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Arthur B. Evans
DePauw University

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Roger Bozzetto

Kepler's *Somnium*; or, Science Fiction's Missing Link

Edited & translated by Arthur B. Evans

Why is Johann Kepler's *Somnium* (1634)¹ an appropriate subject for SF study? Because, until a better model can be found, the *Somnium* seems to represent best what might be called a "primitive" SF form; in some respects, it could even be viewed as an important generic ancestor to today's "hard" SF. In the evolution of conjectural/ speculative fiction, Kepler's *Somnium* stands as a kind of literary "missing link" between those early narratives of pure fantasy (e.g., Lucian's *True History*) and those later ones grounded in scientific discovery (e.g. Cyrano de Bergerac, Jules Verne et al.). Furthermore, to the extent that it constitutes one fictional model around which the SF genre originally developed yet uses a narrative format unlike what most later SF texts will adopt, Kepler's *Somnium* is a locus for many important questions concerning the historical interaction of SF narrative forms and scientific knowledge.²

In this essay, I will adopt two working hypotheses. First, the emergence of a new fictional genre is not something that takes place in a vacuum: it occurs within the context of other pre-existing genres. If the latter are sufficient to express what needs be said, no new genres are created. If, on the other hand, the pre-existing genres are not suited to articulating a previously unimagined concept, a new genre is invented to do so—most often by hybridization. Second, the conditions which necessitate the creation of a new genre are represented and can be discerned in the organization of those texts which constitute this new genre.

These two hypotheses allow one to correlate those elements surrounding the sociology of literary production (the constraints which generated this new genre) with an analysis of the fictional text itself (to show how, by its very structure, it expresses these new concepts). Methodologically, this approach not only permits a detailed look at the birth of an important and original textual artifact in the history of SF, but also clearly illustrates how and why Kepler's *Somnium* is dramatically different from a text like Lucian's *True History* (which, incidentally, Kepler translated in order to learn Greek) or a "scientific romance" à la H.G. Wells, "a mixed literary genre combining the romantic tale of a journey to a lost land, Gothic sensationalism..., and

the expositional didacticism of philosophical speculation vulgarized for the benefit of the masses" (Pagetti: 125).³

1. A New Context. The emergence of SF as an original fictional genre during the 17th century was, in part, a concrete response to a radical change in that age's conception of what constituted reality—i.e., of a new and revolutionary vision of the physical universe and its relationship to human knowledge. As a result, a new paradigm for the speculative imagination was created, and this new paradigm generated a new narrational form (cf. Kuhn).

What distinctive features tended to characterize that form? First, it had to somehow incorporate the notion of an accumulative "progress" of knowledge throughout history—as claimed by Francis Bacon among others—and, concurrently, it had to provide a clear methodology for confronting the unknown. It was only during the 17th century that the concept of "scientific method" and the reproducibility of experimental results via established procedures (and entirely independent of the personality of the experimenter) began to give new meaning to the term "science." In his *De Dignitate et augmentis scientiarum* (or *The Advancement of Learning*, 1623), for example, Bacon proposed a number of procedures, which he labelled "experientia litterata," to be used in scientific investigations. This advocacy by Bacon (among others) of the experiential as a credible means for attaining knowledge constituted a major epistemological turning-point in the history of Western civilization and had a number of important implications: to name but a few, unquestioned authority would be replaced by individual experience, faith by inductive rationalism, and dogmatism by the evidence of experimental method. Further, as one way to popularize this new way of reading the "Great Book of the World" (which, since Galileo, was known to be written in "mathematical language"), Bacon endorsed the use of didactic fictions, or what he called "fables."

