

From Material Discontinuity to Continuity Between Heavens and Earth: Overturning European Jesuit Teachings in the *Huan You Quan* (1628)

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Abstract: Following Aristotle, St. Thomas Aquinas considered sublunar matter and supralunar matter to be substantially different, composed of two distinct species. The Coimbra Jesuit commentary on *De coelo*, published in 1593, supported the Aristotelian position, a position upheld by Jesuit philosophers and astronomers even into the mid-seventeenth century. However, the latest astronomical discoveries suggested otherwise, suggesting that supralunar matter is also subject to change and therefore belongs to the same species as sublunar matter, forming a material continuum. In a sharp contrast to this conservative Jesuit position in Europe, the Portuguese Jesuit Francisco Furtado and the Christian literatus Li Zhizao in the *Huan you quan* (1628) argued for the uniformity of matter across the sublunar and supralunar spheres. The paper investigates the argumentation of the *Huan you quan* and advances three reasons for this significant shift.

Keywords: cosmology, matter, *qi*, Aristotle, Coimbra

摘 要: 遵循亚里士多德的思路, 阿奎纳认为月下物质与月上物质具有本质性的差异, 由两种不同物质构成。1593 年出版的科因布拉耶稣会《〈论天〉评论》支持亚里士多德主义的立场, 直到 17 世纪中期耶稣会哲学家与天文学家仍然主张这种观念, 即便天文学的最新发现暗示着相反情况, 即月上物质也发生变化, 因此与月下物质属于同类, 构成了一个物质性的连续整体。与欧洲耶稣会的保守立场明显不同, 葡萄牙耶稣会士傅汎

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际与中国天主教徒李之藻在《寰有论》(1628 年)中论证月上与月下的物质统一性。本文研究《寰有论》的论证,并为这一转变提出三种理由。

关键词: 宇宙论, 物质, 气, 亚里士多德, 科因布拉

1 Introduction

According to Zhu Xi 朱熹 (1130–1200) and Song Confucianism, every reality is composed of a combination of *li* 理 and *qi* 氣 without exception, such that *li* and *qi* cannot exist independently in practice, although conceptually *li* is prior to *qi*. Similarly, the scholastics follow Aristotle's natural philosophy and uphold the doctrine of hylomorphism, which holds that everything in the corporeal world consists of a combination of matter and form, such that nothing exists concretely except as informed matter.

Matteo Ricci surely recognized the similarity between the two theories, as he identified *li* and *qi* with the Western concepts of form and matter. Unlike the universality of the combination of *li* and *qi* in Chinese philosophy, hylomorphism in the West does not have universal application, since some beings—such as God, the human soul, and angels—are purely spiritual and lack any material dimension.¹ This raises the question of whether hylomorphism applies to the heavens, and if it does, is the matter of heaven identical to the matter of earth?

Surprising answers to these two questions can be found in the *Huan you quan* 寰有论, or *Explanations on the Beings of the Universe*, published in Hangzhou in 1628 by the Portuguese Jesuit Francisco Furtado (1588–1653) and the Christian literatus Li Zhizao 李之藻 (1565–1630). In 1935, Hubert Verhaeren identified this work as a translation of the Coimbra commentary on Aristotle's *De coelo* (1593) but noted that the first *juan* (from six), which discusses creation, does not originate from the Coimbra commentary (Verhaeren 1935). Recently, we identified other sections of the *Huan you quan* that derive from the Coimbra commentaries on the *De physica*, *Metereologica*, and *De generatione et corruptione*.

In the second chapter of the first book of *De coelo*, Aristotle discusses the celestial body (i.e., the fifth element) moving in circle, and the Coimbra commentary presents six questions. The first three are closely related to the motion of the celestial body, while the other three address the substance and matter of heaven—topics not directly discussed by Aristotle in Chapter 2 but found in other sections of *De coelo*. Accordingly, the universe is twofold in nature: the celestial, imperishable world and the sublunary world, subject to generation and corruption. Despite this cosmological duality, it is a closed, finite world and therefore wholly intelligible.

1 Among the scholastics, Bonaventure is a notable exception, as he considered angels to be creatures composed of matter and form and therefore followed the teachings of hylomorphism.

Following Aristotle and St. Thomas Aquinas (1224/25–1274), the Coimbra commentary of *De coelo* argued that sublunar matter and supralunar matter are substantially different, composed of two distinct species. Unexpectedly, *Huan you quan* reversed this stance and argued for the uniformity of the material species across the sublunar and supralunar spheres. Based on a close reading of the text, we shall investigate the argumentation of the *Huan you quan* and propose reasons for this significant shift.

2 Coimbra and *Huan you quan* on applying hylomorphism to the heavens

Let us first look at Question 4 on Chapter 2 of Book 1 of *De coelo*, asking whether heaven is composed of both matter and form.² The question of matter in heaven is difficult to settle because Aristotle affirmed its existence in *Metaphysics* VIII.1 (1042a26) but refuted it in other works. The Coimbra commentary presents the *status quaestionis*, and notes that Duns Scotus (ca. 1266–1308) saw here a divide between philosophers and theologians.³

For Coimbra, the philosophers' denial of the materiality of heaven originates from a comment by Averroes (1126–1198), who considered heaven as “a middle between pure potentiality and pure act” (*medium quid inter puram potentiam et purum actum*) (*De coelo* 1596, I.c.2.q.4.a.1, 37D). The median position of Averroes became radicalized, ultimately affirming the immateriality of heaven. This amounts to denying the universality of hylomorphism, as it would not entirely apply to heaven, allowing forms to exist without matter. Coimbra acknowledges that many philosophers supported the view of a simple heaven as opposed to hylomorphism,⁴ and even Scotus praised Averroes' perspective as far superior to that of the Aristotelians.⁵ Four arguments are presented for the immateriality of the heavens: (1) Philosophers know matter only through changes, but there are no changes in the heavens; (2) If there were matter in the heavens, it would render them corruptible, which they are not; (3) Philosophers should not posit a multiplicity in things without necessity or reason, and there is no necessity to posit matter in the heavens; (4) The beauty of the universe requires simplicity (*De coelo* 1596, I.c.2.q.4.a.1, 37E–38D). As Mario Carvalho observes, the discussion in favor of an immaterial heaven is disappointing because the authors being discussed, such as Iamblichus or Durandus of Saint-Pourçain, are not representative of the broader debate

2 “Quaestio 4: Utrum coelum ex materia & forma constet, necne?” (*Commentarii collegii conimbricensis Societatis Iesu in quatuor libros de coelo Aristotelis Stagiritae* [hereafter as *De coelo*] 1596, I.c.2.q.4.a.1, 37).

