Shadows of Instruction: 
Optics and Classical Authorities 
in Kepler’s Somnium 

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Johannes Kepler’s posthumous work Somnium relates a strange dream that culminates in a detailed picture of the way the heavens appear to a lunar observer. This knowledge is revealed to the dream’s protagonist by a daemon that teaches and explains the main tenets of the lunar astronomy. This daemonic instructor, however, presents itself not as a source of illumination and clarity, but as a shadowy creature, “For as a group we [the daemons] inhabit the earth’s shadows.... Up there [on the moon] we quickly withdraw into caves and dark places.... As soon as a spot begins to be free from the sun, we close ranks and move out into the shadows.”

Instead of the enlightened Platonic teacher, the reader encounters shady daemons, who live in dark caves, where they are granted leisure “to exercise our minds in accordance with our inclination.” The reader might associate this curious characteristic with the general occult ambience of the dream, and might relate it to the protagonist’s mother-witch. Kepler, however, explains that this fascination with shadows and darkness is directly related to scientific observation and knowledge, “The allegory compares the journey through the shadow to the observation of eclipse ... the time spent in the caves, to continuous speculation based on observation of the eclipse.” Kepler proceeds to his own personal experience. “In Prague I had a residence in which no spot was more suitable for observing the sun’s diameter than the underground beer cellar. From the floor of the cellar I used to aim an astronomical tube, described in my Optics, through an opening at the top toward the noonday sun on the days of

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1 Johannes Kepler, Kepler’s Somnium: The Dream or Posthumous Work on Lunar Astronomy, tr. Edward Rosen (Madison, Wis., 1967), 16.
the solstice.”2 The reader is transported into the dark-room, with its technologies of observation as a place of true and clear knowledge. Shadows and darkness are transformed from obstacles into vehicles of knowledge; the daemon and its shadowy world are the true teachers of astronomy: “However, to the extent that ... the daemon stands for the science of astronomy, there is seriousness in the assertion that for the mind there is no passage to the moon except through the earth’s shadow and the other things which depends on it.”3

This change in the value of shadows in relation to knowledge already took place in Kepler’s 1604 magisterial work on optics. In his preface Kepler ponders the origins of astronomy. Following Pliny, he posits the eclipsed luminaries as the trigger for human curiosity that led them out of a world of ignorance.

For the most noble and ancient part of astronomy is the eclipse of the sun and the moon, a subject that, as Pliny says, is in the entire study of nature the most wondrous, and most like a portent.... For this theater of the world is so ordered that there exist in it suitable signs by which human minds, likenesses of God, are not only invited to study the divine works ... but also are assisted in inquiring more deeply. For I implore you what is the cause, if not this, for nature’s playing such games in the sun’s and the moon’s bodies, by which not only humans ... are turned to wonder and stupefaction, so long as they are ignorant of the causes, but even the quadruped, by Pliny’s testimony, commonly take fright?4

The dramatic encounter of the earth, the moon and the sun was the game nature offered the human observers in order to arouse their curiosity. Kepler further claims that it is this distortion in the celestial order that, leads humans in their quest for knowledge: “It is believed rightly that all of astronomy is born from this obscurity of the luminaries. Just as these darknesses may be the eyes of the astronomers, these defects may be a rich source of doctrines these ‘stains’ may illustrate the most precise pictures on the mortal mind. O most excelled and commendable sign for all the nations about the glory of the shadows.”5

In the ensuing optical treatise, Kepler establishes shadows and their measurement as a solid basis for scientific observation. Scientific knowledge is acquired not through direct experience of the phenomena in full daylight, but through the use of instrumental manipulation of shadows, projections or any

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2 Kepler, Somnium, 76
3 Ibid., 63
5 Johannes Kepler, Ad Vitellionem palipomena, quibus astronomiae pars optica traditur (Frankfurt, 1604), ed. Franz Hammer, Johannes Kepler Gesammelte Werke (Munich, 1939) II, 16.
other sort of images and reflections. The shadowy instructor of the *Somnium* is an embodiment of Kepler’s conception of scientific observation. Its central place in *Somnium* suggests that this treatise is more than mere play in favor of Copernican astronomy. The central place of shadows suggests it is a bold attempt to convert the reader’s actual mode of vision. Thus, Kepler expects his reader not only to embrace Copernican theory but also to adopt a new ontology of vision comprising of instruments and shadows as positive elements.⁶

In advancing his arguments for a new mode of vision, Kepler tackles the well-entrenched dichotomy between the empiricist preference of direct vision, and the Neo-Platonic embrace of a super-sensual mode of perception. Kepler detects the general outlines of these two modes of vision in the text’s two main classical sources,⁷ Lucian’s *A True Story*,⁸ and Plutarch’s *Concerning the Face which Appears in the Orb of the Moon*.⁹ In Lucian only direct experience can be counted as a source of knowledge, whereas in Plutarch truth can be partially glimpsed through speculative myths that point beyond rational scientific procedures. The conclusion is the same: the epistemological foundation of astronomy (that deals with objects not given to direct experience) is doubtful, and therefore certainty of knowledge is unobtainable. To confront these criticisms of astronomical knowledge Kepler’s *Somnium* mobilized both rhetorical

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tools and new optics, which together converted the Plutarchian story and the reader’s point of view. In the end scientific observation is the only way out of an obscure and mannerist dream.