These "fables," Bacon contended, must be like "scientific dreams" and appropriately tailored to the unsophisticated minds which they addressed. Such fictions must provide an easy bridge between the traditional models of knowledge and the "newly discovered truths" of modern Science. They must overcome, by method and cunning, the public's inherent difficulty in "conceiving the new." They must proceed inductively, via gentle extrapolation, from a known and recognizable reality, and carry the reader to a point where the anticipated existence of the new reality can be perceived: Copernican heliocentrism, Bruno's concept of infinity and of the plurality of worlds, Bacon's and More's visions of the ideal state, etc. (all of which are examples of what Claude Durand has called "ideological experimentation" [p. 12]).

Such didactic fables, written for the scientifically uninitiated, needed also to provide certain referential and emulative models for their readers—not only a portrayal of their own *lecteur idéal*, or "model reader,"⁴ but also an entire "coherent possible universe"

complete with the basic rules of how it works. To facilitate reader understanding, the fable must both posit such rules and fully illustrate them so that their readers might visualize this (imaginary but quite conceivable) universe and be able to orient themselves comfortably within its hypothetical reality.

Such fictions, then, would not attempt to represent traditionally accepted forms of reality. Rather, they would seek to organize the reader's fictional experience in a wholly different manner: instead of eliciting a kind of playful and rhetorical marvellous [*merveilleux ludique et rhétorique*]⁴—the kind found, in varying modes, throughout the works of writers such as Lucian, medieval romancers, and even Ariosto—they would generate an aesthetic of cognitive wonder [*esthétique de la "meraviglia" et du "conchetto"*]; so that even in the case of imaginary voyages, the reader's fictional experience would be grounded in certain theoretical and hypothetical presuppositions.

As one of the earliest examples of this sort of a Baconian "fable," Kepler's *Somnium* is a speculative text that resides in the domain of literature (since it is a fictional narrative) as well as within the philosophical and scientific controversies of its time. As one way to illustrate its uniqueness, it might be useful to compare this work of Kepler's with Jules Verne's *romans scientifiques*. The latter are semi-didactic fictions geared to inculcate certain lessons from the corpus of already-established 19th-century scientific knowledge. In the early 17th century, by contrast, "fables" such as Kepler's sought to promote the very existence of Science itself as a system of thought: the role of the fiction was to concretize, illustrate, and valorize the "scientific paradigm" as a means to conceiving the (previously) inconceivable.

As such, the *Somnium's* referentiality (despite its 17th-century origins) does not evoke the marvellous [*merveilleux*], as does Lucian's fantasy or certain medieval romances. And it does not—as with Verne and the SF authors who succeeded him—propose an imaginative exploration of the outer edges of a reality *already defined* (in large measure) by accepted scientific fact. Rather, the *Somnium* might be seen as a kind of epistemological stepping-stone between the two: it is an early attempt to give figurative substance to the visualization of the universe as something both rationally conceivable and quantifiable, while making use of an innovative fictional vehicle which bridges the gap (however primitively) between fantasy discourse and scientific discourse. As such, the *Somnium* is a curious literary artifact which concretely reflects what some historians have called the "implications of the scientific revolution for the human imagination."⁵

But how does the *Somnium* manage to accomplish this?

2. The "Somnium" as Atypical Science Fiction. Galileo was condemned in 1633. Kepler's *Somnium* appeared in 1634, its source being Kepler's 1593 *Dissertatio*, which bore the title: "How do the Heavens appear to a Man located on the Moon?" The central thesis posited by both is that the Earth does indeed rotate, although its

inhabitants are unconscious of this movement.⁶ Kepler, reasoning by analogy, places an “observer” on the Moon and demonstrates how his experiences are identical to those of his Earth-bound companions: on the one hand, he does not “feel” the Moon moving; on the other, he sees the Earth waxing and waning in the sky. Before locating his observer on the Moon, however, Kepler must transport him there. And both the actual voyage from the Earth to the Moon and the descriptions of the Moon itself from this new vantage-point are images worthy of a “scenic railway”—initiating a new literary *topos* which will be used, after Kepler, by SF writers such as Francis Godwin and Cyrano.⁷ Furthermore, as a kind of exegetic supplement to his richly speculative tale, Kepler appends to his narrative over 200 separate explanatory Notes, a “Selenographical” Appendix, and even some Notes on the Appendix—throughout which he outlines, among other things, various discoveries by Galileo.⁸ The final text of the *Somnium*, then, is really a “work in progress” that was continually updated by its author in order to present new knowledge in the field of astronomy.

