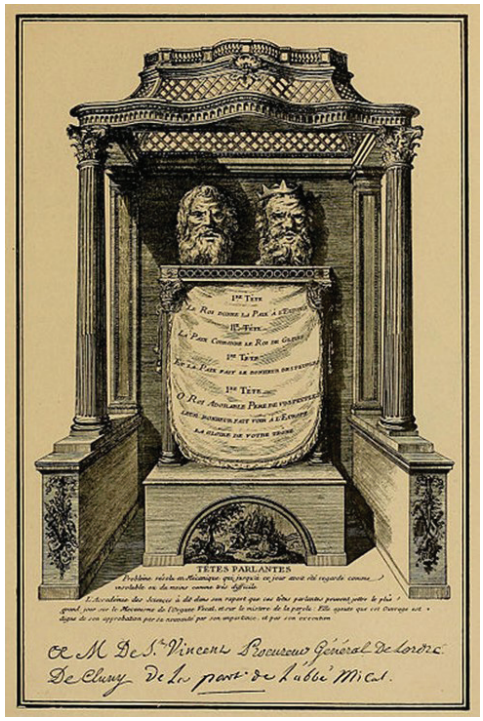


Figure 7. Abbot Mical's "Talking Heads" figuration.

As for Abbot Mical (1730–1789), the third crafter, he became famous for his "Talking Heads" (*Têtes parlantes*, Fig. 7). A report released in 1783 by seven commissioners of the Paris Academy of Sciences recognized the utility of the invention: "for its novelty, significance and execution, this work is worth of its approval". Actually, the Academicians considered the Talking Heads as a great means to understand the vocal organ and speech (Montmignon, n.d., pp. 3–4). Father Jean-Baptiste Montmignon (1737–1824), who besides theological researches carried out some on languages, showed interest in the abbot's creation and reported about it in his *Talking Heads, Invented and Executed by Abbot Mical* (*Têtes parlantes, inventées et exécutées par M. l'Abbé Mical*)[23]. The cleric linguist recognizes that "it is not surprising that the sounds that come out of these artificial organs are harsh, raucous, unpleasant in their roughness" but he confidently envisages further development and uses of Mical's invention. Montmignon recommends to adapt a keyboard to the "talking machine", each key matching with a sound, to make a "vocal harpsichord". He even thinks about an "ocular harpsichord", each key leveling up a little flag with a printed letter on it. The clergyman thinks such a device would be useful for deaf, mute, and help children learn to read. (Montmignon, n.d., pp. 7–9) Prophetically, the father declares: "The imagination goes ahead of all that one could add to assert the usefulness of a machine, which imitates the timbre of the human voice, with sufficient accuracy and fidelity, to determine the value of vowel and articulation sounds,

[23] This work was actually an excerpt taken from his *Système de prononciation figurée, applicable à toutes les langues, et exécuté sur les langues françoise et angloise* (Montmignon, 1785).

their intonation and prosody".[24] Even the essayist Antoine de Rivarol (1753–1801), who gained fame for his *Of the Universality of French Language* (*De l'universalité de la langue française*, 1783), praised Abbot Mical and his "Talking Heads", in which he saw a great device to preserve the French language rightful pronunciation "Talking Heads will warn our children of the decadence of pronunciation".[25]

In 1790, in the excitement of the Revolution, Nogaret wrote his *The Mirror of Current Events, or Beauty to the Highest Bidder* (*Le Miroir des événemens actuels, ou la belle au plus offrant*)[26] (Nogaret, 1790, Fig. 8) featuring two automata, say, androids.