Kepler constructs a narrative within a narrative, unfolding a hectic political situation in contemporary Prague.\textsuperscript{10} The narrator follows the people of Prague in searching for the meaning of this situation in ancient Bohemian legends. The search turns into a dream of a book of memoirs belonging to an Icelandic sage named Duracotus. In a moment of rage his witch-mother, Fioxhilde, gives him away to a passing ship. The boy arrives in Hven at Tycho Brahe’s astronomical observatory. He stays there for a few years learning astronomy, alchemy, and other sciences. Missing his mother, Duracotus then returns to Iceland. His mother is impressed by his newly acquired knowledge and introduces her son to a daemon, her secret mentor of occult knowledge. The narrative now turns into a lecture delivered by the daemon on the way astronomical phenomena are observed from the moon. The daemon adds details of lunar geography and weather conditions. The daemon’s lecture ends abruptly as Kepler wakes up from his dream, leaving the reader puzzled as to its meaning.

This complex narrative within a narrative has an extensive apparatus of footnotes and comments. In these notes Kepler presents himself as astronomer and mathematician in order to explain the other elements of the treatise. He also states explicitly the reason for writing this strange and intricate story: “The purpose of my Dream is to use the example of the moon to build up an argument in favor of the motions of the earth.”\textsuperscript{11} Kepler follows here his own rhetorical method, wrapping an uncomfortable truth in a brilliant and attractive camouflage. In his astrological exposition of 1601 Kepler states these rhetorical percepts explicitly: “We may observe (in order to cure the crowd’s craving for marvels) what physicians observe in the sick, that we may make use of the unnatural and pernicious appetites of the crowd to get them to swallow (as medicine) such advice (disguised as prognostication) as may serve to remove this disease of the mind, and which otherwise we could scarcely have persuaded them to take.”\textsuperscript{12} The physician-philosopher-astronomer humors his patients and lulls them into believing that his moral advice is a marvelous prognostication of their future. In many cases this disguise has a jocular character and in his letter to Bernger, where he discusses extensively his work on the dream, Kepler complains that “There are just as many problems as lines in my

\textsuperscript{10} Kepler leads his reader to expect his Somnium to have political significance, alluding to Macrobius’s definition of somnia as special dreams that serve to illuminate covert political realities. See Macrobius, Commentary on the Dream of Scipio, tr., intro. and notes William Harris Stahl (New York, 1952).

\textsuperscript{11} Kepler, Somnium, 36.

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writing, which can only be solved astronomically, physically or historically. But what can one do about this? How few people will attempt to solve them? The people wish that this kind of fun, as they say, would throw itself around their necks with cozy arms, in playing they do not want to wrinkle their foreheads. Therefore I decided to solve the problems myself in notes, ordered and numbered.”

Kepler’s aim appears to be an introduction of an argument in favor of Copernicanism disguised as a fabulous dream that will attract various readers in search of amusement. The Dream, however, is more than just magnificent wrapping paper to be discarded as the reader approaches the scientific core of the treatise. Kepler points out in his notes that the aim of his dream is a total conversion of the meaning and place of observation in the hierarchy of knowledge. In the note quoted above Kepler explains the allegorical significance of the mother-son relationship in the dream: “However, I wanted to make this further suggestion: untutored experience, or, to use medical terminology, empirical practice is the mother who gives way to science as her offspring.” Kepler, then, identifies this empirical practice as ignorance. Such empiricism ends up in witchcraft, since it cannot supply sound scientific reasoning for its results. Furthermore, in the final account what crude empiricism concludes through magical rites the scientist achieves through reason. When Duracotus came back to his witch mother in Iceland, she was “deliriously happy that I had become acquainted with that science [astronomy]. Comparing what she had learned with my remarks, she exclaimed that now she was ready to die, since she was leaving behind a son who would inherit her knowledge, the only thing she possessed.”

Later, the mother asserts that most of the things Duracotus learned through science she learned from the magical daemon. Kepler claims that the main advantage scientific method has over empirico-magical practices is that through theory one can reach conclusions not available to direct sensory experience alone. In the case of astronomy this is harmful. Empirical experience on its own forms “the universal opposition of mankind” to the notion of a moving earth. Later on, in note 96, Kepler restates the thesis of his Somnium as “an argument in favor of the motion of the earth or rather a refutation of the argument, based on sense perception, against the motion of the earth.”

Kepler confronts crude empiricism that celebrates sensual perception as the only viable source of knowledge. This sort of empiricist thought rejects any theoretical considerations as fictitious human inventions and reasserts only what is immediately given to the senses. Such an empiricist attitude cannot accept the Copernican world-view. Copernicanism mathematically deduces that what


14 Kepler, *Somnium*, 82.
we see is not the truth of the matter and that in contrast to our visual perception the Earth revolves around a stationary sun as well as around its own axis. Kepler’s epistemology, however, is more complicated than just reasserting the Platonic dislike for sense experience as a source of knowledge about the truth. Kepler seeks after an integrated method where theoretical deductions find their affirmation in naïve observation and where sensual wonders find their explanation in a geometric theory of the heavens.