But how is the *Somnium* structured narratologically? To answer this question, I will examine the following features of the published text: the relationship of Kepler’s narrative to a similar one by Plutarch (appended to the *Somnium* in the latter’s first edition), the presence and function of Kepler’s many explanatory endnotes, and the text’s many interlocking levels of narration, which mediate its fictional/non-fictional discourse.

Kepler translated Plutarch’s *De Facies in orbe lunae* (“The Face in the Moon”) and placed it immediately after his own in the first edition of the *Somnium*. The reader thus moves successively from one text—and one mental universe—to the other. Kepler gave no explanation why he chose to do this, but two possible reasons spring to mind. First, by juxtaposing these two texts, Kepler purposefully sought to both identify and construct a bridge between new knowledge and old, astronomy and astrology,⁹ scientific speculation and *merveilleux*. Second, perhaps as a counterbalance of prudence, Kepler chose to pass off his fictionalized treatise on Copernican theory as a dream, in the ancient tradition of “dream narratives” (e.g., *The Dream of Scipio*, *The Dream of Macrobius*, etc.). And since his observer is transported to the Moon by supernatural means, the inattentive reader might easily interpret the *Somnium* as a simple mythic tale (like Plutarch’s?)—unless, of course, the reader refers to the author’s many explanatory Notes, the significance of which I will discuss presently.

The fictional story in the *Somnium* is conveyed by three successive first-person narrators, and the interaction among them is important. First, there is an authorial narrator (N1) who, historically placed in 1608, falls asleep while reading a historical chronicle of Bohemia. While in dream, he finds himself reading another book bought at a fair in Frankfurt. In this book, a second narrator, named Duracotus (N2), recounts his travels as a youth and explains how he became involved in the study of astronomy. Duracotus eventually returns home to his

mother; and she, a practicing astrologer and seer, introduces him to a spirit called the Dæmon from Levania (N3), who then narrates the remainder of the tale.

The Dæmon tells Duracotus of how one might voyage to the Moon (Levania). It is to be accomplished by quasi-magical means: humans “transported” there by Spirits. But the Dæmon also—interestingly enough—openly acknowledges the many technical difficulties inherent in such travel through space.¹⁰ Finally, as the narrative focus shifts to the Moon’s surface, Kepler then proceeds to furnish the reader with a description of the “heavens” as seen from the Moon—as per the original intent of his *Dissertatio*—along with the beginnings of a detailed account of the Moon’s topography and its unusual inhabitants.

The Dæmon’s narrative ends with the abrupt and unexpected return of the authorial narrator (N1), who has just been awakened from his dream by the sound of a rainstorm. The text stops at this point. Neither the tale told by Duracotus nor that of the Dæmon—the narratives within the narrative—is brought to conclusion.

This relatively short fiction is then followed by 223 critical Notes, which together come to almost ten times the length of the fictional narrative itself. These Notes, added by Kepler between 1621 and 1630, offer a wide range of mathematical explanations, discussions of certain theories by Galileo and Aristotle, postulations of various astronomical hypotheses, corrections of errors made in earlier works, and so forth.

Thus the *Somnium* is a half-fictional, half-non-fictional text which has its own history, a history which, reflecting Kepler’s ongoing research, constitutes a valuable document for the History of Science. As narrative, however, it resorts to highly non-scientific means (the Dæmon) to make feasible the portrayed trip to the Moon—something which neither Godwin nor Cyrano will later do. But then again, this unorthodox Dæmon does communicate a plethora of technical observations about the Earth’s rarefied atmosphere, the frigid temperatures of space, the necessity of retropropulsion for landing, etc.—all of which lead one to believe that Kepler was very cognizant of the physical obstacles to space travel and that even if the technology necessary to overcome them was not yet available in the 17th century, it was nevertheless theoretically possible for such a journey to be made.