3 Scotus in *De coelo* (1596, 2 Dist.14.q.1); *De coelo* (1596, I.c.2.q.4.a.1, 37B).

4 “non defuerunt qui caelum corpus ita simplex fecerint” (*De coelo* 1596, I.c.2.q.4.a.1, 37C).

5 “melius hac in re quam caeteros Peripateticos” (*De coelo* 1596, I.c.2.q.4.a.1, 37E).

of the time and lack the physical-mathematical perspective that could abolish the frontiers of the finite universe of Aristotle.⁶

However, scholastic theologians did not adopt the philosophers' view on the immateriality of the heavens. On the contrary, based on the Bible, Saint Augustine (354–430) and other Fathers of the Church, they insisted that the heavens were created by God, inferior in nature, and composed of matter and form, consistent with the Aristotelian doctrine of hylomorphism (*De coelo* 1596, I.c.2.q.4.a.1, 38). Four arguments are offered for the materiality of the heavens: (1) There is no reason to place the heavens above angels and human beings; (2) Even Averroes admits that the heavens are apprehended by human senses and is therefore perceptible, implying a material dimension; (3) Heaven is a mobile being (*ens mobile*) and therefore composed of matter and form, as argued by Aristotle; (4) Even Averroes acknowledges that quantity, rarity, and density are present in the heavens. Additionally, Coimbra cites the authority of Aristotle (*testimonia Aristotelis*), who explicitly affirmed the materiality of heavens (*De coelo* 1596, I.c.2.q.4.a.1, 39–40) in his works.

According to Edward Grant, the medieval controversy between philosophers and theologians was already settled by the sixteenth century when the idea of a purely spiritual heaven, devoid of matter, had progressively disappeared (Grant 1994, 260–261). We could say that the standard view in the sixteenth century was modern in the sense that it leaned toward affirming a unified universe of both heavens and earth, both being material. However, it remained half-modern because it inherited from Aristotle the idea of a universe split into two distinct material realms: on one side, the heavens, with no physical change, and on the other, the earth, subject to a continuous process of generation and corruption. The discoveries of Galileo and other astronomers made it clear that change occurs in the heavens as well, leading to the fully modern view of a material universe governed by the same laws of change throughout.

Concerning the hylomorphism of the heavens, *Huan you quan* in the title of the related chapter provides the standard answer: the heavens are made of matter and form (天由質模構成). But before exploring their argument, the authors saw the need to explain the teaching of hylomorphism in greater detail, as it had only been briefly introduced by Matteo Ricci in *True Meaning of the Lord of Heaven* (*Tianzhu shiyi* 天主實義) and *Structure and Meaning of Heavens and Earth* (*Qiankun tiyi* 乾坤體義) (Ricci 2016, 61). To this end, they turned to another Coimbra commentary, *De Physica* (1592), from which they translated a short passage from Question 2 in Chapter 9 of Book 1. This passage explains prime matter (*yuanzhi* 元質) as a substrate (*dilai* 底賴) that persists through various changes of accidental forms. Theologians emphasized the material dimension of heaven because they were wary of exalting it too highly. Although

6 I am indebted here to a talk given by Professor Mario Carvalho during a seminar at Sun Yat-sen University in May 2023.

heaven could be described as eternal, it could not be described as spiritual, as it was made of matter. The Coimbra commentary asserts its stance against an exalted view of heaven, ranking it instead as a near-nothing (幾無 *prope nihil*), according to Saint Augustine (*Commentarii collegii conimbricensis Societatis Iesu in octo libros physicorum Aristotelis Stagiritae* [hereafter as *Physicorum*] 1592, I.c.9.q.2.a.3, 163). The primary evidence for the materiality of heaven is empirical: heaven can be perceived by human senses and has both quantity and motion. In metaphysical terms, it is explained that heaven consists of both a material cause and a substantial formal cause (有體受之所以然與體模之所以然).

Since hylomorphism indeed applies to the heavens, Coimbra raises two follow-up questions. Question 5 asks whether the nature and substance of celestial bodies differ from terrestrial bodies. However, this question is omitted here as *Huan you quan* does not address it.

Question 6 asks whether celestial and terrestrial matter belong to the same species. This question, addressed by Bonaventure and Aquinas, became prominent in the sixteenth century and was tackled by John Major (1519) and Coimbra, and later by Hurtado de Mendoza (1615), Amico (1626), Aversa (1627), and others (Grant 1994, 695–696). In answering Question 6, Coimbra first notes that Trismegistus, Empedocles, Heraclitus, Anaximander, and Plato, among others, considered celestial and terrestrial matter as belonging to the same species. Later, Aegydius Romanus (ca. 1243–1316) also affirmed the existence of a single species, distinguishing them by noting that terrestrial matter includes oppositions, while celestial matter does not and is therefore eternal. However, Aquinas took an opposing stance, affirming a substantial difference between the two. While the controversy over the hylomorphic nature of heaven was largely resolved, the debate over the material unity or discontinuity of the universe persisted into the seventeenth century without resolution.

On this question, Coimbra demonstrates great prudence, suggesting that both positions are equally probable. However, to remain aligned with Aristotle's position and for the sake of coherence, it ultimately concludes "to uphold the opinion which distinguishes celestial and terrestrial matters in terms of species" (*De coelo* 1596, I.c.2.q.6.a.3, 52). The commentary on the *De physica*, published one year earlier in 1592, had already hinted at this position in addressing the question of whether matter is pure potentiality (Thomistic position) or an entitative act (Scotist position). In discussing this question, the Coimbra commentary on the *De physica* assumes that celestial matter and sublunar matter are distinct, constituting two species. Since every distinction involves a form and an act, this may imply that matter is not pure potentiality. However, Coimbra upholds Aquinas's concept of matter as pure potentiality and asserts that, while celestial matter and sublunar matter belong to different species, their difference is not due to any act intrinsic to matter itself but rather to their capacity to receive different

forms, celestial or sublunary (*Physicorum* 1596, 201–203).⁷ Thus, in the commentaries on *Physics* (1592) and on *Heavens* (1593), Coimbra maintains a conservative position, adhering to the ancient view of a divided universe. Yet, even by the sixteenth century, new astronomical discoveries—such as the nova of 1572 and other comets—began to challenge the notion of a strict division between the supralunar and sublunar realms, suggesting instead a material continuity between the two. Coimbra considers the view supported by astronomers as equally possible but, for doctrinal reasons, continued to uphold the stance of Aquinas.