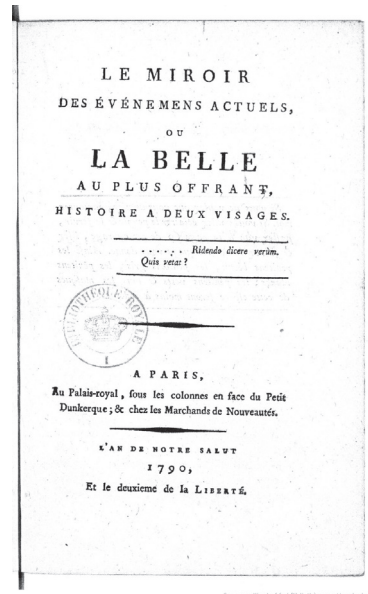

LE MIROIR
DES ÉVÉNEMENS ACTUELS,
OU
LA BELLE
AU PLUS OFFRANT,
HISTOIRE A DEUX VISAGES.
..... *Ridendo dicere verùm.*
Quis vetat?
A PARIS,
Au Palais-royal, sous les colonnes en face du Petit Dunkerque; & chez les Marchands de Nouveautés.
L'AN DE NOTRE SALUT
1790,
Et le deuxieme de la Liberté.

Figure 8. Title page of François-Félix Nogaret's *Le miroir des événements actuels* (1790).

The narrative is all the more credible, seeing that mechanists were already able to create jaw-dropping automata. François-Félix Nogaret (1740–1831) was the son of a civil servant at the Royal Household (*Maison du Roi*); in 1761, he himself joined this administration. Later on, he worked as the librarian of Countess of Artois. Nogaret supported with enthusiasm the Revolution when it broke out. In 1795, he joined the Home Office (*Département de l'intérieur*) and was appointed sole drama censor for theater plays, but was dismissed in 1807. Having become poor and crippled, he wrote until the very end of his life.[27]

[24] "*L'imagination va au-devant de tout ce que l'on pourroit ajouter pour faire valoir l'utilité d'une machine, qui imiteroit le timbre de la voix humaine, avec assez d'exactitude et de fidélité, pour déterminer la valeur des sons voyelles et articulés, leur intonation et leur prosodie.*" (Montmignon, n.d., pp. 14–15)

[25] "*les Têtes parlantes avertiront nos enfants de la décadence de la prononciation*" (Rivarol, 1783, pp. 498–504).

[26] Actually, "*la belle au plus offrant*" (*Beauty to the Highest Bidder*) is a pun on the fairy tale *La belle au bois dormant* (*The Sleeping Beauty*).

[27] Among many other of his fictional works, we can quote: *L'Apologie de mon goût* (Paris, 1771), an epistle about natural history dedicated to Buffon, with whom he was in a relationship; *La terre est un animal* (Versailles, 1795), *Epitre à la lumière considérée comme corps* (Paris, 1808). (*Nouvelle biographie générale*, 1863, pp. 194–196).

The Mirror of Current Events takes place in the antiquity, in Syracuse. The storyteller learned the tale "from a true traveler, whose great-grandfather heard it told to a wise man, who had it from his grandfather, who had read it in the Serapeum, before the books in this library were used to heat the baths of Alexandria".[28] Aglaonice, a seventeen-year-old orphan girl wants to marry. A proclamation is issued: she will marry the craftsman who will invent a machine and "knows well the heart of women".[29] Among a few suitors, two mechanists came forward, Wak-wik-vauk-an-son-frankénsteïn, thereafter called Frankestein, and Nicator. Frankestein produced a metal automaton, the size of a man, dressed in Sicilian style, sitting in a wheelchair and holding a flute in each of his hands. Both Aglaonice and her mentor Cornelius are stunned, namely Cornelius "for he had never heard that a man had, so to speak, created his fellow man ("*son semblable*")"[30]:

> Both approached the statue, which bowed in their presence, and astonished them so much by this beginning, which reminded them of a real living being, that they took two steps back. They believed it to be organized by a divine hand, and as if there had been something to fear from ascertaining otherwise by touching, they sat down again, some distance away from her.[31]

As we see, for its resemblance with a real human being, the automaton at once generates a feeling of malaise, even a kind of fear among the viewers who feel the need to back off. Nevertheless, Aglaonice, impatient, orders the statue to start playing. Then the apprehension gives way to a spell. The piece of music is so sensitive and melancholic that it intensely moves the young girl who almost faints (Nogaret, 1790, pp. 42–43). As a matter of fact, the automaton, the machine, within a few minutes was successful in evoking two strong adverse human feelings.