In one of many digressions in his notes Kepler relates several stories of ancient sages vainly sacrificing themselves in search of the key to natural phenomena. Kepler mentions Empedocles, who “with blind audacity” hurled himself into the flames of Mt Etna “searching for the causes of the everlasting fire,” and Gaius Pliny who was “suffocated by stinking sulfur and cinders” in his vain attempt to investigate the nature of Vesuvius’s eruption. Kepler suggests a different method for the acquisition of knowledge. When Duracotus met Tycho Brahe, Kepler comments that the latter “was quite delighted and began to ask me many questions.” He adds that “it was the habit of that true philosopher never to stop asking questions, acquiring information, valuing such reports highly, thinking about them repeatedly, and applying them to the laws of nature.” Kepler envisions a division of labor between those who observe nature, naively reporting what they saw in their travels, and those who use these reports to depict the true picture of reality. A case in hand is the Dutch mission that searched for the northern passage to the Far East, wintering in icy Novaya Zemlya. Their accounts, Kepler asserts, “supplied a large number of astronomical exercises incorporated by me in my Optical Part of Astronomy in 1604.” Later on Kepler remarks that “the Dutchmen in the Arctic Ocean ... found everything occurring just as we astronomers here at a distance have known and taught.”

Kepler already envisaged a similar division of labor in construing his solar eclipse observation of 10 July 1600. A few months before Kepler had written to his friend and advisor, the courtier and Bavarian chancellor, Herwart von Hohenburg, that he would like to dedicate a few more years to the study of astronomy or else study medicine. However, the only position that would have enabled him to practice full-time astronomical research was as a mathematician at one of the courts. Kepler fancied that such a position would enable him “to pay readers in order to take care of my eyes which already grow feeble and to save time. I would send messengers here and there to obtain books and gather the advice of learned men. I would build instruments. I would appoint others

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15 Kepler, Somnium, 41-42.
16 Ibid., 45.
17 Ibid., 35.
18 Ibid., 52-53.
for observing because I am less suited thereto.” This personal complaint is transformed into an epistemological program in the Dream. Direct experience by itself is limited and cannot give the causes of phenomena. In emphasizing direct experience the relationship between the senses and their guiding mind is severed, creating a rupture between experience and theory. This rupture leads scientists to assume magical and occult causes for natural phenomena. The task of true science is to regain the supremacy of theoretical reasoning over empirical observation. In such a way the vague occult causes are transformed into manifest geometric proofs.

Who are Kepler’s adversaries? Who are the champions of direct experience? The doubting epistemological stand vis-a-vis the merits of theory of the heaven was widespread in sixteenth-century Europe. Erasmus’s Praise of Folly, for instance, mocks the epistemological presumptions of the astronomers:

Their is certainly a pleasant form of madness, which sets them building countless universes and measuring the sun the moon, stars and planets by rule of a thumb or a bit of string, and producing reasons for thunderbolts, winds, eclipses and other inexplicable phenomena. They never pause for a moment, as if they’d access to the secrets of Nature, architect of the universe, or had come to us straight from the council of gods. Meanwhile Nature has a fine laugh at them and their conjectures, for their total lack of certainty is obvious enough from the endless contention amongst themselves on every single point.

Another example is Mulerus, who was in charge of the third edition of Copernicus’s De revolutionibus (1617). He could not decide between the heliocentric or the geocentric models of the universe. His position was resignation and irony: “But what good is it to linger on hypotheses, which are nothing

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20 Kepler’s vision of the relationship between money and knowledge is depicted in the Frontpiece of the Rudolfine Tables, in which the imperial eagle drops coins of gold over the astronomical temple and its dwellers.
21 See Ad Vitellionem, 86: “Therefore it is not the occult nature of light, not the mind of universal nature, but the breadth of the sense of vision alone, that harmonizes with the causes for the sense of vision's placing the image on the perpendicular.”
more than fictions with which men try in vain to discover the world system.... We must recognize the supreme wisdom of God the Creator and the weakness of our intelligence, which must regard with awe more than comprehension of the world machine.”

When Kepler arrived in Prague in October 1600 to assist Tycho Brahe (the then Imperial astronomer and mathematician), he found himself immediately caught in a debate over the relationship between artificial plays and imaginary constructs and scientific truth. The debate pitted Tycho Brahe against Ursus, the former Imperial mathematician, over reciprocal charges of plagiarism. However, the debate was not only legal but had important philosophical overtones. Ursus’s argument was that astronomical hypotheses are nothing more than artificial constructs and have no truthful claims. Following Aristotle, Ursus asserted that mathematics is a fictional invention of the human mind and has no relevance whatsoever to the physical truth of heaven or earth. This degradation of astronomical theory leaves only what is directly observable as the astronomers’ offer to the world of knowledge. This epistemological conclusion threatened Tycho Brahe’s research program that advocated the application of optical instruments as necessary mediators between the human eye and celestial phenomena, for at once it became undeniable that even the simplest experience is dependant on mediation and manipulation of artificial instruments. In his Dream, Kepler suggests the antidote for the naïve belief in direct experience as the source of knowledge. Instead of direct experience, the astronomer can ascertain the true causes of celestial phenomena through the application of geometrically based instruments:

There is a popular joke: “I’ll believe in it rather than go into the matter personally.” And many people ask whether we astronomers have just fallen down from heaven. They were answered by Galileo’s Sidereal message [i.e., the application of optical instruments, in this case the telescope, my comment].... But even stronger is the judgment of rea-


25 “A hypothesis or fictitious supposition is a portrayal contrived out of certain imaginary circles of an imaginary form of the world-system.... I say a contrived portrayal of an imaginary form of the world-system ... not the system itself, but a form of it of the kind which we think up by imagining and proclaiming as a conception of the mind. These contrived hypotheses are nothing but certain fabrications, which we imagine and use to portray the world system. So it is not in the least necessary ... that those hypotheses correspond altogether ... to the world-system itself ... provided only that they agree with and correspond to a method of calculation of the celestial motions, even if not to the motions themselves....” Quoted and trans. in N. Jardine, The Birth of History and Philosophy of Science: Kepler’s A Defence of Tycho against Ursus with Essays on its Provenance and Significance (Cambridge, 1984), 41.