Let us now position the scholastic question within the frame of Chinese philosophy. If it is argued that celestial matter is different from material matter, this may be understood in terms of Chinese philosophy as a rejection of the unity of the *qi* of heaven and earth. In this view, there would be a *qi* for the heavens and a *qi* for the earth, differing in essence, which would directly contradict the teaching of the Han philosopher Dong Zhongshu 董仲舒 (179–104 BCE) who wrote in the chapter “Mutual Generation of the Five Phases” 五行相生 of the *Luxuriant Dew of the Spring and Autumn Annals* (*Chunqiu fanlu* 春秋繁露): “The *qi* of Heaven and Earth unites and becomes one, separates into *yin* and *yang*, divides into the four seasons, and spreads out into the five elements” (Dong 2022, vol. 13; Su 1992, 362).⁸ This teaching has been highly influential and was adopted and systematized by Song Confucianism. Even if there is a *qi* of heaven (天之氣) and a *qi* of earth (地之氣), the two never exist separately but always combine with one another. A *qi* of heaven cannot be spatially separated from the *qi* of earth, as if the *qi* of heaven existed exclusively in the supralunar realm and the *qi* of earth in the sublunary realm. Similarly, the *qi* of heaven cannot be essentially different from the *qi* of earth.

3 *Huan you quan*’s reversal of Coimbra’s stance

It is remarkable that *Huan you quan* takes the opposite stance of Coimbra by affirming that celestial matter and terrestrial matter belong to the same species, as the title of the related section clearly states: “Argument about upper matter and lower matter belonging to the same species” (論上下質同類). This completely reverses Coimbra’s position. Five points are made in support (謂相類者，於義為當，可證者五). In fact, *Huan you quan* reuses the points made by Coimbra, simplifies them, and turns them into proofs for its own stance. Let us examine each point one by one.

7 Polloni has a detailed analysis of the Coimbra commentary on Chapter 9 of Book 1 of *Physics*; Nicola Polloni, “Manuel de Góis, Pedro da Fonseca, and the Problem of Prime Matter’s Potency,” lecture given at Sun Yat-sen University on December 5, 2023.

8 “天、地之氣，合而為一，分為陰陽，判為四時，列為五行。”

3.1 The need for a single ultimate material cause for both the supralunar and sublunar realms

The first point raised in *Huan you quan* is that all causes within their category return to a primary cause (羣倫之所以然咸歸一極初之所以然).⁹ This means that all efficient causes originate from the first efficient cause, all the final causes aim toward the ultimate final cause, and similarly, “all material causes originate from primary matter, and this implies the identity between celestial and terrestrial matter” (今元質乃萬有質者之所以然，是即萬質所歸之一，則天之質與月以下之質固自相類).¹⁰ Stated negatively, if celestial and sublunar matter are distinct in their species, then prime matter cannot be the material cause of all physical things.

To the unicity of causes in each category (efficient, final, material, formal), *Huan you quan* raises the objection that not all causes merge into one; only the efficient and final causes merge into one (i.e., a primary efficient cause and an ultimate final cause). This is demonstrated by the fact that formal causes retain their specificities and do not “necessarily merge into a single formal cause” (若模所以然之倫，似不必歸之於一), suggesting that material causes might not merge into a single material cause either.¹¹

However, *Huan you quan* rejects this objection by stating that “the main principle of the formal cause belongs specifically to the act” (模所以然之要理專屬於為), which merges into one pure act—God (夫惟天主乃萬為中至純之為). It is important to note that in the expression *weisuoyiran* 為所以然, *wei* 為 is pronounced with a falling tone (fourth tone) and means the end or final cause, but in the expressions *zhuan shu yu wei* 專屬於為 or *zhichunzhiwei* 至純之為, *wei* is pronounced with a rising tone (second tone) and means act or pure act.¹² Indeed, formal causes are pure potencies, but as they exist concretely in act (*actus*), they are all grounded in and sustained by the same pure act, namely God.

9 The Coimbra commentary refers here to Aristotle’s *Metaphysics* II.c.6. We translate here from Latin into English: “In any genus of causes, there is a first cause beyond which it is not possible to further advance the search, as Aristotle shows in *Metaphysics* II.6” (*De coelo* 1596, I.c.2.q.6.a.1, 47D).

10 “Among the material causes, there is necessarily a primary matter, but a single matter cannot exist if celestial and sublunar matters are distinguished by their species. Thus, it must not be admitted that matter differs in species” (*De coelo* 1596, I.c.2.q.6.a.1, 47DE).

11 “Even though there is no advance to infinity in the category of cause, as Aristotle says, yet in the category of the material cause, it is not necessary to come to one matter in the same way that the final and efficient causes come to an ultimate cause and a primary cause. However, it must be admitted that, in any physical composite, a single ultimate, namely prime matter, must be reached for the category of the material cause and of individual cause” (*De coelo* 1596, I.c.2.q.6.a.5, 56B).

12 Interestingly, this point was mentioned in the Coimbra only as a possibility, but without adopting it: “The confirmation of the argument could easily be dissolved by saying that the principle for a pure act and for a pure potency is not the same, because the pure act contains in itself every perfection and it cannot be multiplied by species or by number, but clearly the pure potency behaves differently” (*De coelo* 1596, I.c.2.q.6.a.5, 56C).

Since the efficient causes, final causes, and formal causes all return to one single cause (夫作與為與模既咸歸一), “matter cannot be separated into two discourses” (則質不得分為兩論). As we can see, it is only through the notion of God as pure act that *Huan you quan* demonstrates that celestial matter and terrestrial matter are the same. However, for Song Confucians, the notion of *qi* can demonstrate the same without recourse to the theological concept of God as pure act.