Kepler’s *Somnium* is therefore a unique mixture of physics and fantasy, new Science and popular superstition. But it mixes them in a manner that is quite noteworthy. The image of the waxing and waning of the Earth in the Moon’s sky, for example, is created and sustained by means of scientific hypothesis (Copernican astronomy) and mathematical demonstration. That is to say, the SF *novum* involved is the direct result of the internal logic of a newly-conceived model of reality [*modélisation neuve de la réalité*] within which readers are obliged to believe their brains, not their eyes.

This same basic procedure is also used to describe the inhabitants of the Moon. But here, instead of mathematical proofs, Kepler grounds

his explanations (through the appended Notes) in logically-reasoned analogy. For example, if he places caves on the Moon, it is so that the inhabitants can protect themselves from the alternating extremes of heat and cold.¹¹ When he says (p. 27), “Whatever is born on the land or moves about the land (212) attains a monstrous size. Growth is very rapid. Everything has a short life, since it develops such an immensely massive body (213),” he immediately justifies these speculations, via Science, in the corresponding Notes (whose numbers appear parenthetically in the text, as above).¹² In other words, Kepler refuses to make his Moon an idealized Earth-like “otherwhere”—e.g., a utopian locus *à la* More or an exotic backdrop for fantasy *à la* Lucian. Instead, his various postulations about the Moon’s inhabitants are methodically, rationally, and analogically deduced from scientific hypotheses.¹³ As he asserts in Note 210 (referring to “the Privolvian region” [p. 27]): “Which no eye has ever seen. Yet in my discussion...you observe sound reasoning” (pp. 128-29).

Of course, one might argue that the *Somnium* as a whole cannot be considered “true” SF because, despite the fact that its annotations may add a measure of rational conjecture to the text, the fictional narrative to which they are appended does not at all resemble what we today call SF in the “classical” sense. But if one adopts a somewhat less anachronistic and reductive viewpoint and considers this text in the light of its own historical period and the evolving definitions of both “science” and “fiction” during that time, Kepler’s *Somnium* does appear as an early (albeit narratologically primitive) example of “hard” SF—one, however, in which the SF discourse is fragmented and dichotomized; i.e., where the fiction and the science are articulated separately. The very structure of the *Somnium* as a kind of complex “embedded” narrative (with its succession of “interior” narrators and its scientific endnotes conveyed by an “exterior” narrator—which are nevertheless meant to be read concurrently with the fictional text) serves to underscore to what extent the scientific paradigm itself was not yet, during Kepler’s time, a socially accepted and/or legitimate mode of viewing reality (even fictional reality). It had to be integrated into the narrative from the outside—transversally—in the form of extratextual commentary.

But to clarify exactly how the SF discourse functions in this text, a closer examination needs to be made of the interplay between the various narrational levels used in the *Somnium* and the “scientific voice” therein—a voice which, like the status of Science itself during the early 17th century, was far from “pure” and was still colored in many ways by myth, magic, and various forms of the marvellous [*merveilleux*].

3. Science-Fiction Discourse in Kepler’s *Somnium*. In Kepler’s text, as mentioned, the authorial narrator (N1) recounts a dream wherein appears a book. The *Somnium* is thus a book which relates a dream; but the dream itself is the contents of a book with its own first-person fictional narrator (N2), Duracotus, who is listening to

another first-person fictional narrator (N3), the Dæmon from Levania, who tells him about the Moon. By its very structure, therefore, the *Somnium* seeks to portray an “unthinkable” version of reality. Why is this so? Let us examine the components.