Then came the turn of the young craftsman Nicator to show his automaton. He invited his android, a woman dressed as a vestal[32], to join, and she moved forward

[28] "*D'un voyageur véridique, dont le trisaïeul l'avait oui raconter à un sage, qui la tenait de son grand–père, qui l'avait lue dans le Sérapeou, avant que les livres de cette bibliothèque fussent employés à chauffer les bains d'Alexandrie*" (Nogaret, 1790, p. 5).

[29] "*connait bien le cœur des femmes*" (Nogaret, 1790, p. 5).

[30] "*car il n'avait jamais oui dire que l'homme eut, pour ainsi dire, créé son semblable*" (Nogaret, 1790, p. 47).

[31] "*L'un et l'autre s'approchèrent de la statue, qui s'inclina en leur présence, et les étonna si fort par ce début, tenant du phénomène de l'économie animale, qu'ils reculèrent deux pas ; ils la crurent organisée par une main divine ; et comme s'il y eut eu quelque chose à craindre de s'assurer du contraire par le tact, ils se rassirent, éloignés d'elle à une certaine distance*" (Nogaret, 1790, p. 47).

[32] In Roman antiquity, a vestal was a virgin priestess of goddess Vesta whose duty was to maintain a holy fire.

by herself. Holding her hand, Nicator introduced her the same way he would have done with a real human being (Nogaret, 1790, pp. 45–46). Frankestein, in awe, addressing Aglaonice admitted that:

> Miss, if the idea of charming you with sounds did not occur to his [Nicator's] mind, I failed to think of imitating the laws of nature. Unlike him, I did not give my statue this progressive movement, so natural that myself was immediately impressed, and that this inanimate body seemed to me a living being.[33]

Wowed by this invention and enamored with his creator, Aglaonice chose to marry Nicator. Nonetheless, having appreciated the character of Frankestein, she proposes him the hand of her elder sister Bazilide. Both the inventor and the sister agree and the story ends with a double happy ending.

We can see here, by the way they behave, that automata are quite alike to human beings. Actually in those times, as Martin Kemp has observed, "the public boundaries between machine, animal, and human were becoming visibly permeable in an unprecedented way" (Kemp, 2007, p. 122). As a result, human was more and more conceived as a machine. For instance, the above-mentioned philosopher La Mettrie in his *Man a Machine* (*L'homme-Machine*, 1748) developed a materialistic view of man, according to which the soul is nothing but a function resulting from the matter: "The soul is therefore only a vain term about which we have no idea, and that a good mind should use only to name the part in us that thinks."[34]

Discussion

The three presented fictional works, for granting a central place to scientific development and showing the way humans interact with it, may undoubtedly be considered as part of science fiction genre. Voltaire in his *Micromégas* expresses his conviction that science, along with reason and empiricism, will not only

[33] "*Mademoiselle, si l'idée de vous charmer par des sons ne s'est point offerte à son esprit, il m'a manqué de penser à imiter les loix de la nature. Je n'ai pas donné, comme lui, à ma statue ce mouvement progressif, si naturel qu'il m'en a imposé à moi-même au premier aspect, et que ce corps inanimé m'a paru un être vivant.*" (Nogaret, 1790, p. 47).

[34] "*L'âme n'est donc qu'un vain terme dont on n'a point d'idée, et dont un bon esprit ne doit se servir que pour nommer la partie qui pense en nous*" (La Mettrie, 1948; Gallimard, 2010, pp. 189–190; Zarka, 2013, p. 6).

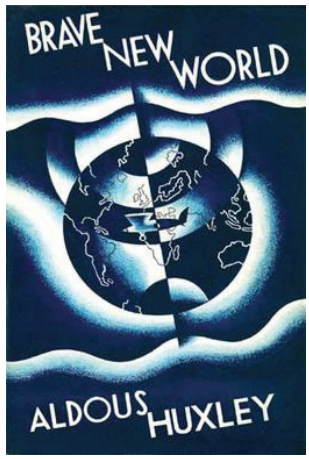


Figure 9. Cover of the 1932 edition of Aldous Huxley' *Brave New World*.