3.2 Common lack of actuality for supralunar and sublunar matter

In the second point, *Huan you quan* continues discussing causes according to their actuality or lack thereof. Since the material causes of the supralunar and sublunar realms are pure potentialities (惟有職受德而已), they lack any actuality.¹³ This common lack of actuality reveals their shared limitation. As shown in the first point, actuality can only come from God as pure act.

Huan you quan raises the objection that, though supralunar and sublunar matter may not be distinguished by an inner act (內為), they can at least be distinguished by the forms to which they are directed (其模之所向).¹⁴ Therefore, the difference arises from an external act by which the forms impose a distinction upon the two types of matter from the outside.

Surprisingly *Huan you quan* does not directly address the objection concerning an external act of differentiation. Instead, it tackles the question of an internal act of differentiation, arguing that a dissimilarity in species (不相類者) arises from a difference in intrinsic form, much like human beings are distinct from animals due to their intrinsic form of spirit (靈). If supralunar and sublunar matter belong to different species, they must have an intrinsic difference in their matter. However, if such a difference exists, it implies the presence of an act within the matter and, consequently, the presence of form. Yet, if matter contains a formal principle, it ceases to be pure potentiality (豈不失其職受德之原義乎).¹⁵ Here *Huan you quan* employs a purely logical

13 “As seen in *Metaphysics* VII.13, every distinction is made through some act; but because the celestial and sublunar matters are pure potencies, they do not require any act in themselves and therefore, they cannot differ from each other in kind” (*De coelo* 1596, I.c.2.q.6.a.1, 47F).

14 “Aristotle teaches that any distinction is made through an act. If the act is intrinsic, the things that are composed of form and matter are distinguished. If the act is extrinsic, celestial and sublunar matters somehow differ from each other at least by the forms to which they are directed, because this does not eliminate the condition for potentiality” (*De coelo* 1596, I.c.2.q.6.a.1, 47F).

15 “Two different species have intrinsic and essential differences by which they contract a genus and mutually diverge among themselves. Therefore, if the two matters are distinguished in species, they will obtain essential and intrinsic difference. Since any difference is act, they will in any case have some act in their essence and will not even be pure powers” (*De coelo* 1596, I.c.2.q.6.a.1, 48A).

argument: based on the definition of matter as pure potentiality, matter cannot be distinguished further by any formal distinction, as this would contradict its definition.

It is worth noting that *Huan you quan* does not fully articulate the opposing argument from the Coimbra commentary, which admits both internal and external acts of differentiation. Coimbra holds that “the differences are nothing more than the order and the potentialities of matter toward the form; these differences are indeed acts but do not eliminate the principle of matter as pure potentiality.”¹⁶ In other words, Coimbra argues for a distinction between supralunar and sublunar matter, but this distinction is not something externally added to them—even internally—but is entirely intrinsic to their potentiality.

3.3 Common low dignity of supralunar and sublunar matter in relation to God

Huan you quan argues that a difference in species would imply a difference in dignity. While celestial matter may seem higher than sublunar matter, in comparison to the dignity of God, prime matter amounts to almost nothing. Thus, both supralunar and sublunar matter are very low in comparison to God, leaving no real difference in dignity (上下質無類可殊).

Huan you quan raises the objection that there remains a difference in degree between celestial and sublunar matter. This is illustrated through an analogy: the distance between human beings and God compared to the distance between angels and God. Both human beings and angels are very far from God, yet angels are closer and therefore possess a higher dignity. Similarly, celestial matter is almost nothing compared to God, but sublunar matter is even less (下質更幾無). Hence, the distinction in degree may still align with a difference in species.

However, *Huan you quan* refutes the analogy between angels and human beings as applied to celestial and sublunar matter. It is argued that while there is a difference between the acts of angels and those of humans, there is no distinction in the matter of the supralunar and sublunar realms. Consequently, there is no difference in dignity (夫上下之質，俱無為者之理，自無多寡可論). According to *Huan you quan*, both prime matter and informed matter occupy the lowest metaphysical degree.¹⁷ This aligns with Aegydus Romanus, who argued that celestial matter should not be considered

16 “Quae differentiae cum non sint aliud quam ordo & ipsaement potentiae ad formam; ita sunt actus, ut non adamant materiae rationem purae potentiae” (*De coelo* 1596, I.c.2.q.6.a.2, 56D).

17 “Celestial matter is more excellent than sublunar matter, and the latter is farther from God than the former. However, both, as substances, are of the lowest quality, near-nothing, and immensely distant from God, insofar as there is no substance that possesses less entity than matter looked at according to its species” (*De coelo* 1596, I.c.2.q.6.a.5, 56E).

superior to earthly matter, as both are the lowest among substances and equally remote from God.¹⁸

3.4 A common desire for forms, but strictly controlled

The fourth point, derived from *Genesis* and its commentators, suggests that God created the firmament, stars, and the four natural elements on earth on the second day. Therefore, celestial and terrestrial matters are fundamentally the same.¹⁹

Huan you quan objects, noting that celestial bodies are indestructible, whereas the natural elements on earth are perishable. If celestial and sublunar matter were the same, then their desire for forms and capacity to receive forms (希容二德) would also be the same. This would lead to absurd consequences, such as celestial bodies acquiring corruptible forms.²⁰ From here, the discussion shifts to whether heavenly forms desire earthly forms. If heavenly forms do desire earthly forms and combine with them, this could support *Huan you quan*'s view that celestial and sublunar matter constitute a unity. However, *Huan you quan* rejects this non-Aristotelian idea of heavenly matter changing to accommodate earthly forms.

One might argue that celestial bodies have already fulfilled their desires for forms and do not seek perishable forms (則所希所容悉滿，豈復尚容他模乎), especially since heavenly forms completely govern earthly forms.²¹ This suggests that celestial matter is

18 Aegydius Romanus: "If celestial and terrestrial matter are pure potentiality, no distinctions can be made between them on the basis of the greater or lesser nobility of the forms they may support" (Grant 1994, 256).