26 See Johannes Kepler, Optics, 6.
son [i.e., theory], being testimony which prevails over every objection, as the Dutchmen found by experience in their winter sojourn.27

In the final account, experience will always corroborate what reason has already proved a priori. The framework of the dream allows Kepler to follow his theoretical principles of astronomy and to depict what is invisible: “In a dream it is necessary to have the freedom sometimes to invent that which was never perceived.”28

In his *Somnium* Kepler does not mention his immediate adversaries but identifies this skeptical attitude in the two classical texts he mentions as the framework of his own treatise. In Lucian’s *A True Story* he finds an example of biting ironic criticism of human curiosity. In Plutarch’s *Concerning the Face which Appears in the Orb of the Moon* he finds a mixture of academic skepticism together with an invaluable compendium of classical physical astronomy. In the *Somnium* Kepler develops a dialogic relationship with these treatises, borrowing ideas and examples from them while discarding their underlying epistemological claim. In doing so he aims to release his readers from the sway of such skeptical attitudes.

Lucian’s *A True Story* poignantly mocks travelers’ stories from Ulysses and Herodotus to his own contemporaries.29 He relates his own fantastic voyage across the straits of Gibraltar to an island where Hercules and Dionysius had visited in the distant mythical past. It was here that vines in the shape of women seduce his sailors, transforming them into vines. As Lucian and his surviving crew escape the island, a storm carries them to the moon. Here they discover that the lunar king is a Greek engaged in a war against the Sun-dwellers. The narrator and his men join the battle, later returning to earth despite the Moon king’s wish that they stay. Upon their return, their ship is swallowed by a giant whale. After fighting other tribes trapped inside the whale, they escape by lighting a fire and forcing the whale to spit them out. Carried by winds, they arrive at the Isle of the Blessed, where they meet those who have never lied. This is a true Utopia where the inhabitants sit at sumptuously laden tables, playing and discussing scholarly matters and holding symposia. These scenes allow Lucian to mock the different schools of philosophers who aim at the good life but never achieve it. After Lucian and his friends are expelled from

28 Ibid., 89.
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this blessed island (one of them tries to run away with Helen of Troy) Lucian tells of their further travelling to other islands and strange lands. Then, suddenly he ends his story promising that “what happened in the other world I shall tell you in succeeding books.”

The explicit aim of this entertaining narrative is to supply the scholars with “the sort of reading that, instead of affording just pure amusement based on wit and humor, also boast a little food for thought that the muses would not altogether spurn.” Lucian nourishes the scholar’s mind with a treatise that calls for common sense when reading fantastical tales and legends from afar. Lucian invites his readers to identify the poets, historians, and philosophers at whose expense his comical parody was written. He admits that the only epistemological merit to his work is that his lying “is far more honest than theirs, for though I tell the truth in nothing else, I shall at least be truthful in saying that I am a liar.”

Lucian’s target, however, is not only to expose false reports on distant lands but to pinpoint vain curiosity as the motivating force behind fanciful inventions. “Once upon a time, setting out from the Pillars of Hercules and heading for the western ocean with a fair wind, I went a-voyaging. The motive and purpose of my journey lay in my intellectual activity and desire for adventures, and in my wish to find what the end of the ocean was, and who the people were who lived on the other side.” This life-wasting curiosity in search of the unobtainable receives its due punishment only in the afterlife: “Sentence was given that for being inquisitive and not staying at home we should be tried after death.” Staying at home means for Lucian not investigating what is beyond one’s reach: neither forward in space—it serves no rational purpose to venture crossing the Pillars of Hercules, nor into the future—Lucian’s greatest lie, as one of the earliest commentators adds in the margin, was his promise to tell more stories in his future work. He investigates neither what is above, as the result is the grotesque voyage to the moon, nor what is below us, into the belly of the whale who inhabits the depth of the ocean. Finally any attempt truly to know the past is futile and will result in absurd answers, such as Homer who discloses that he is actually a Babylonian.

This sort of curiosity leads to disordered thought: “In terms of mnemotechnic, curiosity constitutes both image ‘crowding’—a mnemotechnical vice, because crowding images together blurs them, blocks them, and thus dissipates

30 Lucian, A True Story, 357.
31 Ibid., 249.
32 Ibid., 253.
33 Ibid.
34 Ibid., 313.
their effectiveness for orienting and cueing—and randomness, or making backgrounds that have no pattern in them." In Lucian, curiosity and disorientation are equated with futile speculation that distances one from the good life. The indecisiveness of the different philosophical schools and their inane contemplations lead Lucian to reject philosophy in favor of the here and now.