In this narrative, the “scientific discourse” is presented only by the Dæmon, and it occurs only at the point where the Dæmon begins to speak of the Moon voyage itself. This unusual discourse offered by the Dæmon has its authorial counterpart in the Notes, but in discontinuous form. Reconstructed schematically, for example, the *Somnium* as a whole would take the form of a series of concentric circles. Let us recapitulate its contents in those terms.

In the outer circle, and serving as intermediary between the fiction and its implied readers (whence the polemical, didactic, and justificatory nature of its contents), are Kepler’s critical Notes detailing his research, offering anecdotes, proving his points, etc.—a total of 223 Notes (and diagrams) which (as indicated by the title of this section) “were written in order between the years 1620 and 1630” (p. 30). The next circle contains the narrative by N1, the account of a dream. In this dream, he encounters the manuscript of N2 (the next circle), wherein N3 relates his tale (the final circle) unveiling the “truth” about the Moon. The revelations about the Moon given by the Dæmon are also those elaborated on by Kepler in his Notes (linking the innermost circle with the outermost); and this provides the work as a whole with an overall structural—if not entirely contiguous—unity.

But what is interesting here is that the “Science” in this SF takes the form of a massive support-structure of didactic endnotes totally exterior to the fictional narrative itself (albeit meant to be read concurrently). That is to say, the entire apparatus of scientific rationale—the fundamental *raison d’être* for this work—is presented tangentially via the (apparently acceptable) pretext of a supernatural fantasy. And this spirit-narrated fantasy, mediated by several different narrational levels, supposedly takes place within a dream sequence—i.e., it relies upon the reader’s recognition of the traditional function of a dream which, since Macrobius, had been used by philosophers as an allegorical vehicle to make their points.

Viewed in terms of their respective definitions of textual verisimilitude, Kepler’s practice here stands in sharp contrast to that of a later SF author like Verne, who freely (and quite regularly) tended to punctuate his narratives with widely-accepted and (thus) “authoritative” chunks of scientific discourse—both for reasons of pedagogy and to enhance the “mimetic” quality of his fictions (cf. Evans). It is this choice of a “supernatural” narrative voice embedded within a protracted dream sequence which aptly illustrates the extent to which such “new” knowledge was viewed as lacking any “representable or conceivable referentiality” [*réfèrent représentable ou pensable*] during Kepler’s time. It was only via such a strategy, such a “fable,” that this “new” knowledge could be given acceptable substance.

In what might be seen as a further attempt to “de-alienate” his portrayal of this “new” knowledge, Kepler also continually personalizes his didactic Notes with a great deal of self-reflective commentary. Mixed in with the mathematics and theorems, one discovers a great number of personal anecdotes, tongue-in-cheek humor, and an obvious desire to underscore the allegorical nature of his fictional narrative (and the spirit-narrator portrayed therein). For example, in Note 34 Kepler explains his choice of the “Dæmon” as follows: “These spirits are the sciences in which the causes of phenomena are disclosed. This allegory was suggested to me by the Greek word *Daemon*, which is derived from *daiein*, meaning ‘to know,’ as though it were *daemon*” (p. 50).¹⁴ Commenting on his Dæmon’s knowledge of the secrets of the Moon (and perhaps, indirectly, on his critics, who seemed to find metaphysics more inherently credible than physics), Kepler points out in Note 56: “If we continue the allegory, it is easy for reason...to attain knowledge of celestial phenomena....And here, of course, I indulge in a joke: looking straight ahead, I concentrate on physical reasoning; out to the side, I shoot satirical arrows in all directions...” (pp. 63-64).