19 According to Saint Augustine's *Super Genesis contra manicheos* XII.7, God created heaven and earth from the same matter (*Deum ex eadem materia coelum & terram fabricasse*). Coimbra mentions also the names of Ambroise, Damascene, Basile, Gregory of Nyssa, Chrysostom, Jerome, Severianus, Alcuin, Rabbanus, and says: "This position is more in accord with the first chapter of *Genesis*, . . . where only three bodies are mentioned, heaven, earth, and the waters. . . . It seems that God formed from the matter of the waters all the bodies from the earth up to empyrean heaven" (*De coelo* 1596, I.c.2.q.6.a.1, 49E).

20 "If heaven and the sublunary have the same matter, then both will have the same desire for forms: the matter of fire would seek the form of the moon, and the matter of the moon would seek the form of fire. This would result in the transformation of the subject and in the mutual change of forms in celestial and terrestrial matters, and it would lead to the disappearance of the celestial spheres" (*De coelo* 1596, I.c.2.q.6.a.1, 48F).

21 "This argument is not conclusive because, although the celestial spheres are composed of the same matter, it does not immediately follow that they can dissolve if they are composed in a way that constrains the appetite wandering for matter and do not allow the matter to receive the qualities that cause perishing, a form that must be thought of as the one from which the celestial spheres were composed" (*De coelo* 1596, I.c.2.q.6.a.1, 48F–49A). "The privation and appetite of the other forms only takes place when matter is not possessed by a form containing the other forms in itself, in a virtual or eminent way, and filling all the appetite of matter. In fact, the heavenly form offers force and cooperation to produce all the other lower forms, and necessarily contains them in a virtual way" (*De coelo* 1596, I.c.2.q.6.a.2, 50F).

perfect and unchanging, while terrestrial matter is always in need of new forms and constantly changing. However, this opposition again posits two categories of matter: celestial and terrestrial.

To uphold the unity of matter, *Huan you quan* attempts to show that heavenly matter, like earthly matter, has a desire for forms, potentially even for inferior earthly forms. Yet this desire of celestial matter is subject to stringent limitations. First, celestial bodies limit each other, such as the moon being controlled by higher heavens.²² Second, celestial bodies cannot produce the forms of most animals, which are the primary agents for their own reproduction. Even less can celestial bodies produce the human soul. All this indicates that “it is incomplete to say that the heavenly forms transcend all the beings on earth” (則謂天模超諸下有，於義未盡矣). *Huan you quan* thus challenges the notion of celestial matter’s absolute superiority over life on earth, arguing instead that celestial matter, like sublunar matter, operates under strict limitations.

It might also be argued that matter admits contrary forms, making it plausible that the desire for forms and capacity to receive forms remain unfulfilled. However, heavenly forms lack contraries.²³ This difference with terrestrial matter does not imply two categories of matter but confirms their unity within the same category.

3.5 A common capacity for physical changes, but restricted

An ultimate objection arises: if celestial matter does not actualize its desire for forms, then why does nature endow it with the desire and capacity to receive forms (今天質既不得受他模，則希容二德何為而賦之).

The answer lies in the fact that inner capacities necessarily exert their function, unless they receive external restrictions, which is exactly what happens with the desire for forms in heavens.²⁴ *Huan you quan* mentions four types of restrictions. First, like any

22 “But this answer does not satisfy. First, the form of the sphere of the moon does not virtually contain the forms of the higher spheres. It follows that the form of the sphere of the moon neither exhausts the appetite of its matter nor removes every privation of the other forms. Hence it follows that the sphere of the moon, compared to Mercury, Jupiter, or the sun, is corruptible, since the moon’s matter can receive the forms of their bodies, which it will not receive unless it first discards its own form” (*De coelo* 1596, I.c.2.q.6.a.2, 51A).

23 “Even heaven does not eminently contain the forms of all the lower bodies, but only those which it can produce as their principal cause, by its own power, but not the souls of perfect animals are counted among the forms of this kind, since it is other animals which are their principal cause. Therefore, having lost this stronghold, the advocates of the contrary opinion recover themselves by holding that only matter is subject to the privation of another form having a contrary. However, the form of heaven has no contrary, as Aristotle taught. But they still do not get an effective argument” (*De coelo* 1596, I.c.2.q.6.a.2, 51BC).

24 “There is a natural inclination toward other forms. However, it is prevented from resulting in act, where the thing itself would take on another form, because of the bond of a form without any contrary [like heaven]” (*De coelo* 1596, I.c.2.q.6.a.2, 51E).

physical object, celestial bodies possess quantity, but their imperishability restricts the capacity of quantitative matter to be divided into parts (制幾何分截之用故). Second, like any physical object, celestial bodies are endowed with qualities, but since these do not admit contrary qualities, the capacity for celestial bodies to be affected by qualities such as heat or cold is restricted (制幾何熱冷之情故). Third, human beings on earth have free will, but in the presence of God in heaven, they cannot but love God (則不得不愛), preventing change; similarly, changes in celestial bodies are restricted. Fourth, the human body on earth is subject to corruption, but since it resurrects in heaven, this corruption is eternally restricted (制其受損之情，能令其永無所損); likewise, decay is restricted in celestial bodies. Due to these external restrictions, the capacity of celestial matter for change is restricted, preventing heavenly forms from transforming into earthly forms (在上之質雖能希容他模，卻緣有不受敵之模以制其質之本能，令其不復希容他模也).

Huan you quan thus concludes that celestial and terrestrial matter share the same inner capacities for change. However, in the case of celestial matter, these capacities are externally restricted, which prevents heavenly forms from changing in reality. In contrast, terrestrial material continually assumes new forms. Moreover, opposition does not occur in heaven because celestial matter lacks the appetite to seek anything. In summary, for *Huan you quan*, these differences do not constitute two distinct species of matters; celestial and earthly matter share the same inner capacities for change and belong to the same species.