In contrast to this common-sense empiricism stands Plutarch’s *The Face on the Moon*, which is Kepler’s other source for lunar voyaging. This treatise, written in the spirit of the Platonic Academic philosophy, rejects mere sense perception as a source of knowledge, and sets reason and philosophical myths as the true guides to moral life.

The treatise opens in the middle of a discussion on the reason for the face that appears in the orb of the moon. The main problem is how can one perceive what is not available to the senses directly. The main thrust of the discussion is that when rational philosophizing and ordinary scientific procedures fall short, unconventional solutions come into play. Dreams and ancient myths come in handy when philosophy goes awry; they can bring a discussion closer to the truth than reason and science:

> Since it was the difficulty in these opinions that drove us from our course upon those others? As people with chronic diseases, when they have despaired of ordinary remedies and customary regimens, turn to expiations and amulets and dreams, just so in obscure and perplexing speculations, when the ordinary and customary accounts are not persuasive, it is necessary to try those that are more out of the way and not scorn them but literally chant over ourselves the charms of the ancients and use every means to bring the truth to test.

These words introduce Sulla, a new participant into the discussion, and the reader now expects him to supply these extraordinary remedies. Before Sulla can do that, however, the discussants give him a brief summary of their scientific arguments. Their discussion is concentrated on different theories concerning the physics of the heavens, especially an academic critique of Stoic physics (and also of the Aristotelian world-view) that assumes reason to be immanent in matter and that there is no other realm of reason separated from the visible world. The Stoic-Aristotelian picture of order, where earthly matter is at the center and more rarefied elements such as fire and ether are located in the heaven, is attacked throughout the treatise. The main speaker claims that the

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38 Plutarch, *The Face on the Moon*, 920b, 35.
moon, a heavenly body, is no different from the earth and the face that appears in its orb is nothing but mountains and oceans. Having refuted the arguments of his opponents, he argues the following:

The honorable repute of the moon is surely not impaired nor is her divinity because she is held by men to be a (celestial and) holy earth rather than, as the Stoics say, a fire turbid and dreggish. Fire, to be sure, is given barbaric honors among the Medes and Assyrians ... but to every Greek, of course, the name of earth is dear and honorable, and it is our ancestral tradition to revere her like any other god. As men we are far from thinking that the moon, because she is a celestial earth, is a body without soul and mind and without share fruits that it beseems us to offer to the gods... Consequently let us not think it an offence to suppose that she is earth and that for this which appears to be her face, just as our earth has certain gulfs, so that earth yawns with great depths and clefts which contain water or murky air; the interior of these the light of the sun does not plumb or even touch, but it fails and the reflection which it sends back here is discontinuous.

The realms of meaning and of physical appearance are separate, the entire universe could be composed of earthly matter and celestial bodies might be moving earths in the heavens. However, all that does not change their true meaning and religious significance.

Following the physical discussion, the question of the inhabitants of the moon comes up, when Sulla, the guest, interrupts and tells his fabulous myth. This story turns to the moral meaning of the Moon as a celestial earth, a body at the border between material realm and heavenly spiritual domain. The academic stand portrayed in Plutarch’s treatise suggests that there are different ways to save the phenomena, some even absurd and sacrilegious (assuming the earth to be mobile like a planet, or alternately that the moon is a celestial earth). The more significant speculation, however, leads one to understand the moral meaning of Truth through interpreting and contemplating ancient myths and traditions. Sulla brings into the scientific discussion an entirely different source of knowledge, an ancient myth, related by word of mouth from the priests who serve Cronus in a northern Island. The emphasis in this story is on the blessed form of life that exists around Cronus, on the passage of the soul to the moon after the death of the corporeal body, and on its expectation for a second death leading to a mystical union of the intellectual soul with the Sun.

The priests who serve Cronus “usually choose to settle in the spot [i.e., that remote northern island]... because without toil or trouble they have all things in

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abundance while they constantly employ their time in sacrifice and celebrations or with various discourse and philosophy.” 41 True knowledge is not acquired through these philosophical discussions, but through mystical experiences and dreams that the sleeping divinity inspires in the priests.

For Cronus himself sleeps confined in a deep cave of rock that shines like gold ... and birds flying over the summit of the rock bring ambrosia to him. Around the sleeping divinity are spirits who tend and serve Cronus, having been his comrades what time he ruled as king over gods and men. Many things they do foretell of themselves, for they are oracular, but the prophesies that are greatest and of the greatest matters they come down and report as dreams of Cronus, for all that Zeus premeditates Cronus sees in his dreams. 42

The strange traveler who related this story to Sulla left Cronus’s island and arrived at Carthage, where he discovers “certain sacred parchments.” Consequently, he came to the conclusion that “among the visible gods ... one should especially honor the moon ... in as much as she is sovereign over life (and death, bordering as she does upon the meads of Hades).” 43 This bordering position symbolizes the role of the moon as purgatory standing between the material and bodily realm and the intellectual realm of the mind. To the moon “rises no one who is evil or unclean, but the good are conveyed thither....”