This combination of seriousness, allegory, and satirical humor is quite characteristic of the *pensée paradoxale* evident in much of the literature of the 16th century, as witnessed by works such as Erasmus’s *In Praise of Folly* and More’s *Utopia*. But Kepler’s *Somnium* is substantially different from the speculative works of these “fable”-making predecessors in at least two ways. Unlike utopias, it has a mathematically scientific (as opposed to a social or rhetorical) point to make; and there is a sense of implicit “reversability” that permeates this text on several different levels. For one thing, this “new” knowledge is presented *both as and through* a complex allegory which uses canonical—and therefore acceptable, albeit “unearthly”—vehicles for its expression (the Moon, dreams, the Dæmon). In so doing, the text seeks to render more acceptable those “unthinkable” premises upon which the allegory itself is based (Copernican astronomy). Second, the referential “heart” of the *Somnium* as a Moon-narrative (that portion of the text which is communicated—ironically—by the allegorical figure of the Dæmon, who represents “the spirit of Science”) is, in fact, a narratological mirror-image of Kepler’s detailed commentary on astronomy located in the appended explanatory Notes. That is to say, Kepler’s *Somnium*, by virtue of its very structure as allegory, seems to encourage “rational deconstruction”: it provides the reader not only with a fiction-based portrayal of the “new” knowledge of Science, but with the textual means to *experience* its most implicit methodology as well.

4. Conclusion. We tend too much to speak of SF as if it were the romantic popularization or the novelistic exploitation of a Science which had always been there. Kepler’s *Somnium*, highly atypical of most SF in its narrative structure yet unimpeachably scientific in its goals and content, should cause us to question such facile generic

presuppositions. What is today called Science was at first dangerous speculation, and the basic paradigms by which we view the universe (paradigms we now take for granted) are actually of quite recent invention and can be historically situated. Early scientific speculations, to the extent that they took fictional form, were not always escapist fantasies or utopian social commentary. In some cases, such fictions offered an acceptable vehicle to express the “not yet thinkable” [*le non encore pensable*]. Comparing Kepler’s *Somnium* with the works of Godwin or Cyrano, for example, one can measure the extent to which such “new” knowledge came to be progressively integrated into the fiction itself. The novel, an “omnivorous” fictional genre, soon assimilated this “new” knowledge into its operational epistemology—along with certain previously repressed forms of discourse associated with it (cf. Hallyn). Finally, it must be acknowledged that, unlike More’s *Utopia* (which became a recognized structural and conceptual model for subsequent sociological speculations— cf. Suvin: 222ff.), the *Somnium*, untranslated and all but unknown, had no tangible effect on the evolution of SF itself. Yet within what could metaphorically be called a “discursive geneology” of the genre, it nevertheless constitutes an important “missing link” between the narrative forms of utopian fantasy, imaginary voyage, and “hard” SF.

NOTES

1. Kepler’s *Somnium, seu Opus Posthumum de Astronomia Lunari* was published posthumously by his son in Zagan and Frankfurt/Main in 1634. References to the French version of Kepler’s work (as translated by Michèle Ducos) have been replaced here with ones to the English translation cited below.

It should be added that the present essay is a much altered version of one that originally appeared as “*Le Songe, ou l’origine du genre,*” *Cahiers du CERLI*, no. 15 (Jan. 1988), pp. 180-98.

2. The actual “birth date” of SF, ranging from the *Epic of Gilgamesh* to Mary Shelley’s *Frankenstein*, varies from critic to critic. The problem has to do with how each critic defines the relationship between literature and its scientific context. Quite often such critics forget that each historical period had its own epistemological character—i.e., its own ideas about what constitutes knowledge—and that the various fictional forms prevalent during each period were both recognized and classified according to these notions. It would therefore be erroneous for us to identify a pre-modern fictional text as SF if we are using as criteria our own late-20th-century presuppositions about science and human knowledge. To avoid such anachronisms, we must consider such texts within the context of the mental configuration [*configuration mentale*] of the time in which they emerged.

The SF criterion of rational conjecture must also be refined somewhat. For example, to classify an ancient text of playful speculation as SF because, according to our modern orientation, it appears to satisfy certain requirements for rational conjecture is a highly anachronistic approach. A journey to the Moon for Verne—or even for Kepler—is rational conjecture because, at the

time when such fictions were written (as well as today), the Moon was viewed as an astronomical object, a satellite of the Earth. By contrast, a journey to the Moon as expressed in Lucian's *True History*, for instance, is not rational conjecture; it serves simply as a playful metaphor.