4 Conclusion: Reasons for identifying celestial matter with terrestrial matter

As we have seen, *Huan you quan* follows Aquinas and Coimbra in upholding primary matter as pure potentiality and affirming the material dimension of the heavens. But on the question of whether celestial and earthly matter constitute one or two species, *Huan you quan* takes a completely opposite stance. This reversal is difficult to attribute to the Jesuit intellectual milieu in Europe, as the influential Jesuit philosopher and theologian Francisco Suárez (1548–1617), in his *Disputationes metaphysicae* (1597), continued to follow Aquinas and argued for a distinction in species between celestial and sublunar matter. Notably, just two years before the publication of *Huan you quan*, in 1626 in Europe, the Italian Jesuit Bartolomeo Amico (1562–1649) maintained the same stance in his commentary on the *De coelo*. We hypothesize that, unlike the Jesuit philosophers in Europe at that time, *Huan you quan* made this shift due to three factors: the increasing trend of European astronomy becoming independent from Aristotelianism, the influence of Chinese thought, and theological considerations specific to the Chinese context.

First, Furtado was undoubtedly aware of the conceptual shift already taking place in Europe outside the Jesuit order. The radical Aristotelianism (Averroism) taught by a fellow Jesuit Benito Pereira (1536–1610) at the Collegio Romano posed a direct threat to the legitimacy of astronomy. Pereira argued that, since celestial matter is fundamentally different from terrestrial matter, astronomers could not, through visual observation, truly understand the heavens—this knowledge was reserved for natural philosophers employing Aristotelian philosophy (Lattis 1994, 109). Such dogmatism and outright rejection of empirical observation became increasingly untenable. In the 1585 edition of his commentary on *In sphaeram*, Jesuit astronomer Christopher Clavius (1538–1612) was forced to admit that the nova of 1572 was located not in the atmosphere but in the firmament. Nevertheless, he rejected the possibility of a physical change in the heavens, explaining the nova as a miracle: God creating a comet. Coimbra mostly follows the argumentation of Clavius and similarly invokes miracles. Like the Coimbra philosophers, Suárez and Amico, Jesuit astronomers in Europe such as Giovanni Battista Riccioli (1598–1671) in *Almagestum novum* (1651) and Melchior Cornäus (1598–1665) continued to uphold the theory of celestial and terrestrial matter as two distinct species.

This resistance is surprising since the nature of celestial matter was never a central tenet of the Bible or theology, unlike the centrality of the earth, reaffirmed in 1616 with the condemnation of Copernicus.²⁵ Perhaps the Jesuits in Europe feared that abandoning the two-species theory would open the door to acknowledging changes in the heavens. The theoretical restrictions carefully placed on the heavens—rendering them incapable of actualizing forms—would be challenged, potentially submitting the heavens themselves to change. Outside the Society of Jesus, most astronomers considered the nova of 1572 and other comets as clear evidence against the Aristotelian supralunar-sublunar divide, affirming that changes were indeed taking place in heaven as on earth.

Furtado was probably aware of these disputes while studying at Coimbra, an important center for Jesuit astronomy where Clavius conducted his first astronomical observations between 1556–1560 (Lattis 1994, 14). Later, Furtado may have encountered arguments by lay astronomers advocating continuity between terrestrial and celestial matter. These new astronomical trends likely informed Furtado's shift from the two-species theory to a unified matter theory. Writing in China and in Chinese, he could more freely depart from the position that Jesuits in Europe defended so strongly.

25 The German Jesuit astronomer Scheiner observed sunspots on the moon, but argued that these sunspots were reflections of satellites moving over the surface of the sun (Scheiner 1614). Only in 1630, two years after the publication of *Huan you quan*, did Scheiner affirm that the sunspots are really on the surface of the sun (Scheiner 1630). I am grateful to Professor Shi Yunli 石云里 for bringing my attention to the works of Scheiner.

A second reason for *Huan you quan*'s abandonment of the theory of the two-species theory can be traced back to Chinese philosophy which emphasizes the continuity between earth and heaven. The five planets correspond to the five elements on earth: Venus (metal), Mercury (water), Mars (fire), Jupiter (wood), Saturn (earth).²⁶ More fundamentally, neo-Confucian philosophers developed a kind of hylomorphism, with all reality consisting of a principle (*li*) and a universal basic substance (*qi*). Among them, the philosopher Zhang Zai 張載 (1020–1077) particularly emphasized the preponderant role of *qi* as constituting the fundamental substance of the universe, shaped by *yin* and *yang*. In this cosmology, no spatial distinction exists between two species and the same *qi* pervades the entire universe. It is evident that Li Zhizao, very much attuned to this view, would naturally lean toward the idea of a single material species uniting heaven and earth, and find the strict Aristotelian division incomprehensible.

Thirdly, theological considerations in the context of the China mission may also have played a role. Both in Aristotelian philosophy and Confucianism, heaven is highly exalted. However, *Huan you quan* sought to emphasize the supremacy of the Lord of Heaven and therefore emphasizes that the physical heavens should not be as highly exalted as Aristotelians and Confucians may suggest. Demonstrating that the physical heavens are composed of the same matter as the vulgar matter of the earth (albeit with changes blocked in the heavens) aligns with this agenda, lowering the status of heaven while elevating their idea of the Lord of Heaven.

In summary, Francisco Furtado's sensitivity to the implications of new astronomical discoveries, Li Zhizao's sensitivity to Chinese thought, and theological considerations emphasizing the Lord of Heaven while de-emphasizing the heavens helps to explain their bold departure from Aristotelian dualism. Their embrace of a unified cosmos—modern in its scientific approach and compatible with Chinese tradition—represents a significant intellectual shift.²⁷ Our research is based on a close textual analysis, and further studies could explore how Chinese intellectuals reacted to this portrayal of a cosmos unified by a single material species yet divided into imperishable and perishable realms.

26 Aristotle holds that the four elements exist in heaven only as potential causes of the four elements on earth.

27 However, on the question of the species of heavens, *Huan you quan* maintains the position of Coimbra which attributes to each heaven its own species. Since each heaven has its own motion, it was difficult to depart from the Aristotelian position without creating problems in the explanatory system.

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Appendix 1

Furtado, Francisco 傅汎際, and Li Zhizao 李之藻. Forthcoming. “Lun shangxia zhi tonglei (sizhi)” 論上下質同類（四支） [Argument about Upper Matter and Lower Matter Belonging to the Same Species (Four Articles)]. *Chunti pian di'er* 純體篇第二 [On Aether, Chapter 2]. *Huan you quan* 寰有詮 [Explanations on the Beings of the Universe], juan 2. *Huan you quan jin zhu* 寰有詮今註 [Modern Annotations of Explanations on the Beings of the Universe], edited and annotated by Thierry Meynard 梅謙立, Zhu Hailin 祝海林, and Lin Yichao 林逸超. Beijing: The Commercial Press.