Plutarch asserts a triple partition of the human being: the material body dies on earth and a second death occurs on the moon, symbolizing the separation of mind from soul. This is a process where souls are purged of earthly pollution, and only those souls that had practiced reason manage to hold fast to the moon and gain initiation to her secrets. The moon is proportionally constituted of earthly matter and ether, and so it is both a star and an earth. It is larger than earth and its appearance as smaller than earth’s shadow is due to her hastening her “motion in order that she may quickly pass through the gloomy place bearing away (the souls) of the good which cry out and urge her on because when they are in the shadow they no longer catch the sound of the harmony of the heaven.” 44

The harmony of the heaven is further disturbed by the cries of the chastised attempting to approach the moon. Lunar topography is composed of gulfs and valleys where souls are punished for the sins they “committed after having already become Spirits.” Other valleys are gates facing heaven and earth. The Spirits use the latter for descending to earth as messengers of Oracles. They

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42 Ibid.
43 Ibid., 942c, 191-93.
44 Ibid., 944a, 207.
attend and participate in the “highest of mystic rituals, act as warders against misdeeds and chastisers, and they flash forth as saviors manifest in war and on sea.”\textsuperscript{45} The spirits, however, do not stay on the moon forever but proceed to a second death, where the intellectual mind is released from the affective soul and is absorbed by the sun. The affective soul remains on the moon, awaiting its fertilization by the rays of the intellectual sun, to come down back to an earthly body.

Sulla ends his tale of the stranger’s story with a peculiar comment: “This, said Sulla, I heard the stranger relate; and he had the account, as he said himself, from the chamberlains and servitors of Cronus. You and your companions, Lamprias, may make what you will of the tale.”\textsuperscript{46} This is not the kind of ironic remark to be found in Lucian’s \textit{True History}. The aim of Sulla’s comment is to urge Lamprias and his companions to do something with the story. From the opening sentence of the text to this last comment Plutarch contemplates the moral meaning of myth as the object of true philosophical discourse.\textsuperscript{47} One cannot inquire if the myth is true or false but can gather that only by allowing the intellect to rule one’s passions can true happiness be acquired. Only the intellect can gain immortality and return to its solar origin, while bodily desire and emotional passion remain either buried in the material earth or hanging desperately to the moon.

These two treatises gave Kepler the general framework of his own narrative on traveling to the moon and assisted him in shaping his student dissertation on lunar astronomy into literary form. Plutarch, specifically, supplied him with additional details of ancient theory of physical astronomy, critically portraying the different alternatives.\textsuperscript{48} Kepler saw this discussion as a solid basis for a beginner’s guide to astronomy and even suggested this treatise as a textbook to his friend Bernegger. He cites extensively from Plutarch in the relevant chapters of his \textit{Optica pars astronomiae}, on the moon and how it reflects the sun’s light.

In the \textit{Somnium} Kepler alludes to these texts in several ways. Lucian’s treatise, because of its satiric nature, plays only a minor role in Kepler’s text, but it supplies the formula for the combination of satire and philosophical argumentation. Lucian’s celebration of common-sense empiricism is criticized

\textsuperscript{45} Plutarch, \textit{The Face on the Moon}, 944d, 211.
\textsuperscript{46} \textit{Ibid.}, 223.
Kepler's Somnium

throughout the *Somnium*, and Kepler emphasizes in turn the role of rational-geometrical procedures in the acquisition of knowledge. At the end of the *Somnium* Lucian’s satire is completely inverted. Leaving the Isle of Punishment, Lucian and his companions land on the Isle of Dreams where for thirty days and thirty nights they meet all sorts of dreams and fantasies, having a “fine time—sleeping. Then of a sudden a great thunder-clap came; we woke up, sprung out of bed...”49 A similar scene appears in the *Somnium*: “When I had reached this point in my dream, a wind arose with the rattle of rain, disturbing my sleep.... I returned to my self and found my head really covered with the pillow and my body with the blankets.”50 In adding this comic detail Kepler gives new meaning to Lucian’s sudden awakening. As Rosen remarked, the covered head signifies the observers of solar eclipses. Instead of waking up from vain dreams and empty phantasm, Kepler is waking up from scientific observation. Despite the fact it took place in a dream, this observation still vouches for the truth contained within the dream. Lucian’s conception of dreams as a source of deception is rejected by Kepler in favor of the covered head of the astronomer, who measures the motions of distant planets in the process of disclosing their causes.

Plutarch’s treatise proves to be more complex. Plutarch posited myth and dreams as higher sources of knowledge than scientific reasoning in his epistemological hierarchy. Furthermore, Plutarch rejected mathematics as an instrument for the discovery of the laws of nature.51 In order to reverse this epistemological path, Kepler restructured Plutarch’s narrative. His own treatise begins with a dream and with super-rational revelation only to disclose that the daemon relates a scientific picture of the universe. As Kepler’s apparatus of footnotes reveals, the daemon’s knowledge is powered by rational scientific reasoning. The notes are a safeguard for speculation gone astray, an attempt to control the seventeenth-century reader’s tendency to look for the occult and the fantastical. Kepler’s aim is to fortify the authorial position and to fix the interpretational context. He explains the names he chose for the different characters and places populating his story, describing how he came about these names in contingent contexts.52 In explaining the name “Levania,” ascribed to the land on the moon, Kepler notes that “The moon in Hebrew is *Lebana*, or *Levana*. I could have called it Selenitis. But Hebrew words, which are less often heard by