These remarks parallel Michel Foucault's notion of an "epistemological base" [*socle épistémologique*]. See, in particular, the analysis by Michel de Certeau in his *Histoire et psychanalyse, entre science et fiction* (Paris, 1987), p. 27.

One might argue that Kepler's *Somnium* had no impact whatsoever on the development of SF because it remained virtually unknown; whereas the texts of Godwin and Cyrano de Bergerac, for example, nurtured a new and identifiably SF rhetoric and *mythos*. It is undoubtedly for this reason that Robert M. Philmus, in his *Into the Unknown*, treats Kepler as marginal to SF—a position shared by C. Dollerup. From a strictly factual viewpoint, this assertion is true; however, when considering the history of the SF genre in the broader context of the evolution of speculative fiction and its relationship to scientific discovery, it is not entirely pertinent.

3. It is not gratuitous to link Kepler with Wells, who uses a quotation from the *Somnium* as the epigraph for *The First Men in the Moon*.

4. "...writing means constructing, through the text, one's own model reader": Umberto Eco, *Reflections on "The Name of the Rose,"* trans. William Weaver (London, 1985), p. 48.

5. See Michèle Le Deuf and Margaret Llasera's *La Nouvelle Atlantide, suivi de Voyage dans la pensée baroque* (Paris, 1983), p. 16. I am deeply indebted to these two scholars for my preceding discussion of Francis Bacon.

6. This hypothesis, derived from philosophy, actually predated that of Copernicus. See Nicholas of Cusa's *De Docta ignorantia*, as cited by Alexandre Koyré, pp. 14-15.

7. Note, however, that the date of publication for Godwin's *The Man in the Moone* (1638) probably belies its date of composition (generally now thought to have been sometime between 1625 and 1630). See Philmus, p. 40n, for the articles on this subject.

8. For Kepler's differences with Galileo, see Nicolson, pp. 37-39.

9. It should be noted that Kepler himself, an accomplished astronomer and physicist, remained a passionate believer in astrology.

10. "In every instance the take-off hits him as a severe shock (66), for he is hurled just as though he had been shot aloft by gunpowder to sail over mountains and seas (67). For this reason at the outset he must be lulled to sleep immediately with narcotics and opiates (68). His limbs must be arranged (69) in such a way that his torso will not be torn away from his buttocks nor his head from his body, but the shock will be distributed among his individual limbs. Then a new difficulty follows: extreme cold (70) and impeded breathing. The cold is relieved by a power which we are born with (72); the breathing, by applying damp sponges to the nostrils (73)...Their bodies roll themselves up, like spiders, into balls which we carry along almost entirely by our will alone (76), so that finally the bodily mass proceeds toward its destination of its own accord (77)... Many additional difficulties arise which it would be tedious to enumerate. On the other hand, we suffer no harm at

all": *Somnium*, p. 16.

11. See Note 211: "Here is pure reasoning, divorced from any visual evidence. However, had I then known that the moon has as many sunken cavities as Galileo's telescope has revealed...I would have asserted my theories with a freer pen" (*Somnium*, p. 129).

12. See Note 213, for example: "This is from the Tübingen theses. It, too, is intended to express a proportion...Between the very slow motion of the fixed stars for us and the brief periods of the individual planets down to the daily rotation of the earth, there is a proportion which seemed to me to be also that of human life to the modest size of our bodies. For the moon, on the other hand, the fixed stars return more quickly than Saturn, whereas a day is thirty times longer than ours. Hence I thought that I should attribute a short life to the living creatures but enormous growth..." (*Somnium*, pp. 129-30).