（疏）問形天之質與月以下之質相類否者，蓋形天與月以下物，各模不同，尤有所以不同者。若但據其模之不同為不同，則上質下質固自相類；若於模外尚有不同，則是其質不相類也。

古今學者，或謂相類，或謂不類。謂相類者，於義為當，可證者五。

其一，亞利云：“羣倫之所以然咸歸一極初之所以然。”故作所以然之倫，其萬作之所以然悉歸一初作之所以然；為所以然之倫，其萬為之所以然悉歸一終為之所以然也。今元質乃萬有質者之所以然，是即萬質所歸之一，則天之質與月以下之質固自相類。

（駁）或曰：不然。雖作者、為者所以然之倫咸歸於一極初作、極終為者，若模所以然之倫，似不歸之於一，緣諸模各自為模，不相維繫。故論所以然歸一之理，惟屬作與為二者。

（正）曰：否。模所以然之要理，專屬於為。（惟有模在其物內，乃能致其物之有所為。）夫惟天主乃萬為中至純之為，為萬為之極初為，凡模所以然之要理，必悉歸之。夫作與為與模既咸歸

一，則質不得分為兩論。

其二，物所以分為兩者，因為而分（為即模）。今夫質在上在下，皆不屬為者，惟有職受德而已，則質豈有二哉？

（駁）或曰：物之分而為兩也，固繇其為而分，然內為、外為皆可以分。今上下質雖無內為可分，然就其模之所向，似亦可分其類。

（正）曰：凡謂不相類者，皆繇內模而分，如人為覺而靈之生者，覺而靈為人之異於物者：覺則別於草木，靈則別於鳥獸也。設謂上下質不類，必其各質之內有異焉者。苟質內有可辯之異，則毋乃其質者之中兼有為者乎？夫為之義，獨歸於模。若質理內復有模理，豈不失其職受德之原義乎？

其三，凡不同類者，必亦不同貴。亞利曰：“類如數然。”蓋物以類論，必有大小貴賤之等，譬數數者繇一而二而三也。又亞吾斯丁曰：“天主所造兩者：一屬近己為神性，一屬幾無為元質。”則知上下質無類可殊。設若有殊，必分小大賤貴，則其大者貴者安得謂之幾無？

（駁）或曰：人性之靈，亦近天主，多許肖似，故亦謂為天主之像；天神之靈視人之靈更多，故其肖天主也尤近。元質幾無之義亦爾，今謂上質幾無，下質更幾無，似不悖於二質幾無之說。

（正）曰：非所比也。天神與人之靈性皆以其所有之為而論，因分多寡，故其肖天主者亦可以多寡論焉。元質不然，以其無何有也而謂近於無，其所無何有者即前之所謂為者。夫上下之質，俱無為者之理，自無多寡可論。既不得分寡近於無、多近於無，則亦何從而分上下之類乎？

其四，天主經中論化成天地之事，謂首日化成三物，天也、地也、水也。天非各重之天，乃各重天以上之靜天也。又曰：次日天主以水體化成堅定者，釋經文者謂天主匪但以水體造列宿天，亦以造各重天及火及氣，自古聖人咸以為然，可見上下域同一質矣。

（駁）或曰：如上下質相類，則天體必為能變、能朽之物。今既不變不朽，則上下質不相類。設其相類，則上下質咸有希容二德，並能受模，蓋類同者情必同也。（如人與人為類，其能笑者為情。）夫有所希且能容者，乃下質之情。若上質誠與相類，其情必同，則亦能希能容諸模，豈有他模緣引而能永不受變者哉？

或解之曰：質有希容，其所希容之模設尚未滿，或希他模，致容緣引，乃受其變耳。如其已得超統諸模之一模，則所希所容悉滿，豈復尚容他模乎？今觀下物之生皆繇天施，則天模既統下有之模，何所復希？故上下質雖同類，而上者必不希他模也。

（正）曰：此雖一說，然義未盡。且如月輪之天，不能有施於上，則不能超統月天以上之模，固當希容上重之模，必去本模以受彼模，斯能滿其所希所容，則亦不免於受變也。又，天體為下有之所以然者有二：一為司作之所以然，一為培扶之所以然。蓋天之本德曰生，其運行蒸變則為司作之所以然，以成濕生化生不繇族類者；若其裨益物質，令入引模之情，則為培扶之所以然，以成或禽或獸之有族類者。夫其為無族類物之所以然也，屬司作者，固是超統無族類物之模；而其為傳類之模之所以然，第屬培扶而已，則亦何得謂超謂統？況若人之靈模，猶為天主所成，絕不繫於有形之天，則謂天模超諸下有，於義未盡矣。當知模有與敵者，有無與為敵者。如質所抱之模屬有敵者，則其希容二德尚屬未滿，緣引有間可投；如其所有之模無或與之為敵，則既滿其所希所容，其模必不受變。今天模原非有敵，何變之有？