51 “So far beneath the stars is she [the moon] that the distances cannot be expressed, but you mathematicians in trying to calculate it run short of numbers” (Plutarch, *The Face on the Moon*, 73), and “I am ashamed to confute a mathematical proposition, the foundation, as it were, on which rests the subject of catoptrics. Yet it must be said the proposition, ‘all reflection occurs at equal angles,’ is neither self evident nor an admitted fact” (*ibid.*, 107).
52 See Kepler, *Somnium*, 87.
us, are recommended for occult arts by the greater aura of superstition attached to them.”53 Instead of a Cabbalistic interpretation, searching for an original meaning of a Hebrew word and its poetic power, Kepler emphasizes the arbitrary nature of the human language and its consensual nature. Furthermore, human languages express only human sensory experience of physical reality, not its essence whatsoever.54

The other task of the apparatus of notes is to provide an astronomical validation of the daemon’s description of the moon. Just as Duracotus and his mother have to perform a magical rite in order to summon their daemon, so Kepler has to perform his magic in order to call forth the mathematical interpretation. As soon as the moon became crescent and Saturn entered the sign of the Bull, Duracotus and his mother stood at a crossroads and evoked the daemon.55 In parallel manner Kepler describes a magical game he used to perform in Prague that evoked mathematics and astronomical observational techniques.

This also is a magical ceremony. The corresponding feature in the teaching of astronomy is that the method is not in the least voluble or spontaneous. On the contrary every prompt action requires repose, recollection of ideas, and set of words. During those years in Prague I often carried out a special procedure in connection with a certain observation. Whenever men or women came together to watch me, first, while they were engaged in conversation, I used to hide myself from them in a nearby corner of the house, which had been chosen for this demonstration. I cut out the daylight, constructed a tiny window out of a very small opening, and hung a white sheet on the wall. Having finished these preparations, I called in the spectators. These were my ceremonies, these were my rites.... In capital letters I wrote with chalk on a black board what I thought suited the spectators. The shape of the letters was backwards (behold the magical rite), as Hebrew is written. I hung this board with the letters upside down in the open air outside in the sunshine. As a result what I had written was projected right side up on the white wall within. If a breeze disturbed the board outside, the letters inside wiggled to and fro on the wall in an irregular manner.56

Kepler identifies the enchanted crossroad in Duracotus’s tale with a specific location in his house as well as with a specific position of the sun and the

53 Kepler, Somnium, 99.
55 Kepler, Somnium, 14.
56 Ibid., 57.
Kepler’s Somnium 239

moon. This position “invites the astronomers to observe the latitude of its [the moon’s] limits.” The fun of the game increases when the optical principles underlying the magical appearances are revealed. “I used to tack on these very games, which the spectators enjoyed all the more for realizing that they were games.”

This courtly amusement turns out to be the paradigm for the acquisition of knowledge. The visual pun with its magical undertones supplies Kepler with the method of applying optical instruments to astronomical observation of the world: “With this very rite (how magically magical!) ... we had observed a solar eclipse on October 12 1605. You remember, O envoys from the Count Palatine of Neuburg, because you were present. For on the balcony of the pavilion in the emperor’s gardens we lacked a dark room. Therefore we covered our heads with our coats and kept out the daylight in that way.” In this anecdote, the magic of Duracotus’s mother is converted into science and the significance of human letters is inverted. Attention is turned not to their apparent meaning but to the technique of observation. Kepler suggests optical instruments like the camera obscura as reliable vehicles of knowledge. From this point onwards the irony and playfulness of the notes gradually disappear and Kepler points to the “physical considerations” that underlie “the jocular explanation.” The daemon’s tale of lunar astronomy is told through mathematical analysis. The different features of the terrestrial-based universe are relative to the position of the spectator and “exist only in the imagination of the earth-dwellers. Hence, if we transfer the imagination to another sphere, everything must be understood in a different form.”

The motions of the heavens create diverse appearances for differently-positioned spectators: “These appearances of their [the planets’ motion] own are mingled with the motions in which the earth and moon travel, as things look to the earth-dwellers and the moon-dwellers.” The analysis of these appearances serves Kepler in introducing the moon as an inverted, mirror-like image of the earth: “To those who are on the moon it does not seem to revolve, but they regard it as stationary, just as our earth seems stationary to us.” This leads the moon dwellers to transfer their path in the heavens to earth: “However, this lunar path bending around the earth as though the latter were stationary in the

57 Kepler, Somnium, 58.
58 Ibid., 58-60.
60 Kepler, Somnium, 85.
61 Ibid., 88.
center of the universe is transferred by the moon dwellers, who imagine their own home to be stationary, to this earth, that is, their Volva."\(^{62}\)

These differences of perspective redefine all basic concepts of astronomy. The poles as the apparent stationary points around which the heavens seem to rotate are different for the moon-dwellers. This is due to the fact that the “the axis of the lunar globe is not parallel to the earth’s axis but is always intersected at right angles by the line from the center of the earth. Consequently the moon’s axis is not directed toward those points toward which the earth’s axis is directed.”\(^{63}\)