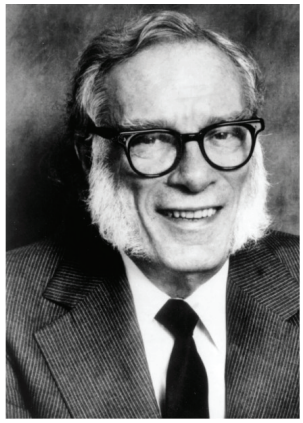


Figure 10. Isaac Asimov. His robots are the distant offsprings of Nogaret's automata.

provide a better knowledge of the environment of human being, but also a new basis for human relationships. *Amilec* is a digest of up-to-date information on reproduction. Ultimately, this "biological trend" of the science-fiction genre will find its accomplishment with the embryos in jars of Aldous Huxley's *Brave New World* (Huxley, 1932, Fig. 9).

Centered on a rivalry to win the heart of a beautiful lady, Nogaret's narrative is closer to more traditional literary works. Nevertheless, his musician androids will have a prolific descent culminating with Isaac Asimov's *The Robots* series (Figs. 10 & 11).

On the whole, the three reviewed French works convey a benevolent (*Amilec*, *The Mirror of Current Events*) or an openly enthusiastic (*Micromégas*) support to science. Here possibly lies their very specificity, for in the following centuries, as the influence of science gets stronger, its impact becomes increasingly questionable for the consequences it may have on humans and society. Consequently, science fiction became a media to warn about dangers that may be foreseen. Asimov expressed it: "Individual science fiction stories may seem as trivial as ever to the blinder critics and philosophers of today—but the core of science fiction, its essence, the concept about which it revolves, has become crucial to our salvation, if we are to be saved at all." (Asimov, 1978)

Actually, if Voltaire was right to pledge against prejudice and promote critical reasoning, the end of anthropocentrism he initiated in *Micromégas* likely went too far. Humans get used to rely more and more on science, leading to an unescapable dependence on it. It should be noted that René Dubos (1901–1982), the eminent French-born American microbiologist, in his *So Human an Animal* (Dubos, 1968) (was the title a reminiscence of La Mettrie's works?),

Figure 11. Asimov's collection of short stories *I, Robot* (1950).

while reminding how indispensable science is, drew attention to that humanity is facing the danger of losing its humanness because of the omnipresence of the technological environment. The biologist stressed that humans must regain the central role to fulfil the eighteenth-century promise of a science at the service of mankind, and not the other way around: "There is a demon in technology. It was put there by man and man will have to exorcise it before technological civilization can achieve the eighteenth-century ideal of humane civilized life." (Dubos, 1972, p. 216)

In keeping in with René Dubos' assertion, it must be noted that the primacy of science, initiated in the 18th century, coincided with a dehumanization of the human, which occurred around the same time. When Tiphaigne in *Amilec* narrows the physiological differences between human and plant, he contributes to cancelling man's specificity. La Mettrie, in his *Man a Plant* directly assimilates the human to a vegetal. In his *Man a Machine*, the human being is conceived as a mere cold mechanism. Voltaire did not think otherwise, when in his correspondence he considered a foetus as a "hardly organized little machine".[35] The most respected Montesquieu himself considered that "Our machine accustoms our soul to think in a certain way […] it is here that physics could find a place in morals, showing us how much the dispositions for human vices and virtues depend on the mechanics".[36] In the following century, choked philosopher Maine de Biran (1766–1824) was to remark: "Eighteenth-century philosophers made a serious mistake in this regard: they didn't know man".[37] Maine's remark may be sensible, but more likely, a new regard on the human had emerged. Such dehumanization sheds new light on atrocities that occurred during the French Revolution. Evocating this major

[35] Letter written on 5 July 1773 by Voltaire to his nephew Dompierre d'Hornoy, letter D 18544, t. 40 (Voltaire, 1975, p. 44; Martin, 2000, p. 10).