（駁）或又曰：性學凡賦物以本德，咸有本用，故曰性非定向不行。今天質既不得受他模，則希容二德何為而賦之？

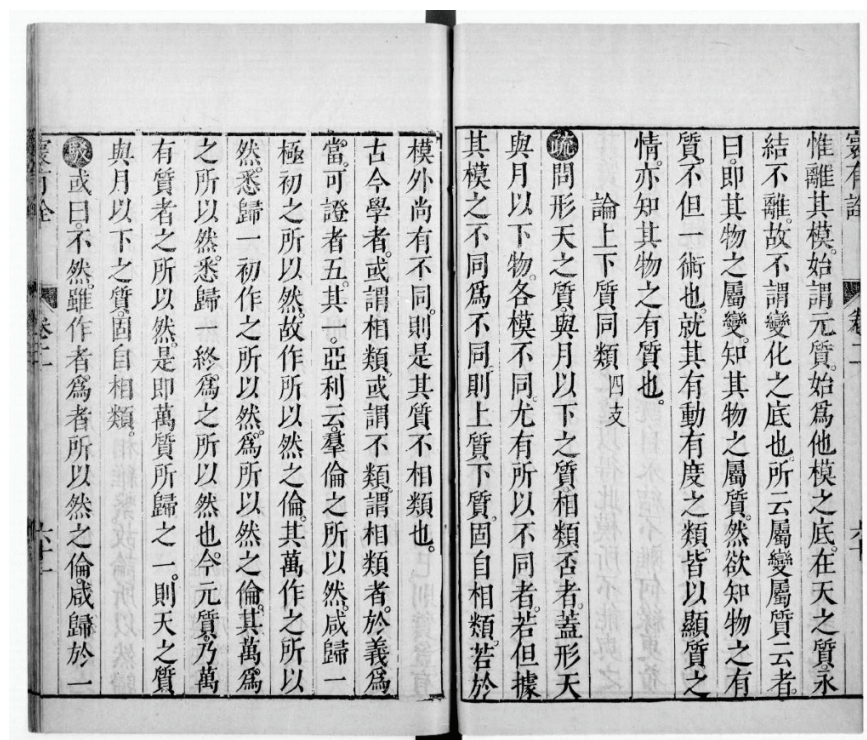
（正）曰：凡物性本有之能，若非受制他能，必自行其本用；惟為他能所制，即本能之用不行。姑證四端：一，幾何者能統分截之用，然在天體之幾何，則其用不行，蓋天體不壞，制幾何分截之用故。二，幾何之情，能受熱冷，然賴居天體，火不能熱、水不能寒，蓋天模不屬受敵，制幾何熱冷之情故。三，人之靈魂，能自主愛，或自主不愛，然見享天主，則不得不愛，蓋至美好者令人以

愛己之能制其不愛，使之必愛故。四，復生在天聖者之身，論其人性，自應被損，但緣所享真福，制其受損之情，能令其永無所損。繇斯以觀，在上之質雖能希容他模，卻緣有不受敵之模以制其質之本能，令其不復希容他模也。

Appendix 2

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極初作極終爲者。若模所以然之倫似不必歸之於一。緣諸模各自爲模。不相維繫。故論所以然歸一之理。惟屬作與爲二者。

正曰。否。模所以然之要理。專屬於爲。惟在模在其物之內。乃能致其物之。夫惟天主乃萬爲中至純之爲。爲萬爲之極初。爲凡模所以然之要理。必悉歸之。夫作與爲與模。既咸歸一。則質不得分爲兩論。

其二物所以分爲兩者。因爲而分。爲。即今夫質在上在下。皆不屬爲者。惟有職受德而已。則質豈有

二哉。

或曰。物之分而爲兩也。固繇其爲而分。然內爲外爲。皆可以分。今上下質雖無內爲可分。然就其模之所向。似亦可分其類。

正曰。凡謂不相類者。皆繇內模而分。如人爲覺而靈之生者。覺而靈爲人之異於物者。覺則別於草木。靈則別於鳥獸也。設謂上下質不類。必其各質之內有異焉者。苟質內有可辯之異。則毋乃其質者之中兼有爲者乎。夫爲之義。獨歸於模。若質理

內復有模理。豈不失其職受德之原義乎。其三。凡不同類者。必亦不同貴。亞利曰。類如數然。蓋物以類論。必有大小貴賤之等。譬數數者。繇一而二而三也。又亞吾斯丁曰。天主所造兩者。一屬近已爲神性。一屬幾無爲元質。則知上下質無類可殊。設若有殊。必分小大賤貴。則其大者貴者。安得謂之幾無。

或曰。人性之靈。亦近天主。多許肖似。故亦謂爲天主之像。天神之靈。視人之靈更多。故其肖天主

也。尤近元質。幾無之義。亦爾。今謂上質幾無。下質更幾無。似不悖於二質幾無之說。

正曰。非所比也。天神與人之靈性。皆以其所有之爲而論。因分多寡。故其肖天主者。亦可以多寡論焉。元質不然。以其無何有也。而謂近於無。其所無理。自無多寡可論。既不得分寡近於無多近於無。則亦何從而分上下之類乎。

其四。天主經中。論化成天地之事。謂首日化成三

物天也地也水也。天非各重之天，乃各重天以上之靜天也。又曰：次曰天，主以水體化成堅定者。釋經文者謂天主匪但以水體造列宿天，亦以造各重天及火及氣。自古聖人咸以爲然，可見上下域同一質矣。

或曰：如上下質相類，則天體必爲能變能朽之物。今既不變不朽，則上下質不相類。設其相類，則上下質咸有希容二德，並能受模。蓋類同者情必同也。如人與人爲類，其能笑者爲情。夫有所希且能容者，乃下質

之情。若上質誠與相類，其情必同，則亦能希能容。諸模豈有他模緣引，而能永不受變者哉？

或解之曰：質有希容，其所希容之模設尚未滿，或希他模致容緣引，乃受其變耳。如其已得超統諸模之一模，則所希所容悉滿，豈復尚容他模乎？今觀下物之生，皆繇天施，則天模既統下有之模，何所復希？故上下質雖同類，而上者必不希他模也。或曰：此雖一說，然義未盡。且如月輪之天，不能有施於上，則不能超統月天以上之模。固當希容上

重之模，必去本模以受彼模，斯能滿其所希所容，則亦不免於受變也。又天體爲下有之所以然者，有二：一爲司作之所以然，二爲培植之所以然。蓋天之本德曰生，其運行薰變，則爲司作之所以然，以成濕生化生不繇族類者，若其裨益物質，冷入引模之情，則爲培植之所以然，以成或禽或獸之有族類者。夫其爲無族類物之所以然也，屬司作者固是超統無族類物之模，而其爲傳類之模之，所以然第屬培植而已，則亦何得謂超統？況若

人之靈模，猶爲天主所成，絕不繫於有形之天，則謂天模超諸下有，於義未盡矣。當知模有與敵者，有無與爲敵者。如質所抱之模，屬有敵者，則其希容二德尚屬未滿，緣引有間可投。如其所有之模無或與之爲敵，則既滿其所希所容，其模必不受變。今天模原非有敵，何變之有？

或又曰：性學凡賦物以本德，咸有本用，故曰性非定向不行。今天質既不得受他模，則希容二德何爲而賦之？