Since the altitude of the poles helps in determining the latitude of places on all the meridians, this difference in the position of the celestial poles means an alternative map of the universe. The astronomer takes into account these differences together with the moon-dweller belief that their “lunar plane and the ball of Volva hanging up high over it remain in one place,” in order to depict the way the universe is for the lunarians. However, the ability of the mathematician to disclose indirect experiences is not limited to this. The mathematician can further disclose the topography of the moon through the decipherment of obscure spots observed on the body of the moon, “For by absolutely certain principles of optics we prove that that variety of spots and light is connected with the roughness and smoothness of the surface: what is bright, is both high and hilly; what is dark, is both flat and low.”\(^{64}\)

These tools supply Kepler with the length of the lunar day and night, with the possible physical influences the sun, the earth, and the other planets have on the moon and with weather conditions on the different parts of the moon. Furthermore, knowledge of the topography of the moon enables Kepler to speculate as to other living conditions of the lunarians. These speculations come in the last notes and Kepler emphasizes that they are not scientifically based: “Therefore, in this place, too, my prophesying breaks down” and that these speculations are based on “pure reasoning, divorced from any visual evidence.”\(^{65}\)

The evidence is taken partially from literary sources concerning different tribes in remote corners of the world. Yet, these evidences are embedded in the well-established astronomical and optical framework. This is in accordance with Kepler’s astrological project that emphasized physical determination against mental dispositions. The analysis of lunarians’ way of life is limited to: “their bodies ... their functions, breathing, hunger, thirst, waking, sleep, work, and rest.”\(^{66}\) Thus, there are hardly any speculations on their social organization and their mores. Instead, the reader gets a grotesque and inverted picture of human

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63 *Ibid*.
life on earth: over-sized creatures with rapid growth and short life who prefer to dive under water than to boil in the sun, and are of a serpentine nature that grow out of pine shaped objects. These images emphasize the treatise’s main point: the moon is an inverted picture of the earth. If for us the earth stands still and the universe rotates around it, for the moon-dwellers the moon stands still and the entire universe together with the earth revolve about it. These beliefs are a result of our immediate visual experience and its distortions: “Everyone screams that the motion of the heavenly bodies around the earth and the motionlessness of the earth are manifest to the eyes. To the eyes of the lunarians, I replay, it is manifest that our earth, their Volva, rotates, but their moon is motionless. If it be argued that the lunatic senses of my lunarian people are deceived, with equal right I answer that the terrestrial senses of the earth-dwellers are devoid of reason.”

The lunarians’ false beliefs are a mirror-image of the earth-dwellers’ false beliefs. In transferring the reader to the moon, Kepler forces the reader to invert these beliefs and to perceive the correct picture of the universe: the earth is not static in the center of the universe but revolves around the sun and around its own axis. This principle of inversion is strongly associated with the camera obscura. Kepler opens this section of notes with this instrument, and he ends his comments with it. The context of his last note is the problem of the diminution of the lunar disc in times of eclipse of the sun. Tycho Brahe and his followers tried to use this phenomenon as a proof of the existence of an airy atmosphere on the moon. Their argument was that the illuminated layer of air over the moon disappears during an eclipse, causing its diminution. Kepler rejected this explanation outright. In his Optics of 1604 he proved that this diminution is a result of the intersection of the rays of light at the pinhole camera’s aperture. In 1606, however, this debate resurfaced in a disputation presided over by Kepler’s teacher, Maestlin. In the Somnium Kepler confutes these arguments. He points out that in measuring the resultant shadows and images, the observer should take into account the effects of the instrument of observation and the process of vision as essential factors in shaping them. The observed “extension beyond the body of the moon,” is not an effect of the real physical shape of the moon, but a product of visual distortion that spoils “the image of

67 Kepler, Somnium, 106.
the visible object on the retina.” At different times of the day, “bright parts expand and encroach on the bordering dark region,” thus distorting the moon’s image. This, however, does not detract from the epistemological value of observation. The mathematician can calculate this distortion away, and in the end, “this picture on the concave retina within the eye corresponds exactly and invertedly to the vision of the external object.”

The stable geometric center, through which all lines pass from the corresponding points on the object and on its inverted picture, limits the mind’s ability to play with the sense data and thus guarantees one’s visual knowledge. In a sense, Kepler’s retinal picture is a sort of a “serious joke”: though it represents the world upside down, it allows one to perceive the physical truth hidden in the world of appearances.

Reading Kepler’s *Somnium* in light of the two notes on the camera obscura discloses the treatise itself as a camera obscura, where the daemon’s fantastic lunar astronomy is an inverted picture of the terrestrial world view. The role of the notes is to supply the reader with the inversion principles, thus revealing the real structure of physical reality of the heavens. Furthermore, Kepler’s *Somnium* begins with a fantastic tale that ends with a narration of a myth; Kepler’s *Somnium* begins with a fantastic tale that ends with a scientific description. This methodological inversion allows Kepler to rebuff Lucian’s skepticism. The optics of the camera obscura as well as of other instruments of observation supply accurate knowledge even of objects and phenomena not available to direct experience.

The *Somnium* is a Copernican treatise that aims to convert the reader’s modes of vision and modes for the acquisition of knowledge. Observation of shadows through instruments is superior to direct and unaided sight and scien-

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70 Kepler, *Somnium*, 145.


scientific observation is superior to textual tradition. The Somnium begins with the narrator as an avid humanist in search of an historical and textual meaning. It ends with the conversion of the narrator, his head covered with a pillow, into a scientific observer of the heavens.

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