[36] "*Notre machine accoutume notre âme à penser d'une certaine façon […] c'est ici que la physique pourrait trouver place dans la morale, en nous faisant voir combien les dispositions pour les vices et les vertus humaines dépendent du mécanisme*" (Montesquieu, 1941, p. 245; Martin, 2000, p. 22).

[37] "*Les philosophes du XVIIIe siècle se sont lourdement trompés à cet égard: Ils n'ont pas connu l'homme.*" Written in his diary on 16 June 1816 (Maine de Biran, 1957, p. 147; Martin, 2000, p. 294).

event, the French literature specialist[38] and history connoisseur Aldous Huxley in the preface to the 1946 *Brave New World* edition observed that the revolution Robespierre achieved was superficial, for it was merely a political one. For Huxley, the "really revolutionary revolution" is still to come "not in the external world, but in the souls and flesh of human beings". That is, not in society but within human themselves.[39]

Ultimately, scientific achievements may put at risk what makes the essence of human being. As Thierry Hoquet observed: "Individuals amputated and repaired by robotic prosthesis are in reality the laboratory where the forms of life of the future are experimented. That is to say, at the same time amplified and potentially annihilated by the advent of something else that is no longer him."[40] Progressively overshadowed by science, the human has to take back the rudder to regain control of his destiny. French science fiction master Jules Verne had felt the need of it when in *Twenty Leagues Under the Sea* (1870) he says through the mouth of Captain Nemo: "The earth does not need new continents, but new men!"[41]

Conclusion

Voltaire's *Micromégas*, Charles-François Tiphaigne de la Roche's *Amilec, or the Seeds of Mankind* and François-Félix Nogaret's *The Mirror of Current Events, or Beauty to the Highest Bidder*, in which scientific innovations are central, are precursors (proto science fiction) of the science fiction genre in literature (Fig. 12).

Indeed, humans examined under the lens of the microscope made by the Saturnian in *Micromégas* helps to rethink the place of mankind in the universe, the procreation theories present in *Amilec* explore the making of the human

[38] Huxley taught French literature at the prestigious Eton College. One of his students was George Orwell, the author of *1984*.

[39] It is worth of notice that Mary Shelley's prominent science-fiction work *Frankenstein, or the Modern Prometheus* (Shelley, 1818) was influenced by her reflection on the French Revolution (Catron & Newman, 1993).

[40] "*Les individus amputés et réparés par prothèse robotique sont en réalité le laboratoire où s'expérimentent les formes de vie de l'avenir : où l'humain sera prolongé, c'est-à-dire à la fois amplifié et potentiellement annihilé par l'avènement d'autre chose qui n'est plus lui*." (Hoquet, 2011; Zarka, 2013, p. 3).

[41] "*Ce ne sont pas de nouveaux continents qu'il faut à la terre, mais de nouveaux hommes!*" (Verne, 1870, p. 141)

being, while *The Mirror of Current Events'* automata study that of the nature of human being self.

These works are food for thought and, as science fiction genre nowadays, may be conceived as a laboratory of ideas enabling to consider all possibilities. Indeed, imagination is useful to draw attention to the issues our societies have to address at the moment and the perils that threaten them. Additionally they contribute to arousing interest in science and scientific professions.

The reading of these three analyzed literary works is relevant for science history and anthropology, as it helps to assess the place of science in the society and that of the human being in his environment. Worth reading for the amateurs, they are the touching milestones of a nascent genre of literature—science fiction.

Figure 12. The nascence of science fiction coincided with the flourishment of a new artistic style. Illustration from Louis Guillaume de la Folie's work *Le philosophe sans prétention, ou l'homme rare* (1775).

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Dr **Arnaud Parent** is a lecturer of French language and French civilization at the Institute of Humanities of Mykolas Romeris University, Vilnius, Lithuania.