13. In fact, it might be said that Kepler inaugurated a new kind of fiction which Descartes, Malebranche, Fontenelle, and Leibniz would later adopt for their own purposes and call "philosophic fiction." Detached from its "epiphanic" function of representing the already-existing, the referentiality of this fiction is geared more to portraying the rationally conceivable and the logic of the possible. One can discern here the first stirrings of what will become not only extrapolative SF but also many other concretely speculative activities such as future forecasting, computer simulations and modelling, etc. For more on "philosophical fiction," see Guy Lardreau's *Fictions philosophiques et science-fiction* (Paris, 1986), pp. 23-64.

14. To fully understand Kepler's play on words, Edward Rosen's commentary is helpful: "According to religious beliefs of the ancient Greeks, a daimon was a minor divinity, intermediate between the great gods and human beings; it is in this sense that Kepler, half-seriously and half-jokingly...speaks about the Daemon from Levania...The Greek word *daemon* means 'an expert,' 'one who knows.' In deriving *Daemon* ('minor divinity') from *daemon* ('expert'), Kepler followed the etymological speculation of Plato in *Cratylus*" (*Somnium*, p. 50, nn. 78-79).

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RÉSUMÉ

Roger Bozzetto. *Le Songe de Kepler, ou le chaînon manquant de la science fiction*.—La recherche des origines d'un genre est une exploration sans fin. Les sources de la science-fiction peuvent remonter à Homère ou à Lucien pour les voyages imaginaires, et à Platon et More pour le versant utopique. Mais le voyage imaginaire comme l'utopie demeurent pure fantaisie ou jeu conceptuel non narratif. Avec *Le Songe*, Kepler inaugure un nouvel espace spéculatif: il expose les conséquences d'une théorie astronomique en articulant des raisonnements analogiques et des calculs vérifiables dans le cadre d'une fiction qui sert d'appui à une polémique philosophique et scientifique. Compte tenu des conditions d'émergence de cette fiction, Kepler se trouve dans l'obligation d'inventer une forme à la fois éclatée (dimension que lui confèrent les notes en annexe) et emboîtée (l'intervention du narrateur surnaturel qui justifie la démarche scientifique). Cette forme très complexe et difficile à lire n'a d'ailleurs eu aucune postérité directe. Cependant, à partir de ce nouvel espace spéculatif inventé par Kepler, Godwin, puis Cyrano de Bergerac (qui ont su intégrer habilement le savoir neuf dans le cadre d'une fiction plus linéaire) développent des situations qui aboutiront à la science-fiction classique. Nous avons donc avec *Le Songe* un "primitif" de la science-fiction "hard" et sans doute le "chaînon manquant" entre Lucien et More d'un côté et la tradition de la science-fiction de l'autre. (RB)

Abstract.—The search for the origins of a literary genre is an endless exploration. The sources of SF can be traced, in relation to the imaginary voyage, to Homer and Lucian and, for utopian fiction, to Plato and Thomas More. But both imaginary voyages and utopias remain either pure fantasy or non-narrative conceptual games. With Kepler's *Somnium*, a new speculative format was inaugurated: he demonstrated the consequences of an astronomical theory, complete with analogical reasoning and verifiable mathematics, within the framework of a fiction which served as a kind of polemical platform for his philosophical and scientific arguments. Taking into account the historical conditions prevailing at the time of this work, Kepler was obliged to invent a complex narrative form which was simultaneously open-ended (with its addition of appendicized notes) and multi-framed (with the intervention of a supernatural narrator to render its message credible)—a narrative form that was clumsy, difficult to read, and with no direct posterity. Nevertheless, utilizing this new speculative format invented by Kepler, both Godwin and Cyrano de Bergerac—who more skillfully integrated the "new" knowledge into their linear narrative models—began to develop its potentialities into the first "classical" SF. In Kepler's *Somnium*, therefore, we have the first example of "hard" SF and what might be called a generic "missing link" between Lucian and More on the one hand and the SF tradition on the other. (ABE)